Capturing the Interconnected and Interpersonal Nature of Emotion Concepts: Implications for Social-Emotional Learning



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Abstract

The current multimethod study adopts a developmental perspective to address how emotional learning relates to social learning and its import to education settings. The aim is to add to the social-emotional learning (SEL) literature by setting precedent for future research on how we identify emotions in others that simultaneously addresses the roles of language, temperament/personality, and interpersonal accuracy (IA). Three studies were undertaken to approach the main research question via different lenses. The first, a systematic review and meta-analysis of intervention studies with SEL programmes universally implemented in Primary Years 4 to 6, addressed the question of how emotions have been 'taught' in primary schools in the past decade, and whether SEL programme participation directly promotes child emotion understanding (EU). The second study, a linguistic analysis of child-produced emotion definitions, explored the relationship between emotion representation and emotion language across middle childhood. The third study focused on the impact of emotion representation on IA in a sample of first- and final-year undergraduates, and potential links with personality, the ability to identify and describe one's own emotional states, and sense of social connectedness.

Results: A total of 54 studies were included in the review (Study 1) based on the presence of a SEL programme targeting a specific aspect of EU and transparent reporting of programme components. EU areas most frequently targeted were: 'Recognition' (38 programmes), 'Regulation' (33 programmes), 'Decision/Action' (33 programmes), 'External Cause' (30 programmes), and 'Belief' (26 programmes). A sub-set of 20 studies from the systematic review were included in the meta-analysis that indicated SEL programme participation had a small positive impact on child EU (Hedge's $g = 0.22$) as compared to a control group.

Study 2 was a small-scale corpus analysis of 1,239 definitions of 27 emotions produced by 49 children ($M_{age} = 9.24$; $SD = .75$; 46.9% Female). All emotion words appearing in definitions co-occurred with at least one additional emotion term. Emotion term co-occurrence patterns were also operationalized as a 'blend score.' A significant regression equation was found between emotion term co-occurrence and non-emotional mental state term (MST) production ($F(1, 47)= 20.879$, $p < .001$) with an R^2 of .308; average MST production increased by 1.233 for each average blend score. Independent samples *t*-tests indicated a statistically significant difference based on gender for average MST production ($t(47) = -2.811$, $p = .007$), with female children producing more MSTs across emotion definitions as compared to male children, but there was no statistically significant relationship between gender and emotion blend score. Thematic analysis indicated that common topics across child emotion definitions included: interpersonal dynamics (e.g., rejection, conflict), experiencing a non-social situation (e.g., a disappointing/negative event), non-emotional human behaviour (e.g., sleeping), and performing an activity (primarily leisure, such as playing or reading a book).

Study 3, an online cross-sectional study with a sample of 150 undergraduates (67.3% Female; $M_{age} = 19.93$, $SD = 2.05$), found a small positive relationship between an emotion language manipulation (i.e., condition) on the researcher-developed IA task and below-average trait-based behaviour prediction accuracy ($r_s(148) = .18$, $p = .025$). General difficulty appraising one's feelings predicted self-reported levels of social connectedness ($R^2 = 0.147$, $F(1, 148) = 25.431$, $p < .001$), and was inversely correlated with personality dimensions—specifically participant 'Extraversion' ($r(148) = -.19$, $p = .020$) and 'Agreeableness' ($r_s(148) = -.20$, $p = .016$). Social connectedness was also positively correlated with certain participant

personality dimensions including 'Agreeableness' ($r_s(148) = .26$, $p = .001$) and 'Extraversion' ($r(148) = .29$, $p < .001$).

Conclusions: The three studies provide preliminary evidence in support of: a) the positive impact of SEL programme participation across middle childhood on EU development (Study 1); b) the interrelated nature of emotion concepts across middle childhood, the importance of context for anchoring EU, and a relationship between gender and MST production rates in emotion definitions across middle childhood (Study 2); and c) positive relationships between levels of social connectedness, the ability to describe and identify one's own emotional states, and personality in young adults (Study 3).

To the researcher's knowledge, this study is the first to: a) identify trends in how emotions have been taught across middle childhood by synthesizing SEL intervention literature to reflect broader emotion socialization practices in schools; b) provide statistically significant evidence of the direct impact of SEL programme participation on the development of child emotion understanding; c) provide evidence of spontaneous emotion term co-occurrence across definitions in order to stress the inter-relational dimension of emotion concepts from the child's perspective, a consideration often lacking in SEL literature and programme content; and d) to directly explore the impact of emotion representation on IA. By 'inter-relational' is meant the interconnected nature of emotion concepts within a representational system as well as the primacy of social experience in forming the conceptual understanding of emotions.

In addition to findings, contributions to the field include the creation of a **corpus of child emotion definitions**, a **data visualization protocol** for translating emotion term co-occurrence patterns found in emotion definitions into network maps that highlight interrelationships amongst emotion concepts, and **a new IA task** that captures personality trait attribution, trait-based behaviour predictions, and trait covariance ratings. Implications for the promotion of social-emotional development in classroom settings (in particular the need to consider the classroom's social-emotional reality pre-intervention) and the potential for student well-being are discussed, in addition to how SEL as a field can embrace individual and cross-cultural differences in understanding SEL programme implementation.

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List of Abbreviations

ANS: autonomic nervous system
ASD: autism spectrum disorder
BET: basic emotion theory
BPS: British Psychological Society
CASEL: Collaborative for Academic, Social and Emotional Learning
CFA: confirmatory factor analysis
CU: callous-unemotional
DLD: developmental language disorder
DM: dissimilarity matrix
EA: emotional awareness
EASI: emotion as social information
EC: emotional competence
EEG: electroencephalography
EI: emotional intelligence
ELP: English Lexicon Project
EMH: enduring mental health
EMS: emotion-mental state
ERP: event-related potential
ES: effect size
ESB: emotion socialization behaviour
ESK: emotion situation knowledge
EU: emotion understanding
EWC: emotion word comprehension
FBU: false-belief understanding
HDI: Human Development Index
HLM: hierarchical linear modelling
IA: interpersonal accuracy
LC: language competence
LRH: linguistic relativity hypothesis
MST: mental state term
NED: negative emotion differentiation
REML: Restricted Maximum Likelihood
SE: standard error
SEAL: Social and Emotional Aspects of Learning
SEC: social-emotional competence
SECD: social-emotional and character development
SEL: social-emotional learning
SEM: structural equation modelling
SES: socio-economic status
SIP: social information processing
SOLO: Search Oxford Libraries Online
TD: typical development
TEC: Test of Emotion Comprehension
ToM: theory of mind
UK: United Kingdom
US: United States of America
UNESCO: United Nations Educational, Scientific and Cultural Organization
WHO: World Health Organization

Introduction

Emotion and our ability to express it play a key role in social interaction, yet how to describe the development of an individual's emotion concept system and its impact on interpersonal behaviour remains up for debate. Emotions have been understood to form the basis of our capacities for empathy and prosocial behaviour (Hughes, 2011; Izard et al., 2002), with emotion understanding (EU) and expression vital to the maintenance of relationships starting at a young age (Saarni, 1999). Social information processing (SIP) theory posits emotion as fundamental to the social decision-making process in childhood (T. Cooke, 2017; Garber & Dodge, 1991; Lemerise & Arsenio, 2000), but there is a persistent difficulty to provide a detailed account of how emotion concepts arise and inform social skill. Observed individual differences in social-emotional skill also require further study in order to capture their developmental impact (LaBounty et al., 2017; M. D. Lewis, 2005; Pons & Harris, 2005; Zahn-Waxler, 2010; Zupančič & Podlesek, 2010).

There are competing views within the research field regarding how to define and represent an emotion. The relationship between emotional experience and the words we have to label them by is also debated. Multiple models to visualize dimensions of emotion have been proposed including Plutchik's Wheels of Emotion (1958, 1960, 1991), Russell's (1980) Circumplex Model of Affect, the Bradley and Lang (1994) Valence-Arousal-Dominance (VAD) Model of Emotion, and Cambria et al.'s (2012) Hourglass Model of Emotion. These models characterize emotion primarily by its valence (i.e., as being positive or negative) or its intensity (i.e., level of activation), but fail to describe potential inter-relationships between emotion concepts themselves within one representational system. These models also do not readily speak to the developmental origins of a conceptual system for emotion. Adults have been found to represent emotion according to valence and intensity, but such a bidimensional representation of emotion is not necessarily observed in children. Children at younger ages

have been found to represent emotion primarily in terms of valence and hence, monodimensionally. Language has been found to mediate this dimensional shift in emotion representation (Nook et al., 2017), implying that the representational structure of emotion concepts likely depends on age and language ability.

The structure of previous models that represents emotion largely in two-dimensional space relates to the contention that emotions are not experienced in isolation, yet are often studied as such (Coan, 2010; D. M. Gross & Preston, 2020). This is problematic when considering empirical reports that different emotions have shared components such as facial expressions (Witkower & Tracy, 2019) or accompanying physiological changes (Siegel et al., 2018), and that multiple emotions can be activated by the same experience (Scherer et al., 2004; Trampe et al., 2015). A representation of emotion at varying developmental stages could also be beneficial to accurately capturing emotion understanding across the lifespan.

The lack of theoretical clarity to define and accurately capture emotional experience is problematic for pedagogy concerned with the social and emotional development of students—that is to say, social-emotional learning (SEL). Previous research has flagged which areas are important to address in social-emotional education, and efforts have been made to translate a myriad of SEL competencies into sequenced programmes for classrooms. The incorporation of SEL within schools is with the expectation that participation in such programmes will have causal impacts on student outcomes, both social-emotional and academic. Meta-analyses of SEL programmes indicate a positive impact on academic performance and student social-emotional factors (e.g., Blewitt et al., 2018; Corcoran et al., 2018; Durlak et al., 2011; Taylor et al., 2017), but there are also many instances wherein SEL programmes are implemented with little success. Wigelsworth et al. (2016) focused their meta-analysis on implementation factors that may explain why SEL programmes fail, but did

not discuss which aspects of SEL programmes (i.e., at the component level) may be more effective than others to address SEL topics in education settings.

Nevertheless, efforts to incorporate SEL within educational practice have been more common due to an agreed benefit for student well-being (Mahoney et al., 2018). With the increasing number of available SEL programmes worldwide, the mechanism by which engaging with SEL impacts student development needs to be further examined and described. Carroll et al. (2020a) identified via hierarchical linear modelling (HLM) which student populations may benefit the most from SEL programmes: those with greater emotional and behavioural difficulties prior to programme participation regardless of age, gender, or socio-economic status (SES). Still, how to explain any improvement in student social-emotional skill due to SEL programme participation is limited by empirical understanding of the relationship between emotion, language, and social skill.

SEL programmes are often designed to promote emotional awareness both within the self and of others—processes vital to both greater social skill and integration. Identifying emotions is fundamental for SEL lesson plans that reinforce the importance of labelling internal experiences. More research is needed, however, regarding how emotion concepts develop, the potential influence of factors such as language and personality, and their relationship to social skill so as to inform school curricula that aim to be age-appropriate and evidence-based. Evidence suggests a difference between children and adults in how they process emotion words (e.g., Kuperman et al., 2014; Vesker et al., 2018) as well as interpret social situations (Lovett & Pillow, 2010), yet there is a paucity of data dedicated to child emotion representation that could explain such age-based variation.

The role of language is paramount to the formation of emotion categories and subsequent emotion understanding (EU). A significant body of evidence reports a positive association between both language and EU (e.g., de Rosnay & Harris, 2002; Ruffman et al.,

2003) as well as social skill (e.g., Cutting & Dunn, 1999; Grazzani et al., 2018) in children. Cognitive mental state language is commonly used in research focused on the relationship between language and social skill, with the production of mental state terms (MSTs) (e.g., think, know, believe) taken as a measure of a child's capacity to represent the minds of others (i.e., theory of mind).

Recently, Streubel et al. (2020) found that emotion vocabulary knowledge accounted for individual differences in EU in children ages 4 to 11, specifically in their emotion recognition and regulation abilities. However, a child's acquisition of an emotion word does not necessarily mean they are able to use and understand it in its adult sense (Ameel et al., 2008; Saji et al., 2011). The contribution of language skill to EU also requires further study from a developmental perspective in light of Nook et al.'s (2017) finding that general language skill and not specific emotion word knowledge mediated a more complex representation of emotion from child to adult.

There are also other environmental and individual factors that need to be theoretically accounted for in order to fully describe the development of emotion understanding and representation, including the process of emotion socialization. Emotion socialization has been defined as the environmental influence that informs how emotions are expressed, regulated, experienced, and understood from childhood to adolescence (Zahn-Waxler, 2010). Formal education settings present an important environment for emotion socialization as students encounter different social situations and emotional experiences, as well as form a sense of self (Valiente et al., 2020). Although SEL programmes are commonly implemented in classrooms, assessments of the pre-existing classroom social-emotional climate are rarely included in discussions of programme effectiveness.

Middle childhood in particular marks a dynamic period both developmentally and academically for education research (Manning, 1998) that can be meaningfully supported by

SEL programme participation. Children ages 8 to 11 continue to acquire important social-emotional skills including both advanced theory of mind (ToM) (Peterson & Wellman, 2019; Wellman et al., 2011) and emotion concept differentiation (Eccles, 1999), strategic emotion regulation (Eisenberg & Morris, 2002), and a burgeoning moral sense (Christner et al., 2020; Kingsford et al., 2021). A reduction in egocentric errors on communication tasks is also observed in middle childhood that continues on through adolescence—indicative of the child's increasing ability to take the perspective of others (Wang et al., 2016). Middle childhood is also an important developmental period for language skill as it is accompanied by more complex syntactic (Frizelle et al., 2018) and grammatical abilities (Muter & Snowling, 1997), as well as deeper semantic understanding (Deckert et al., 2019). Cassano et al. (2007) also found that parents expect their children to display more emotionally competent behaviour after the 2nd Grade (i.e., Year 3).

Academically, schooling at age 8 can mark a significant shift in teacher expectations of child autonomy and social-emotional competence (SEC) that continues throughout formal education. The transition to secondary school towards the end of middle childhood has also been deemed a particularly difficult critical life event (Zeedyk et al., 2003). Commencing secondary school entails a distinct environmental shift to a new educational setting that typically involves being taught by multiple teachers, larger classroom numbers, and additional expectations of both student behaviour and academic performance (Anderson et al., 2000; Wassell et al., 2007; West et al., 2010). Tobbell and O'Donnell (2013) have also raised how the social dynamics of secondary school are novel for children in that they are largely free from adult observation.

Students also take on greater independence in and responsibility for their learning in secondary school that continues on during another transition point: that of university entry. Beginning university marks an important time in a student's life and their formation of a

sense of self, providing new opportunities for social interaction (Arnett, 2000). Levels of exposure to social situations and comfort with engaging with others (e.g., sense of belonging, integration) can influence social skill development by modulating how many opportunities one has to meet different people and make use of social problem-solving skills. Undergraduates also experience the need to adjust to new social dynamics whether living with housemates, making new friends, or managing homesickness (Wang et al., 2012).

A decline in emotional well-being (Anderson et al., 2000; Barber & Olsen, 2004) and academic achievement as well as in achievement goals (Paulick et al., 2013) has been found upon secondary school entry (*see* Evans et al., 2018 for review of the academic and psychological impact of the transition to secondary school). There is longitudinal evidence suggesting SEC developed in childhood impacts on later outcomes such as postsecondary performance and adjustment as well as adult levels of depression (Domitrovich et al., 2017). The final years of primary school present a prime opportunity to directly develop social-emotional skills for a successful transition to the next academic chapter and beyond (Klein & Englund, 2021; Okano et al., 2019). However, the relationship between emotion understanding and social skill must first be better understood in order to assess the effectiveness of school-based SEL programmes in promoting social-emotional skills in middle childhood that can a) be used throughout adolescence, and b) lead to better adjustment upon university entry.

Another important factor in the larger question of what influences SEL programme impact is individual temperament or personality. Temperament, also referred to as affect and often absent from intervention research as it is considered a ‘stable’ variable, has been increasingly addressed within education research in the context of understanding classroom dynamics (Brophy-Herb et al., 2019; Valiente, Swanson, & Lemery-Chalfant, 2012; Vitiello et al., 2012). There is empirical support for the relationship between temperament and a

variety of social-emotional factors. Although temperament may not necessarily be alterable via SEL programme participation, understanding its relationship to emotion representation and social decision-making can offer a useful perspective for framing the effect of SEL activities on development.

SEL programmes incorporated into school curricula provide a direct scaffold for students to develop their social-emotional skills. However, there appears to be an unintentional tension between the focus of SEL curricula and available research. An empirical confusion within the SEL field has been flagged (Abrahams et al., 2019; Hoffman, 2009; O'Grady & Nag, 2022; Schoon, 2021) that stems from the abundant and interchangeable terminology for relevant constructs and related issues for social-emotional assessment (Denham et al., 2009). Concern for construct confusion and inadequate measurement is echoed within the psychological research field of social skill development (Beauchamp & Anderson, 2010; Schaafsma et al., 2015).

Efforts have been made to move towards transparency and greater precision in reporting within the SEL field, but an overview approach is needed to organize SEL research that makes use of such programmes. Meta-analyses and systematic reviews have been conducted to synthesize research on SEL programme impact and to identify pertinent implementation factors, but a discussion of and reflection on programme content is lacking. Such an endeavour is constrained by the level of detail reported in SEL intervention studies. However, the aim of this research project is to advance direct inquiry into how emotional learning relates to social learning as a step towards greater clarity on how to explain individual differences in student social-emotional development, and how schools can act as a source of support.

The Present Study

Describing how school-based SEL programmes promote emotion understanding (EU) as it relates to social skill is difficult due to limited evidence relaying: 1) how EU has been addressed in education settings; 2) how children represent emotions and the role of language in this conceptual organization; and 3) how emotion representation informs interpersonal behaviour (viz., perspective-taking and social decision-making). The current research adds to the SEL literature by setting precedent for addressing these topics via three exploratory studies. Two different populations of typically developing students are included: primary school children ages 8 to 11 exposed to formal SEL education (Studies 1 and 2), and undergraduate students in their first and final years of study who may no longer have direct instruction in social-emotional skills, but have gained new experiences contributing to their social-emotional understanding in a university setting (Study 3).

The first study is a combined systematic review and meta-analysis of SEL programme intervention studies that promoted and assessed EU across middle childhood. The second study is a linguistic analysis of child emotion definitions focused on emotion blends so as to glean interrelationships between emotion concepts and to inform a larger discussion of emotion representation across middle childhood. The third study is an online cross-sectional study with undergraduate students on relationships between emotion language, interpersonal accuracy, personality, the ability to identify and describe one's own emotional states, and sense of social connectedness. Studies 1 and 2 focus on EU development across middle childhood with particular emphasis on the role of language in emotion representation. Study 3 extends this research focus to explore links between emotion representation and social skill with an older age band of students in a different educational setting. Studies 1 and 2 inform social-emotional development in the years leading up to adolescence, whereas Study 3 focuses on a period directly after.

Findings from all three studies will provide further insight into how to characterize the development of emotion representation beginning in middle childhood, accounting for the potential influence of individual-level factors including language, temperament/personality, and interpersonal accuracy (IA). Study 1 actively addresses the question of how emotional learning relates to social learning at times lost within the greater SEL literature by focusing specifically on how SEL programmes promote child emotion understanding (EU) and whether SEL programme participation provides a direct impact on child EU. A framework detailing common facets of EU is developed that can be used by other researchers to frame understanding of the topics common to SEL programmes that promote emotional learning. Study 2 underscores the child's perspective on emotions to further nuance theory on child emotion concepts by compiling and analysing direct accounts of emotion definitions in an effort to better describe the child's larger representational system of emotion. Findings from Study 2 are with the aim of prompting a reflection often omitted in SEL programme content design and implementation concerning emotions—specifically their inter-relational nature, both in how they are conceptually organized and informed by social experience. This study emphasizes the social dimension to gaining an understanding of emotion (e.g., social experiences triggering emotions, through relationship building, communication of internal states) as it is a perspective sometimes lost in SEL intervention research, yet crucial to accurately grasping how exactly a SEL programme shapes student emotional learning. Study 3 is the first to address how individual emotion representation may impact interpersonal accuracy (IA), specifically access to emotion language describing others, and to explore potential relationships between IA, levels of social connectedness, the ability to identify and describe one's own emotional states, and personality. Additional contributions to the research literature include: an emotion definition corpus specific to middle childhood, a protocol for generating visualizations of child emotion term co-occurrence (i.e., emotion blends) based on

linguistic data, and a novel IA task that captures personality trait representation and attribution, as well as trait-based behaviour predictions.

The present study will advance that the understanding of any one emotion is necessarily linked to the understanding of another different emotion, either based on similarity or in contrast. The componential approach to emotion is adopted (Scherer, 2005, 2009; Sekwena & Fontaine, 2018) as well as a constructionist perspective. The componential approach defines EU as the ability to understand likely emotional processes that emerge when an individual encounters goal-related events (Sekwena & Fontaine, 2018). Emotional processes include an emotion's associated appraisal, action tendencies, bodily reactions, expressions, and subjective feelings. Support for the componential emotion approach stems from psycholinguistic research (Fontaine et al., 2007) pertinent to the current study's focus on the role of language in shaping emotion concepts (e.g., Gendron et al., 2012), and supporting the relationship between EU and social skill across development (e.g., Grazzani et al., 2018). The constructionist perspective to emotion characterizes emotions as emergent phenomena both biologically evident and socially constructed (Barrett, 2012), allowing for between- and within-variation amongst individuals in both the experience and interpretation of emotions (Barrett, 2006).

Findings from this research project aim to highlight the interconnected and interpersonal nature of emotion concepts in order to emphasize the importance of the social-emotional context in which SEL programmes are implemented. By social-emotional context we acknowledge that the setting in which social-emotional skill is developed is in effect the relationships between students and/or teachers. Context is also paramount to how the understanding of any one emotion is developed, shaping its representation accordingly in its link to specific interpersonal experiences. The core concern of this study is to further specify the nature of emotion concepts beginning in middle childhood to then link in how emotion

representation may impact interpersonal accuracy later on in development. Language and temperament/personality are understood as important factors that must be included in research dedicated to accurately characterizing the development of social-emotional skills. As such, this study sits within a broader research aim in the SEL field: identifying mechanisms by which SEL programmes promote social-emotional skill, coupled with explanations for sources of individual differences. The overall structure of the present thesis that explores how we develop the ability to represent the emotions of others and its import to interpersonal dynamics will now be discussed.

Chapter Contents

The thesis begins with a literature review comprising four sections that define lines of inquiry pertinent to the present research scope addressed in three studies. The first establishes the rationale for Study 1 as it describes SEL as a pedagogical practice and considers the school as an environment for emotion socialization. The strengths and limitations of SEL research are outlined to justify further research efforts on detailing how 'social learning' relates to 'emotional learning' across development—the core focus of the present study.

The second literature review section describes another type of programme that targets child social-emotional skills: researcher-developed training studies that provide further evidence in support of actively promoting EU and theory of mind (ToM). This second section adds to the focus of Study 1 concerned with how EU is positively developed in school settings, frames how EU can relate to social skill (primarily ToM), and stresses the importance of language as the basis of such training studies.

The role of language in representing others' emotions and other internal states is paramount to the focus of Studies 2 and 3. Study 2 analyses the language of child emotion definitions to a) highlight interrelationships between emotion concepts, and b) explore the relationship between emotion representation and non-emotional mental state term (MST)

production. Study 3 manipulates the quantity of emotion language included in task character descriptions to assess whether it impacts how personality traits are represented, and whether availability of said linguistic emotional information can subsequently enhance interpersonal accuracy in trait-based behaviour attributions of others.

The third literature review section on the conceptual representation of the self and others presents an overview of how emotions have historically been defined within the literature, distinct from the experience of moods and feelings. Evidence of age-based differences in emotion processing is then presented followed by core theories on child emotion understanding development that informed the present thesis. Theoretical frameworks pertinent to the broader ability to represent the minds of others (i.e., theory of mind) are then addressed, followed by a presentation of evidence supporting the relationship between emotion understanding and social skill, as well as the import of EU to social-problem solving ability. The third literature review section has two goals pertinent to the rationale of Study 3. First, it addresses theoretical frameworks concerned with how a child forms a representation and understanding of internal states, both emotional and mental. Second, it presents evidence in support of how EU both underpins social skill and further informs social problem-solving as well as the ability to predict the likely behaviour of others.

The fourth and final section of the literature review describes influential factors on social-emotional development pertinent to the study's research questions including language and temperament/personality. The topic of language and emotion representation is also addressed in order to reference methodological precedents of import to Study 2, namely the use of emotion language as proxy for emotion concepts and that of linguistic analysis to interpret emotion networks as well as individual EU. Chapter 1 then concludes with a description of the present study including its theoretical stance, a methodological overview

(i.e., research design, research questions, and analytic procedure), and a discussion of ethical considerations.

Chapter 2 then describes Study 1: the systematic review and meta-analysis of school-based SEL interventions with typically developing children in Years 4 to 6 focused on promoting EU development. The chapter begins with a description of the context in which the review was undertaken, highlighting global efforts both within education and at a policy level to promote social-emotional development. The review's rationale and objectives are then presented including all information suggested by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (Moher et al., 2010) regarding research questions, search strategy, study inclusion decisions, method for both narrative and quantitative syntheses of information abstracted from included studies, assessments of bias, and reporting of results. Chapter 2 also includes tables summarizing the types of intervention studies included in both the systematic review and meta-analysis, which SEL programmes were used in intervention studies and how they map onto an EU framework, as well as the main findings from both the systematic review and meta-analysis.

Chapter 2 concludes with a preliminary discussion of Study 1 findings as they pertain to recent trends in SEL, specifically which areas of child emotional learning have been emphasized in the classroom and whether there is an observable impact on child outcomes. There is also a reflective discussion component on why certain areas of emotional learning are emphasized in the classroom via SEL programmes versus others. Study 1 provides an overarching perspective on how child emotion representation and its relationship to social skill have been defined as well as promoted in educational practice across a decade that is then contrasted with child-generated emotion representation in Study 2, described next.

Chapter 3 describes the method and findings of Study 2, a linguistic analysis of a researcher-compiled child emotion definition corpus, beginning with a brief overview of

relevant methodological literature. The aim of Study 2 is to provide insight into child emotion representation as communicated directly by children. This contrasts with how adults present emotions to children, a perspective presented in the preceding chapter through review of EU-focused SEL programmes (Study 1). Although there is past research on child processing of emotion terms as compared to adults as well as child knowledge of emotion term vocabulary, there is no database to the researcher's knowledge of child-specific language describing emotion captured via direct accounts. The analytic focus of Study 2 is the spontaneous co-occurrence of emotion terms (i.e., emotion blends) produced by children across emotion definitions. Emotion blend patterns are taken as evidence of inter-relationships between emotions at a conceptual level. Study 2 also looks at the relationship between emotion blend patterns and participant demographic variables (i.e., age and gender), as well as non-emotional mental state term production. Additionally, Study 2 addresses the content of child emotion term definitions to catalogue whether there are recurrent events or topics mentioned across definitions. This is achieved through thematic analysis of emotion definitions and adds to the broader research aim of understanding how children process and interpret emotional states. An initial inventory of which experiences children appeal to in their definitions and thus associate with emotional states can be useful in the discussion of which scenarios are chosen in SEL programmes to teach children about emotional experience (as reviewed in Study 1/Chapter 2).

Chapter 3 also describes the protocol developed for translating emotion blend patterns into visualizations of emotion concept inter-relationships. Visualizations developed for Study 2 capture which emotion terms co-occurred across child emotion definitions via 1) semantic network maps for each age band, and 2) spider plots that present emotion blends at the individual level. Spontaneous associations between emotion terms identified through Study 2 analysis are taken as potential indicators of child emotion term network clusters that denote

certain emotions as having stronger conceptual links in their representation as compared to others (Lange & Zickfeld, 2021; Watson & Stanton, 2017). The linked nature of emotion concepts, meaning the representation of one emotion can activate the representation of additional emotions in a cluster network, may be at odds with evidence from Study 1 as SEL programmes often make use of activities that promote mapping emotion labels to experiences, facial expressions, and/or situations on a one-to-one basis.

Chapter 3 concludes with a preliminary interpretation of Study 2 findings, notes study-specific limitations, and then discusses larger implications for understanding the development of internal state language to describe both emotions and mental states as it relates to emotion socialization and the context-specific nature of emotion concepts. Both the identification of which emotion terms co-occur and visualizations of preliminary emotion clusters completed for Study 2 informed the design of the interpersonal accuracy task used in Study 3. The task, concerned with how emotion representation impacts the representation of personality traits and one's ability to make decisions about the likely behaviour of others, is described next.

Chapter 4 describes Study 3 method and findings by beginning with a discussion of relevant methodological literature. Study 3 adopted a cross-sectional design conducted online to explore the relationship between emotion representation, personality, level of social connectedness, and interpersonal accuracy (IA) between first- and final-year undergraduate students. Studies 1 and 2 focus on EU development across middle childhood with particular emphasis on the role of language in emotion representation. Study 3 extends this research focus to explore links between emotion representation and social skill, specifically IA, with an older age band of students in a different educational setting. Study 3 addresses the impact of emotion representation on the ability to represent personality traits and to make predictions about the likely behaviour of others based on these representations. Study 3 assesses

difficulty in appraising one's emotions, personality, and level of social connectedness to explore potential relationships with IA.

The basic format of the IA task developed for Study 3 is also described in Chapter 4. To investigate the role of emotion language in representing others' emotions and traits, two conditions for the IA task were designed: one with basic descriptions of personality traits and behaviour for different characters, and one wherein these same descriptions were enriched with additional emotion terms to provide more information on how the described characters process emotions. Which emotion terms were added to the 'emotion rich' condition descriptions were identified based on Study 2 analysis that recorded which defined emotion terms had high levels of co-occurrence with other emotion terms (i.e., were highly blended) in middle childhood. The manipulation of language content across conditions in Study 3 complements the line of inquiry regarding language and emotion representation addressed in Study 2. The aim of Study 3's emotion language manipulation was to explore its potential impact on interpersonal accuracy, namely to test the assumption that the condition with emotion language 'rich' character descriptions would prompt a more nuanced representation of character emotions that could then benefit precision in attributing likely personality traits and behaviour to a described character. The inclusion of highly blended emotion terms (as identified in middle childhood by Study 2) was with the thinking that such terms may be more likely to trigger representation of associated emotion term networks that could then potentially provide individuals with a richer representation of the character, then benefitting interpersonal accuracy in turn.

Study 3 findings address the broader research question of how 'emotional learning' relates to 'social learning' through the recognition of others' emotions as they speak to whether emotion representation is beneficial to trait representation and trait-based behaviour prediction. The inclusion of a personality measure in Study 3 relates to a larger discussion

(raised both in the literature review and Study 1) on which factors influence SEL programme effectiveness, namely the presence and impact of individual differences in social-emotional development. Study 3 concludes with an interpretation of findings, description of study-specific limitations, and then a discussion of how emotion language can impact the representation of others, and potential links between interpersonal accuracy, social connectedness, appraising one's feelings, and personality. Avenues for future development of the interpersonal accuracy task are also proposed.

The fifth chapter comprises a discussion section summarizing and interpreting the findings of all three studies in relation to each other. The goal of this final chapter is to position findings from all studies as different perspectives on the overarching research question: how does the development of representing others' emotions contribute to social skill development? The main discussion points raised concern implications for SEL practice and research in the classroom, namely the importance of context (especially cross-cultural differences) and the teacher-student relationship as it contributes to the social-emotional reality of a classroom, as well as how school-based emotion understanding promotion can buffer against negative student mental health. The chapter continues with additional reflections on limitations of the research project as a whole and ends with a discussion of future directions for research on emotion understanding in education as it relates to social skill promotion. Specifically, the focus turns to how SEL as a field can support the holistic development of students while still engaging with individual differences to echo global calls for schools to prepare the next generation for its new host of challenges by emphasizing social-emotional development.

Chapter 1: Literature Review

1.1 Social-Emotional Learning and Child Development—School as Environment for Emotion Socialization

Empirical research on the social and emotional development of students included under the umbrella term social-emotional learning (SEL) has highlighted how academic success depends on factors not strictly 'academic' (i.e., subject knowledge). Academic performance or achievement has been found to be impacted by student levels of: social competence (Ashdown & Bernard, 2012; Finne & Svartdal, 2017; Legkauskas et al., 2019; M. A. Miller et al., 2011; Rabiner et al., 2016), social skill (B. R. Cooper et al., 2014), social-emotional effectiveness (B. L. Schultz et al., 2011; S. W. Smith et al., 2014), social-emotional competence (Curby et al., 2015; Lam et al., 2021; Ren et al., 2016; Rhoades et al., 2011), and school readiness—understood as the child's ability to adjust to a school setting (Adela et al., 2011; Correia & Marques-Pinto, 2016; Landry et al., 2017; Nix et al., 2013; Rosso, 2016). Academic performance has also been linked to multiple aspects of emotion in different age groups including emotion understanding (Cekaite, 2013), knowledge (Denham, Bassett, Way, et al., 2012; Giménez-Dasí et al., 2015; Nathanson et al., 2016; Ursache et al., 2020), regulation (Clarke et al., 2015; E. L. Davis & Levine, 2013; Hallam, 2009), and competence (Trentacosta & Izard, 2007). White et al. (2021) found links between educational attainment and child facial emotion recognition ability errors, and that the relationship was further mediated by peer relationship problems.

Social competence has been found to mediate the relationship between school achievement and theory of mind (Lecce et al., 2017), as well as with emotion understanding (Franco et al., 2017). McKown, Russo-Ponsaran, Allen, et al. (2016) found based on structural equation modelling (SEM) that 'skilled' social behaviour mediated the relationship between social-emotional comprehension and academic performance (i.e., reading and math

skills) across elementary school in a sample of 139 children in Kindergarten/Reception through 5th Grade/Year 6. Social-emotional comprehension was operationalized as emotion recognition and the ability to interpret social meaning via perspective-taking and social problem-solving. Having emotional and/or behavioural problems has been linked to poor academic performance in primary school (Hinshaw, 1992; Moilanen et al., 2010; Mundy et al., 2017). Social-emotional development has also been found to relate to academic grit and motivation in children (Bozgün & Akın-Kösterelioğlu, 2021). Lower levels of social-emotional functioning have also been associated with truancy in adolescence (Iverson et al., 2018; Nik Jaafar et al., 2013) and lower engagement in school overall (J. A. Baker et al., 2008; Roeser et al., 2002; M. Wang & Fredricks, 2014).

Panayiotou et al. (2019) provide an empirical basis for understanding the relationship between SEL and academic performance. In an effort to test theorized mechanisms by which SEL supports academic performance, the researchers undertook secondary data analysis of longitudinal data gathered at three timepoints annually as part of a cluster randomized trial of the Promoting Alternative Thinking Strategies (PATHS) curriculum across 45 schools in England, UK. The sample comprised 1,626 students ages 9 to 12 (M = 9.17, SD = .31 at baseline). It should be noted that in schools not receiving PATHS (i.e., UP schools), students still received some form of SEL instruction in line with the Personal, Social and Health Education (PSHE) UK national curriculum requirement. Structural equation modelling indicated that social-emotional competence (SEC) did not predict later academic attainment, but mental health difficulties did. Student SEC at T1 was related to lower levels of mental health difficulties at T2, which in turn predicted higher academic performance at T3. In effect, mental health difficulties were found to predict later academic achievement above and beyond gender and prior academic achievement. School connectedness at T2 also neither predicted academic attainment at T3, nor mediated the relationship between SEC at T1 and

academic attainment at T3. Findings from Panayiotou et al. (2019) indicate that SEL programmes can potentially buffer against mental health difficulties that would otherwise negatively impact academic performance across middle childhood. However, a direct causal link between SEL programme participation and increased academic attainment could not be drawn.

One main SEL area of interest to the present study is that of social problem-solving as it relates to a student's ability to navigate social situations within a learning environment and to form relationships. Core to such interpersonal skill is a student's internal or conceptual representation of others which includes emotional states. Education settings are inherently social (e.g., Boocock, 1973), and mark important transitions in the lifespan whether entry to formal education in primary school, entry to secondary school coupled with the onset of adolescence, or university entry as students become young adults should they choose to pursue higher education (Kuther, 2019). With each new school year, there is a series of new age-related expectations of behaviour and social conduct, especially upon entry to secondary school (Simmons & Blyth, 1987).

Education settings provide a context for a plethora of social interactions and situations that contribute to a student's formation of a sense of self, as well as further opportunities for socialization and language skill development (whether via direct instruction or with school-based conversation partners). Interpersonal relationships, their formation and dissolution, also play an important role in the development of self-concept (Mattingly et al., 2020). Furthermore, students with access to education consistently spend a significant amount of time in the school setting, once again raising the importance of relationship formation within the school environment and the impact of one's sense of belonging. Consequently, there is meaningful incentive for schools and institutions of higher learning to directly promote social-emotional development as it can contribute to overall student success and well-being.

Social connectedness, referring to a subjective sense of how one connects with others and a human need to experience relatedness, can also be fostered in schools (Barber & Schluterman, 2008), impacting how students relate to one another and engage with the school environment. Whether levels of social connectedness can be directly linked to emotion identification skill or individual temperament/personality is a line of inquiry of interest to this study as it relates to interpersonal accuracy (IA), taken up in Study 3. Lee et al. (2008) tested a mediation model between extraversion (a dimension of personality), subjective well-being, and levels of social connectedness, finding that social connectedness was a construct unique from extraversion, but this was only with a sample of undergraduates and not children. Social connectedness is arguably a feeling that can lead to a greater sense of bonding with others and give rise to multiple emotional experiences (e.g., Stieler & Germelmann, 2016), but whether greater levels of social connectedness are related to greater ability in identifying the emotions of others remains to be explored.

Students who exhibit aggressive behaviour towards others (and arguably 'poorer' social problem-solving skill) often have strained relationships with peers and teachers in primary school (Hymel et al., 1993; van Lier & Koot, 2010). Social problem-solving skill persists as an important factor for school adjustment in both secondary school (Ogoemeka & Helen, 2011; *see* Merrill et al., 2017 for review of social problem-solving interventions across primary and secondary school), and later on at university. For example, S. R. Baker (2003) conducted a longitudinal study with undergraduates, finding social problem-solving was related to both academic adjustment and performance as well as perceived stress levels across three years of study. Social problem-solving ability has also been found to relate to mental health more broadly amongst undergraduate students (Chow et al., 2011; Hasegawa et al., 2016; Ranjbar et al., 2013).

Affect has also been found to impact social problem-solving. Affect is used in psychology to describe an individual's psychophysiological construct of an experienced state (whether feeling, emotion, or mood) in reaction to a stimulus, and is considered along dimensions of valence, motivational intensity, and arousal (Harmon-Jones et al., 2013). Nelson and Sim (2014) presented a sample of undergraduate participants with fictional interpersonal problem-solving scenarios, priming participants to either experience a positive, neutral, or negative affective state by reading a series of 25 statements. This priming method was developed by Seibert and Ellis (1991)—a methodology based on the mood induction procedure created by Velten (1968). Participants primed for positive affect (e.g., who read statements such as, "being in college makes my dreams more possible," "most people like me") were more effective in generating successful solutions and effective coping mechanisms for stressful or problematic social situations, moderated by their level of optimism. The relationship between positive affect and potentially increased cognitive flexibility in decision-making has been explored in the literature, but is not included in the scope of this study. Rather, concern for individual affect in this present study pertains to its potential status as a source of individual differences in social-emotional development, and impact on the processing of social-emotional cues that would then affect interpersonal accuracy and social decision-making.

The construct of affect when considering children is more commonly referred to as temperament. Walker and Henderson (2012) found that temperament (specifically shyness and inhibitory control[1]) rated in Preschool was found to predict later academic skill in Kindergarten/Reception and 1st Grade, mediated by child social problem-solving competence. Level of impulsivity has been found to predict academic achievement in preschool-aged

[1] Inhibitory control is an aspect of self-regulation that refers to the capacity to suppress a 'dominant' response in favour of a sub-dominant response in relation to one's goals for a particular situation (Tiego et al., 2018).

children who have high levels of effortful control or approach emotions, referring to positive affect and frustration (VanSchyndel et al., 2017). Johns et al. (2019) also found that the temperament of children's peers (specifically negative emotional expressivity) in Kindergarten/Reception moderated both the relationship between a child's effortful control and changes in their classroom engagement as well as the relationship between child negative emotional expressivity (i.e., temperament) and classroom engagement. Peers in the study were nominated by teachers as classmates with whom target children spent a lot of time. As such, the temperament of individual children as well as that of their classmates has been found to impact individual child academic performance.

When developing SEL programmes, the consideration of students' subjective experience of internal states, personality factors, and their influence on both decision-making and social-emotional cue interpretation should thus not be ignored, but how to incorporate them into SEL lesson plans presents difficulty. How temperament and personality factors as well as levels of social connectedness may impact social problem-solving and emotion understanding/representation remains unclear. These topics will be addressed in the present study within the larger aim of framing the way emotional learning relates to social learning across development from middle childhood to young adulthood.

There has been a rise in interventions in the past twenty years dedicated to promoting social-emotional development (Durlak et al., 2011; Mahoney et al., 2018; Papieska et al., 2019) and overall well-being (e.g., Clarke et al., 2014), focused on both the physical and mental health of students. Understanding the context in which these SEL programmes are administered is equally important to gleaning how such programmes impact student social-emotional development. Trickett and Rowe (2012) advance that an ecological perspective within the school context (taken from community psychology for prevention, health promotion, and public health) can be effective for grasping the influence of context on

individual behaviour. SEL programmes have been administered universally at the classroom level via pull-out methods with targeted student groups and also at the school level. Oberle et al. (2016), focused particularly on the US context, established a framework for systematic schoolwide SEL implementation and emphasized that such large-scale implementation can maximize the benefits of SEL. However, the field of SEL is currently limited in its ability to accurately grasp the 'true' benefit of SEL programme participation for reasons discussed next.

The creation of SEL programmes and interventions has spurred a need to quantify social-emotional development in order for both practitioners and researchers to shift towards a paradigm of improvement, and to identify how non-academic factors can be measured so as to better understand their impact on academic performance. Corcoran et al. (2018) reviewed 50 years of research in their meta-analysis of school-based SEL interventions conducted in pre-Kindergarten to 12th Grade (Year 13/Upper Sixth), and focused on academic achievement outcomes. Small to medium positive impacts of SEL programme participation on student reading, mathematics, and science skills were found with mean effect sizes (ESs) of .25, .26, and .19 respectively. Concerning immediate SEL programme impacts post participation, social-emotional skill improvement has also been reported across other meta-analyses, with ESs ranging from .23 (Taylor et al., 2017) to .57 (Durlak et al., 2011) to .70 (Sklad et al., 2012), but only at .07 at later follow-up assessments of SEL skill (Sklad et al., 2012). These correlations appear modest based on Cohen's (1988) benchmarks,[2] yet still underscore how SEL programmes are not without merit for their impact on academic and social-emotional skill development.

Discussion of empirical benchmarks for effect sizes in education research stresses the importance of considering age band and the assessment tool chosen. Specifically, Hill et al.

[2] That characterize an ES of .20 to be small and an ES of .50 to be medium.

(2008) found the overall mean ES reported across intervention studies differed depending on in which school years an intervention was conducted. At the elementary school level, a mean ES of .33 was reported whereas an ES of .51 was found for middle school (Years 7 to 9) and that of .27 for high school (Years 10, 11, and 6th Form). At the elementary school level, mean ES was highest in instances wherein specialized tests were used (.44), followed by the use of narrowly focused standardized tests (.23). As part of their larger research synthesis effort, Hill et al. (2008) also reported findings from a meta-analysis of 192 education meta-analyses including studies across all of primary and secondary school. Mean ESs reported were in the .20 to .30 range—a more sensitive and contextually relevant statistical benchmark for education researchers.

From a theoretical perspective and based on a statistically reliable empirical body of evidence, the benefit of formally incorporating social problem-solving skills and emotional awareness within educational practice is largely undisputed, but lacks a consistent and reliable approach. Multiple challenges and considerations have arisen when applying SEL in education whether tailoring programmes to be age-appropriate, setting culturally-relevant standards, or developing standardized assessments that accurately capture social-emotional development variables (Buckley et al., 2003; Campbell et al., 2016; Denham et al., 2009, 2016; S. M. Jones et al., 2017; McKown, 2017, 2019; McKown et al., 2013; McKown, Russo-Ponsaran, Johnson, et al., 2016). Although school assessments of social-emotional skills aim to be empirically based, assessing the evidence from the SEL field as a whole is difficult given the variety of measures used. Additionally, many of the capacities and processes associated with social-emotional development (and further organized into SEL domains) are often inconsistently operationalized due to the plethora of available measures, with terms for constructs used interchangeably.

Consequently, there is a need to generate assessments that both embrace the complexity of processes tied to social skill and emotion understanding, as well as possess a level of construct validity and specificity. Such assessments can provide clearer insight into how SEL programme participation impacts social-emotional development. The increasing number of SEL programmes also requires efficient and informative ways for practitioners to make decisions about which programmes to use. Although impact assessment studies exist for certain SEL programmes, tools to measure social-emotional skill are often varied. The variety, and subsequent quantity, of SEL measurement tools is potentially tied to the lack of consensus in defining 'social skill' from a broader perspective or intent to capture a conceptual difference between emotions and feelings. Reconsidering how we measure social-emotional skill inherently calls for the re-examination of mechanisms underlying social-emotional development—a project in which the current study takes part.

At present, the fields of psychology and education lack exhaustive explanations for individual differences in typically developing student populations with regards to social skill and emotion understanding (EU). The limitations to such explanations are inherently tied to and dictated by measurement choice (Parhomenko, 2014). For example, categorial assessments that conclude children either possess or lack particular social skills or EU components problematically constrain research to binary conceptualizations of social-emotional ability that give no greater information as to how or why one child progresses—that is to say, the core concern of education.

There is also the risk that education acts in the service of homogenizing an area of development intrinsically linked to individual level factors such as temperament or personality by establishing set standards or thresholds for positive social-emotional skill development. The motivation to directly promote social-emotional skill in students is not unfounded as it relates to supporting overall student success, but how SEL programmes

achieve this at the level of causal mechanisms between programme participation and observed increase in social-emotional outcomes requires further study.

The choice of SEL programme content plays an equally important role in construct operationalization in addition to the choice of SEL skill assessment. What is emphasized in a particular SEL curriculum can be considered a choice part of a child's greater socialization in a school context that further impacts their social-emotional development on a conceptual level. How a child's understanding of emotion is impacted by the way SEL programmes apprehend emotion is taken up by Study 1's review of SEL interventions.

Further organization to the multiple domains encompassed by SEL across frameworks would also be beneficial to the research field. In particular, a discussion of how common and popular SEL domains relate to one another as opposed to their systematic listing may be more fruitful for positioning how exactly a SEL programme supports student development. The majority of research efforts raised by the overview of previous SEL meta-analyses has primarily focused on academic outcomes. Constraining analysis to the relationship between SEL programming (especially at the level of lesson plan content) and social-emotional student outcomes can deepen understanding of pertinent causal mechanisms, and help to identify and/or further explore sources of individual differences.

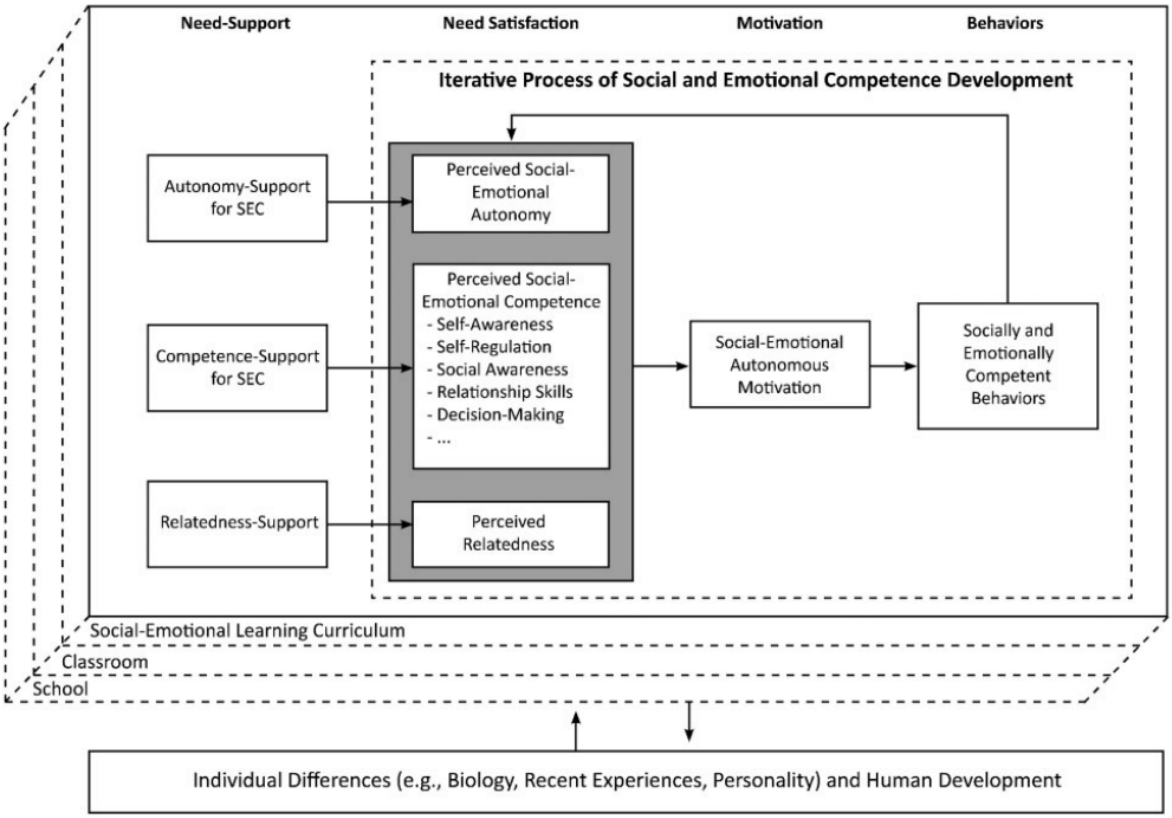
The present study's broader research focus on how emotional learning relates to social learning constrains the discussion of SEL to one specific yet complex aspect of development, and links to theoretical models in support of greater integration between emotional competence and social competence within an education setting. Drawing on self-determination theory, Collie (2020) presents an integrated model named the 'Social and Emotional Competence School Model' that focuses on primary school-aged children and adolescents. Social-emotional competence (SEC) is operationalized as three components: basic psychological need satisfaction (of autonomy, competence, and relatedness); social-

emotional autonomous motivation; and socially-emotionally competent behaviours that interact in an iterative cyclical pattern as SEC develops (*see* Figure 1).

A SEL curriculum in the Collie (2020) model is considered one of three education contexts (alongside the classroom and the school) in which students can learn about values, beliefs, and norms tied to both positive and appropriate social-emotional behaviours and responses. The model also identifies three basic psychological needs of the student including *perceived autonomy* (the sense that one is the source of one's behaviour and one's behaviour aligns with individual desires; DeCharms, 1968), *competence* (the sense that one is effective in one's actions and can exercise personal capacities; White, 1959), and *relatedness* (the sense of being connected to others who are meaningful to one's life; Baumeister & Leary, 1995). In effect, the Centers for Disease Control and Prevention (CDC, 2009) cited promoting school connectedness in particular as part of a strategy to increase protective factors for student development.

Figure 1

Social and Emotional Competence School Model



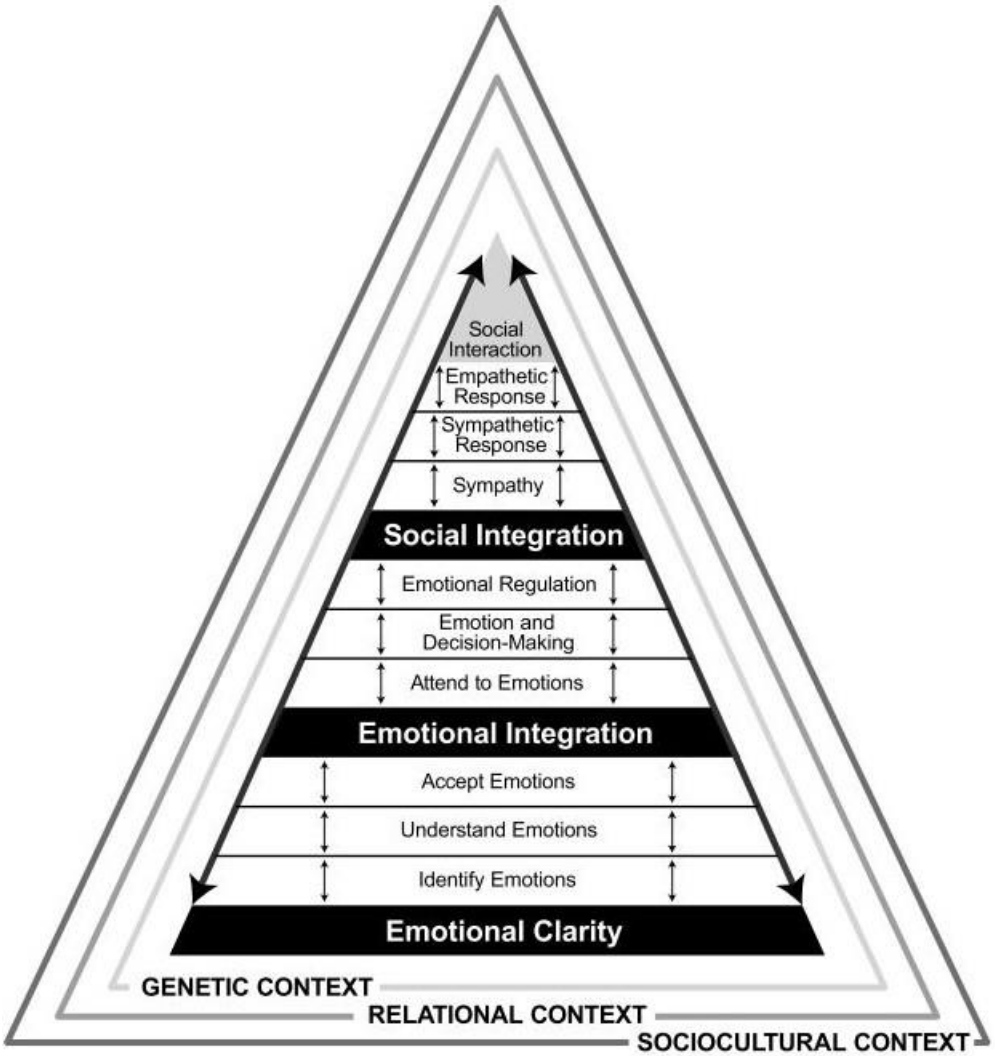
Note. Reproduced from Collie (2020).

The Harris et al. (2022) SEAD (Social Emotional Ability Development) model also presents an integrated model of emotion-based competences, concerned with what facilitates individuals to employ adaptive prosocial behaviours and processes. The SEAD model is grounded in theories regarding the constructs of both emotional intelligence and social intelligence, as well as sociocultural learning theory. The SEAD model is of interest to the SEL field and this study's broader research focus as it raises the contextualized nature of social-emotional ability within close relationships. This is in contrast to only considering the individual as a unit of analysis within understanding social-emotional development. Harris et al.'s (2022) review of the constructs of social intelligence and emotional intelligence (including measures) underscored how the two are intertwined.

Harris et al. (2022) developed the SEAD model with the intent that practitioners including educators could use it to develop programmes, however developmental trajectories would need further explanation beyond the conceptual discussion of the interplay of relevant constructs proposed in their treatise. The development of a practical diagnostic tool to capture "the dynamics of emotion both intrapersonally and interpersonally" (Harris et al., 2022, p. 6) is also forthcoming. Nevertheless, the SEAD model stresses the interplay and importance of emotion representation, not just for the individual to develop awareness of their own internal states, but also as it impacts their ability to identify emotions in others. The prosocial perspective of concern to the SEAD model shifts the focus of emotion into three main dimensions (summarized in Figure 2) that include: *emotional clarity,* pertaining to the integration of emotion and thought so as to lead to emotion identification, understanding, and acceptance; *emotional integration* wherein emotion is integrated with thought and behaviour to enable an individual's ability to attend to intrapersonal emotions, incorporate emotional information into decision-making, and regulate emotions adaptively; and lastly, *social integration* wherein emotion, thought, behaviour, and social interaction are integrated via individual abilities to understand and attend to the emotional states of others (whether through the experience of sympathy, sympathetic response, or empathetic response).

Figure 2

Social-Emotional Processes Tied to SEAD Model



Note. Reproduced from Harris et al. (2022).

Such theoretical efforts that integrate emotion or affect with social cognitive processes are echoed in later sections of this literature review concerned with how emotion understanding (EU) underpins social skill and impacts both social problem-solving and interpersonal accuracy (*see Sections 1.3.4 -1.3.6*). Study 1 of the present research focuses specifically on the impact of SEL programme participation on student emotional learning as opposed to the general promotion of social-emotional skill. Pons et al. (2002) is one example of a study that made use of a sequenced programme (i.e., SMILE—School Matters in Lifeskills Education) dedicated to instruction and activities to promote EU, specifically the

"comprehension of the nature and causes of emotion as well as the possibilities for control and regulation" (p. 296). Pons et al. (2002) addressed whether it is possible to teach children (typically developing and aged 9) about simple and complex aspects of emotion in a classroom setting, and whether such instruction could impact pre-existing individual differences in EU. Pons et al. (2002) found that children who participated in the SMILE programme made significant gains in their EU development. Children in the control group also increased their EU over time, but the increase was marginal in comparison to children who participated in the SMILE programme. As such, findings from Pons et al. (2002) support the claim that direct instruction regarding emotion in childhood is not without merit. To gain greater background on how to define child EU and methods to promote this area of development, EU training studies and the importance of language will be discussed next.

1.2 Training Studies—Another Example of Targeted Emotion Understanding Development

Emotion understanding (EU) has been defined as the ability to identify, interpret, and communicate about emotions (whether of the self and/or others) and as such, includes knowledge of emotion language (Castro, Cheng, et al., 2016; Denham, 1986, 1998; P. L. Harris, 1989; M. Lewis, 2016; Parrigon et al., 2015). Harris (2008) adds that EU relates to the way a child may predict or explain emotions that they and others experience. EU is integral to emotional competence as it refers to an individual's conceptual knowledge of emotion that comprises: the nature of emotions, their potential causes/external triggers, linked physiological reactions, subjective feelings, potential action impulses resulting from an emotional state, and awareness of strategies to regulate emotions (Manstead, 1994; Pons et al., 2004; Saarni et al., 1998). Here, Saarni's (1999) definition of emotional competence is used as it encompasses emotional expressiveness, emotion regulation, and emotion knowledge.

Targeting child EU is a fruitful endeavour to promote positive social-emotional adjustment in light of evidence supporting an inverse relationship between EU and behavioural problems (e.g., anti-social behaviour, aggressiveness, limited empathy), and a positive relationship between EU and prosocial behaviours (e.g., Hughes et al., 1998) such as helping or sharing with peers. There is longitudinal evidence supporting associations between EU, theory of mind (ToM), and prosocial orientation as well as sympathy (Eggum et al., 2011). In children ages 24 to 47 months, emotion knowledge and gender have been found to account for variance in child helping behaviours, whereas ToM and language skill have been found to account for variance in sharing behaviours (Conte et al., 2018).

Like SEL programmes, EU training studies advance that direct instruction regarding emotion processes is an effective method to promote child EU and related social-emotional development. For example, Peng et al. (1992) focused on training children ages 4 to 7 in the concept of mixed emotions (i.e., that emotions of opposite valence can be experienced simultaneously)—an understanding about emotional experience that typically arises in later middle childhood (i.e., ages 8 to 11). After presenting children with story characters experiencing mixed emotions, the experimental group was then prompted by the researcher to attend to the character's internal states and to provide possible explanations for them. The youngest children (ages 4 to 5) showed no improvement after such prompting for identifying mixed emotions, but there was improvement in 6- to 7-year-old children. Peng et al.'s (1992) findings highlight the possibility that intervention on the part of an older person to draw a slightly older child's attention to the nature of a character's mixed emotion was sufficient to support EU development. Specifically, the adult direction fostered ease within the child to identify mixed emotions at a developmental point in their EU where the child was expected to not naturally focus or attend to the mixed nature of emotional experience.

Sprung et al. (2015) undertook a meta-analysis of 19 EU training studies that had a composite sample of 749 children (M_{age} = 7 years) conducted across seven different countries. EU training studies were found to have robust effects on increasing external, mental, and reflective levels of EU (Hedge's g = .62, .31, and .64 respectively) regardless of duration of training sessions or intervention, publication year, or study sample type. The distinction of different levels of EU is drawn from a developmental model of EU proposed by Pons et al. (2004) and Pons and Harris (2005) (discussed further in *Section 1.3.3* of this literature review concerned with theories of child EU development).

Findings from training studies with typically developing children have also indicated the impact of language on EU. Such studies usually comprise researcher-developed programmes that emphasize instruction in specific areas tied to language, whether holding discussions on mental states (Pons et al., 2019) or promoting the use and acquisition of emotion-mental state (EMS) vocabulary (Ornaghi et al., 2011). The potential of linguistic input to enhance child EU is in line with evidence that correlates EU, ToM, and language ability with medium to high coefficients ranging from .30 to .59 (Grazzani et al., 2018). The link between language and EU development is also supported by findings that maternal causal explanations of emotion predict child EU levels (Ontai & Thompson, 2002; Taumoepeau & Ruffman, 2008). Children who produce less 'emotion talk' as toddlers were also found to have lower levels of EU when assessed later at 6 years of age (J. R. Brown & Dunn, 1996; Dunn et al., 1991).

Within EU training studies, emotional situations are apprehended via stories that have an enriched EMS lexicon (Gavazzi & Ornaghi, 2011) that then prompt considerations and explanatory conversations of the characters' internal states (Tenenbaum et al., 2008). The use of dyadic reading or storybook-based intervention as a strategy to prompt such conversations about emotions and greater emotion comprehension has also been tested (Michaud et al.,

2021; Roy-Charland et al., 2021). Salmon et al. (2013) found that 3- to 4-year-old children assigned to a training condition wherein adults emphasized emotion labels and causes improved only in their knowledge of emotion labels rather than other components of emotion knowledge.

How emotional learning may relate to social learning is addressed in the intervention approach of EU training studies that target EU as a way to promote social skill. EU training programmes have been created to support development of overall social cognition (Ornaghi et al., 2014) and prosocial behaviour, but the results regarding prosocial behaviour are mixed. For example, Grazzani et al. (2016) administered a conversation-based intervention about emotions with a sample of 2- to 3-year-olds, finding the experimental group had higher levels of mental state talk ability, EU, and prosocial behaviour towards peers as compared to a control group. In comparison, Richard et al. (2020) developed a play-based training programme for slightly older children ages 5 to 6 to promote their social-emotional competence by providing structured scenarios for play. Sessions focused specifically on emotion comprehension via discussion of internal states, negative emotion regulation by introducing specific strategies to children, and prosocial behaviour by teaching encouragement language that could be said to others during pretend play (e.g., 'bravo,' 'come play with us'). Emotion comprehension was understood as "children's awareness of their own feelings and those of others" (Richard et al., 2020; p. 4), and prosocial behaviour was characterized as being "responsive to the emotional needs of others [whether by sharing] positive affects [or responding] in a prosocial way rather than antisocially to the distress of others" (Richard et al., 2020; p. 4). Participants in the training group showed a greater increase in their ability to label emotions as compared to a control group, however there was no significant difference between groups on measures of emotion regulation and prosocial behaviour.

The question of whether access to more emotional information about others can support social behaviour at the level of interpersonal emotion identification and interaction across development is of interest to the present study and addressed in Study 3 with a sample of undergraduate students. As we consider the perspective that EU development occurs in tandem with that of social skill, along with potential influential factors shaping the process such as language, identifying how we are to define an emotion concept as well as social skill is paramount.

1.3 Building a Conceptual Representation of the Self and Other: From Emotions to Thoughts to Action

1.3.1 Defining an Emotion

Walle and Dahl (2020) stress the importance of defining an emotion when studying emotional development as the definition of an emotion logically has consequences for the design and interpretation of emotion research. The lack of consensus within the psychological field on how to define emotion (Izard, 2010) is problematic for the SEL field in education as it allows for lay or folk conceptualizations of emotion to permeate SEL curricula. Efforts to develop sequenced lessons plans to teach children about emotions is further complicated by the variety in how emotions have been measured in psychology (Weidman et al., 2017), disagreement regarding the relationship between thought and emotion (Reddy, 2020), and the quantity of theories that provide different explanations as to what causes or gives rise to emotion (*see* Moors, 2009 for review). Certain methodologies and conceptualizations of emotion found in psychology are also not necessarily relevant or useful to the education context. Theoretical debates within research fields aside, individuals also possess their own lay theories of emotion that inform how they process or interpret the emotional states of others (sometimes referred to as affective cognition) (King & dela Rosa, 2019; Lindquist et al., 2013; Ong et al., 2015). Such lay interpretations cannot be ignored as they can influence

interpretation and results when assessing emotion, for instance in the use of self-report or in the use of SEL curricula as teachers, practitioners, and students engage with programme manuals and training content regarding emotional learning.

Building on work synthesized by Kleinginna and Kleinginna (1981), Izard (2010) succinctly and effectively outlines the multiple meanings and aspects researchers and scientists attach to the term 'emotion' based on survey and questionnaire responses administered to 34 leading emotion scientists across disciplines and specialties. There was agreement amongst participating researchers regarding the structures and functions of emotions despite the researchers holding several different meanings of emotion. Izard (2010) stresses that the different definitions of emotion, largely heuristic, are not necessarily in conflict with one another. There was greatest agreement on the following aspects of emotion:

> emotion consists of neural circuits (that are at least partially dedicated), response systems, and a feeling state/process that motivates and organizes cognition and action. Emotion also provides information to the person experiencing it, and may include antecedent cognitive appraisals and ongoing cognition including an interpretation of its feeling state, expressions or social-communicative signals, and may motivate approach or avoidant behaviour, exercise control/regulation of responses, and be social or relational in nature. (Izard, 2010, p. 367)

However, findings from Izard (2010) cannot be considered to form a unitary definition of emotion. Ekman (2016) furthers such synthetic work on describing emotion with a survey for researchers to identify areas of agreement. Principal findings were that researchers endorsed views that there was compelling evidence in support of universal signals for emotion (whether facial expressions or vocalizations), but less compelling evidence in support of universals in events that give rise to specific emotions, physiological changes, or appraisal mechanisms. Roughly half of respondents supported a discrete emotion orientation in their personal research approach, with only 11% reporting a constructionist view to emotion (with the construction being either social or psychological); 30% of researchers advocated for the use of both orientations (i.e., discrete and constructionist) towards

understanding emotion. Emotion labels considered to be empirically established by at least 76% of respondents were those for anger, fear, disgust, sadness, and happiness. Roughly half agreed that shame, embarrassment, and surprise were empirically established. Emotion labels with the lowest percentage of agreement as to their status of being empirically established included: awe, compassion, contempt, envy, guilt, gratitude, love, pain, and pride. It should be noted that the survey was conducted in English. There was also:

> […] high agreement about whether "specific moods may be related to specific emotion(s) such as anger to irritability" (88%), whether "specific personality traits are related in some way to specific emotions, such as fear to shyness" (82%), and whether specific emotional disorders are related in some way to specific emotions, such as disgust to anorexia. (Ekman, 2016, p. 32)

Four approaches to the scientific study of emotion will now be presented including the traditions of basic emotion, appraisal, constructionist, and componential theorists. This brief overview of different approaches to studying emotion serves to contextualize this study's research scope on emotion understanding and representation (*see* Gendron & Feldman Barrett, 2009 for a review of emotion theorizing in psychology from 1855 to 1960).

Throughout the history of emotion theorization, the notion that emotions are modular or discrete is an important first premise as it refers to how emotions are distinct and distinguishable from each other (based on facial and vocal cues), and associated with both autonomic physiological responses and preceding events that can trigger emotions (Ekman & Davidson, 1994). As such, discrete emotions are biologically based responses to stimuli. Discrete emotion theory does not require an evolutionary basis for emotion, with Parkinson (1996) advancing that discrete emotions are socially constructed (and thus shared) responses to stimuli. Basic emotion theory (BET), also referred to as emotion signaling theory, is a pervasive framework that also advances a set of 'basic' emotional states that have associated facial expressions; each basic emotion has its own mental module to facilitate identification and interpretation (Ekman et al., 1987; Izard, 1971, 1992; Panksepp & Watt, 2011; Tomkins

& Karon, 1962; Vytal & Hamann, 2010). Basic emotions (organized into categories) include: happiness, sadness, anger, fear, surprise, and disgust. Ekman and Cordaro (2011) further specify what is meant by calling emotions 'basic' to signal two characteristics of emotions: again, that they are *discrete*, meaning they can be distinguished from each other, and second, that they are *evolutionary adaptations* in response to a surrounding environment. Emotions are defined as "discrete, automatic responses to universally shared, culture-specific and individual-specific events" (Ekman & Cordaro, 2011, p. 364).

In a sample of children in Preschool to 2nd Grade (Preschool – Year 3), Camras and Allison (1985) found child accuracy in matching emotion term labels or facial expressions to stories of emotion-inducing events increased with age. Six emotions were studied including anger, disgust, fear, happiness, sadness, and surprise. Interestingly, recognition of emotion labels was higher than that of facial expressions overall. There was also a difference in correct responses depending on the emotion. For example, disgust was recognized correctly the least often, and happiness and sadness were recognized more easily than surprise, fear, and anger. In effect, Widen and Russell (2008a) also found a majority of children ages 3 to 7 had difficulty identifying prototypical facial expressions of disgust, often misattributing these stimuli as expressions of anger or denying an association with disgust. A proportion of adult participants (25%) also either associated the disgust facial expression with anger or denied its association with disgust.

Strand et al. (2016) conducted a study to test BET predictions that the recognition of facial expressions of emotion are insular in their development, but foundational to emotional perspective-taking skills. In other words, social and verbal inputs are theorized to not influence the development of facial emotion recognition skill, but they do influence greater emotion understanding (EU) development. Strand et al. (2016) assessed EU (operationalized as emotion expression recognition and emotional perspective-taking in line with a two-factor

model of EU for preschoolers) and receptive language skills of 417 preschool children. Cross-lagged structural equation modelling supported BET predictions for younger preschoolers (ages 36 to 48 months), but not for older preschoolers (ages 49 to 67 months) wherein bidirectional influences between EU and receptive language were found. The bidirectional relationship between language and EU found in the older group of preschoolers is in line with a constructionist view of the brain (Strand et al., 2016). The authors concluded that their findings supported a hybrid model wherein the relationship between receptive language and EU skill is initially nonsignificant, but increases in importance as children grow.

A second tradition in emotion research is the appraisal approach typically attributed to Arnold (1961) for links to its modern understanding. Emotions in this approach do not arise out of habit or reflexively, but rather as the consequence of an individual's interpretation of an event or situation (i.e., an object in the world). Attributing meaning to an object in the world then causes an emotion by the 'law of situational meaning' (Frijda, 1988). Whether Frijda's laws of emotion are empirically based is debatable (e.g., Smedslund, 1992), but they raise an important consideration in emotion theorization as to the extent to which conceptualizations about emotions are *a priori,* or involve an attempt to integrate empirical evidence as is done in the constructionist approach (the third tradition described here). Appraisal models "consider emotion as an act of making meaning" (Gendron & Feldman Barrett, 2009, p. 4), an intentional state—a characterization of emotion also found in constructionist models. However, where in the appraisal model meaning arises from an individual interpreting the situation that gives rise to the emotion, the constructionist model emphasizes the individual's interpretation of the internal state (Gendron & Feldman Barrett, 2009).

The constructionist approach advances emotions to be psychological constructions with distinguishable components. Although the existence of emotion categories is accepted, constructionists embrace the notion that there are 'fuzzy' boundaries between categories that allow for overlap. The generation of such emotion categories is the source of construction in the constructionist view as it treats emotion categories as artefacts—that is to say the product of socio-cultural processes. This is in contrast to the view that emotion categories are 'given' by nature (i.e., natural kinds) as is espoused in both BET and some philosophical traditions dedicated to the study of emotion (Moors, 2009). The constructionist view is not necessarily in conflict with BET on this point as some constructionists support the claim that emotions are both biologically based and socially constructed. The physiological reality linked to emotional experience (e.g., pupil dilation, increase in heartrate) is not denied by constructionists.

The role of social construction adopted in the constructionist approach factors in the interpretive process an individual undertakes when assessing an internal state (then called an emotion), and also refers to norms about the display or expression of emotion (linking in the consideration of an individual's emotion socialization) (Harré, 1986). An emotion in the constructionist view becomes the cognitive process that organizes such an internal experience—the act of categorization that then gives rise to a conclusion that a certain emotion is being experienced or not. The categorization process or classification scheme applied to physiological changes associated with emotional experience is informed by shared conceptual knowledge (Barrett, 2012). The interpretive or evaluative component to emotion found in both the appraisal and constructionist approaches is pertinent to this study's focus on the role of identifying others' emotions in social interaction.

Support for a constructionist approach to studying emotion stems from research in neuroscience. Lindquist et al. (2012) conducted a meta-analytic review summarizing the

neuroimaging literature on human emotion. The researchers compared evidence in support of a *locationist* approach, that advocates for distinct brain regions consistently and specifically dedicated to discrete emotion categories, as opposed to a *constructionist* approach, that advocates general brain networks are involved in the construction of discrete emotion categories but are not specific to any one category. Overall, Lindquist et al. (2012) found a larger body of evidence in support of a constructionist view of the brain that posits brain regions commonly active in emotional psychological operations interact with non-emotional brain regions during both the experience and perception of emotion across a range of discrete emotion categories. Siegel et al. (2018) conducted a meta-analysis to address the topic of autonomic nervous system (ANS) 'fingerprints' of emotion—referring to how each emotion category has a specific ANS response pattern distinct from that of other emotion categories (in the same way fingerprints are unique to an individual). Siegel et al. (2018) found that there was no one-to-one mapping between emotion category and a specific ANS response. Rather, there was significant variation in ANS changes even across instances of the same emotion category that were unaccounted for by experimental moderators (e.g., how the emotion was induced in participants). The authors concluded that their findings were more in line with a constructed theory of emotion wherein "an emotion category is a population of context-specific, highly variable instances that need not share an ANS fingerprint" (Siegel et al., 2018, p. 343).

To clarify, the scope of this study does not include an individual's experience of emotion in a social situation, although this is another dimension relevant to further study of how emotional learning relates to social learning. The present study is also not concerned with one-to-one mapping of facial expressions to discrete emotions, nor with a particular hierarchy amongst emotions within a single conceptual system as emphasized in the discrete or basic emotion approaches. The present study also does not contend with the evolutionary

basis of emotional reactions. Rather, the research focus is on how individuals represent the emotions of others and the factors shaping such representation, namely language (especially emphasized in Study 2) and personality (Study 3).

We support the characterization proposed by Gendron and Barrett (2018) of "emotion perception as a stream of synchronized conceptualizations between two individuals, which is supported and shaped by language" (p.101); this view also flags the role of culture in emotion perception—a topic not discounted, but outside the scope of the present study. Our discussion of emotion representation places particular emphasis on the interrelationships amongst emotion concepts themselves, as opposed to a categorization of certain emotions being more foundational or complex than other emotions (a classification found in BET), or a discussion of primary (i.e., instinctual), secondary (i.e., learned), and tertiary (i.e., thought-related) emotions (e.g., Panksepp & Watt, 2011). This study is still concerned with the organization of an individual's emotion concept system, but rather than treating emotion concepts in a hierarchical fashion, it will focus on a network approach instead to consider how emotion concepts may interconnect based on an individual's understanding of an emotion—an understanding that can be communicated through language.

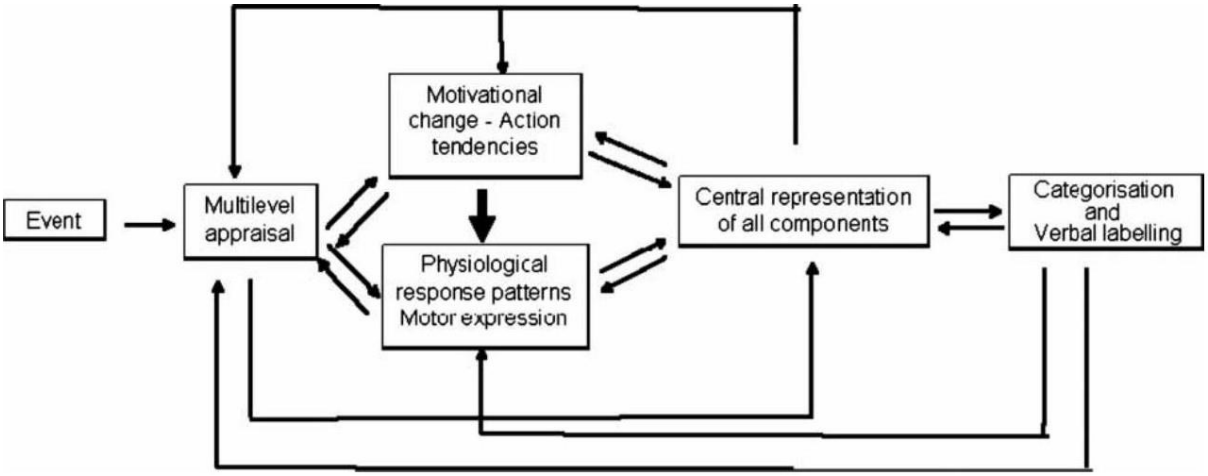
Scherer (2005), in reflecting on how to define an emotion and the associated issues that arise, defends a view of emotion previously presented (Scherer, 1982, 1984b, 1984a): defining emotion as a component process. Emotion components are understood to include an appraisal (the cognitive component), bodily symptoms (the neurophysiological component), action tendencies (the motivational component), a facial and vocal expression (the motor expression component), and an emotional experience (the subjective feeling component) (Scherer, 2005). Each component is further linked to an emotion function: the cognitive with an evaluation of objects and events, the neurophysiological with system regulation, the motivational with preparation and direction of action, the motor expression with

communication of reaction and behavioural intention, and the subjective feeling with the monitoring of internal state and organism-environment interaction. The componential approach to emotion is further supported by Fontaine (2016) in their re-examination of the construct of emotional intelligence, who advances that emotions are "processes […] elicited by goal-relevant situations and that consist of an interplay between appraisals, action tendencies, bodily reactions, expressions, and feelings" (p. 332).

We will now present how emotions will be defined throughout the present study, noting a distinction between feelings and mood as outlined in Scherer (2005). An emotion will be understood as a psychological construction rooted in reaction to a stimulus that has multiple components (specified later), in line with the componential approach to emotion described earlier. A stimulus can be *external*, such as an event, or *internal*, whether a physiological state or a thought. Emotion components will be understood as those outlined in the emotion component process model to include an appraisal (i.e., an evaluative or cognitive component), a physiological reaction/change, motor expressions (can be facial, vocal, and/or gestural), an action tendency (referring to how emotions motivate action), and a subjective feeling. Emotions will further be understood as processes in that they are dynamic and adaptive in line with a dynamic systems approach (M. D. Lewis, 2005; M. D. Lewis & Granic, 2000) as applied to social process theory (Fogel et al., 1992). A dynamic systems approach also emphasizes individual differences as a "key feature" to understanding development and behavioural performance (Izard et al., 2000). Potential sources of individual differences in social-emotional development pertinent to the current research scope are addressed in *Section 1.4* of this literature review. The component process model also characterizes the architecture of emotion as dynamic (Scherer, 2009) (*see* Figure 3).

Figure 3

The Component Process Model



Note. Reproduced from Scherer (2009).

We support that emotions can be organized into distinct categories so that emotions are subjectively discernible from each other, attached to a specific label. The association between emotion label and emotion as a psychological construct links to a broader discussion of emotion representation addressed in this study. Specifically, we are concerned with the contribution of an emotion term label to the representation of said emotion at the level of organizing its semantic space (i.e., the conceptual representation of word meaning). We do not deny the possibility that an individual can experience an emotion for which they do not have an emotion term label for, either due to limited vocabulary size or the lack of an adequate label to describe the internal experience.

Skrandies (2011) considered the structure of semantic space across development in a sample of children ages 9 to 18 who rated 72 German nouns on 12 bipolar adjective scales. A core characterization of semantic space is that each word is "embedded in a network of emotional associations" (Skrandies, p. 65) that can be measured via *semantic differential* scales (Osgood et al., 1957; Ploder & Eder, 2015) as participants rate various words on bipolar scales with contrasting adjectives at either end (e.g., 'good – bad'). The connotative meaning gleaned from such ratings is then transformed (or reduced) into dimensions via

factor analysis and factor scores for each word indicate placement of said word in semantic space (defined by previously identified dimensions). Varimax-rotated factor analysis conducted by Skrandies (2011) produced three dimensions by which each word could be located in semantic space (independent of age): *evaluation* (reflecting desirability)*, potency,* and *activity* (the result of two dimensions that reflect potential threat when taken together). Findings from Skrandies (2011) support the claim that the basic structure and dimensionality of semantic space is stable across development. However, emotional words differed in their developmental pattern of connotative meaning, especially on the evaluative dimension.

The terms 'emotions' and 'feelings' are used interchangeably in SEL curricula (the focus of Study 1), a misnomer that can be traced back even to William James (Scherer, 2005), one of the core thinkers in conceptualizing and studying emotion (James, 1884). The present study understands a feeling as the subjective experience of an emotion—an individual's conscious awareness and interpretation of their internal state that has a specific label used to communicate the state to others (most pertinent to Study 2's focus on child emotion definitions). In the componential theory approach, any verbal or language-based measure of emotion arguably measures the emotion component of "subjectively experienced feeling" (Scherer, 2005, p. 722). In the present study, a feeling is that which we have an emotion term label for—a response to the question 'how are you feeling?' as opposed to a question of 'what are you emoting?' In the absence of a label, the experience remains at the status of an emotion that can nevertheless be interpreted and experienced, but is not crystallized further into a single emotion term and distinct subjective experience. This conceptualization is in line with Adolphs' (2017) characterization of a feeling as the conscious experience of emotion in their reflection on how neuroscientists should distinguish between emotion states, concepts, and experience in their study of emotion. The present study also considers a mood as distinct from an emotion in that it can arise without identification of

a clear cause and hence, without a link to a specific event or appraisal. Moods are further understood as a set of subjective feelings that can last several hours or days as well as affect the experience, mindset, and behaviour of a person.

In what follows, the discussion of emotion turns to that of age-based differences in emotion representation and emotion understanding, flagging the importance of language. A more detailed discussion regarding the influence of language and temperament/personality on emotion understanding and social-emotional development can be found in *Section 1.4* of this literature review.

1.3.2 Age-Based Differences in Emotion Representation

Addressing emotion understanding and representation from a developmental perspective is justified based on evidence supporting differences between adults and children in their emotion representation. The first area of age-based difference concerns the explanation of interpersonal events. Lovett and Pillow (2010) conducted a study with adults and children (ages 5, 7, and 9) wherein participants were presented eight stories depicting either prosocial or antisocial actions, and then asked to provide an explanation as to why a character performed the target action. Both adults and children appealed to situational and mental state explanations, but mental state explanations were more common when explaining antisocial actions unpreceded by an interpersonal event. Furthermore, adults were more likely to mention the psychological goals of characters. As child age increased, so did the likelihood to explain prosocial actions in terms of psychological goals, however antisocial actions were explained exclusively in terms of emotions and beliefs for all children (Lovett & Pillow, 2010). It appears then that depending on a child's age, what is used in their representation of an 'other' to explain motivations and reactions depends on whether the situation has positive or negative outcomes.

Thus, antisocial situations appear to prompt affective perspective-taking on the part of the child whereas prosocial situations prompt cognitive perspective-taking. *Affective perspective-taking* describes the ability to understand the emotional states of another (P. L. Harris et al., 1989) in contrast to *cognitive perspective-taking* that refers to representing the perception or knowledge of another person (Hinnant & O'Brien, 2007). Lovett and Pillow's (2010) findings have important implications for a child's emotion understanding as it would be of interest to see how the child's categorization of situations as prosocial or antisocial occurs. However, the present study takes such evidence of age-related differences when explaining interpersonal events and actions as justification for a specific focus on child representation of not just social situations, but emotion concepts overall as they appear to be related to a child's appraisal of said social situations.

Differences between children and adults regarding emotion representation have also been found in relation to language. The first realm of difference concerns the processing of emotion terms. Research supporting age-variant emotion term processing (e.g., Ready et al., 2017) suggests a semantic cohesion among emotion terms which informs to a certain extent how emotions are represented. Watson and Stanton (2017) refer to 'superclusters' of emotion terms to describe their valence-based grouping. The existence of superclusters points to how emotions are associated with one another at a conceptual level that can then be extended to the consideration that any one emotion is necessarily understood in relation to another, either in similarity or opposition.

There is debate within the literature regarding the role of valence in child emotion term processing and its impact on conceptual representation. The conflict results from evidence that supports a child processing bias for positive terms over negative terms, but also evidence suggesting there is no valence-dependent processing advantage. Vaish et al. (2008) speak to a negativity bias in social-emotional development in their discussion of infants

preferential attending to negative stimuli that is evolutionarily based. Although there is discussion of a bias towards negative stimuli within the literature for humans overall, this does not contradict support for a positivity bias in the processing of emotion terms (with regards to speed) as such findings still indicate participants attend longer to negative stimuli. Bahn et al. (2017) note that research with children (as opposed to adults) regarding emotion term processing is sparse, but children have still been found to process positive emotion words faster than negative or neutral ones (Bahn et al., 2017; Pérez-Edgar & Fox, 2007; Sylvester et al., 2016). However, Silk et al. (2009) found neither age nor valence-related differences in emotion word processing with a sample of 66 children and adolescents ages 8 to 18. Compared to pre-/early pubertal participants, mid-/late pubertal participants showed faster reaction times to all words (positive, negative, and neutral), greater peak pupillary reactivity to emotional words regardless of valence, greater recall of emotional words, and rated themselves as 'more emotional' during lab visits to participate in the study.

Regarding research with adult samples, valence and arousal have been studied in relation to word recognition. Kuperman et al. (2014) specifically considered the potential independent influences of valence and arousal on word recognition, finding that negative words and arousing words were recognized more slowly than positive and calming words. Participants spent more time attending to negative and high arousing words across tasks. Furthermore, valence explained roughly 2% of variance observed in word recognition latencies. Kuperman et al. (2014) ran their statistical analysis using mean valence and arousal ratings provided by Warriner et al. (2013) who had conducted their study with a sample of adult participants with an age range of 16 to 87 to generate norms of valence, arousal, and dominance for 13,915 English lemmas (i.e., a word's form registered in a dictionary). Mean lexical decision and naming latencies were also retrieved from a dataset generated using an adult sample part of the English Lexicon Project (ELP) collected by Balota et al. (2007).

Ponari et al. (2018), also focused on English, found that the emotional valence of words supported the acquisition of abstract words. Word emotional valence supported processing of abstract words but not that of concrete words in their child sample (n = 51) with an age range of 6 to 12, divided into three age bands. Ponari et al. (2018) analysed previously collected adult word ratings of age-of-acquisition, concreteness, and valence (also retrieved from the ELP), finding words acquired earlier tended to be emotionally valenced.

Ponari et al. (2020) build on their previous findings to further test the hypothesis that emotional valence operates as a bootstrapping mechanism to support child acquisition of novel concepts (e.g., Kousta et al., 2011) by focusing on whether it is the intrinsic valence of words or the valence of the context in which the word is used that facilitates learning. Context was manipulated as teaching strategy type with a sample of 7- to 10-year-olds (n = 76). One teaching strategy emphasized emotional information and the other, encyclopaedic non-emotional information. Ponari et al. (2020) found that teaching strategy had no impact on abstract word acquisition, suggesting that the valence of the context in which words were learned did not have a significant effect. In contrast and in line with previous findings, abstract words with emotional valence were better learned as compared to neutral abstract words by children up to age 9.

Addressing a gap in the literature regarding emotion word comprehension (EWC) in non-English speaking contexts, Li and Yu (2015) studied vocabulary trajectories for Chinese children ages 2 to 13 as well as the influence of valence and empathy on EWC. Participants were further grouped into three age bands of ‘Kindergarten’ (ages 2 to 6), ‘Lower-Elementary School’ (ages 7 to 9), and ‘Higher-Elementary School’ (ages 10 to 13). Across all age bands, the comprehension of positive emotion words was greater as compared to that of negative and neutral words. The comprehension of neutral words was greater than that of negative emotion words only for the lower- and higher-elementary school bands (i.e., for children ages 7 to 13).

Although EWC generally increased with age, the age range of 6 to 8 years marked a period of particularly dramatic increase in EWC. Regarding cross-cultural differences in EWC, Chinese children presented lower EWC development as compared to a UK sample in early childhood (ages 4 to 6) and higher EWC than their UK counterparts in middle childhood (understood to encompass ages 7 to 10). However, there was no significant difference in EWC between UK and Chinese samples in later childhood (ages 11 to 13) suggesting that cross-cultural differences regarding EWC skill observed in childhood were not maintained at the start of adolescence.

Although the present study is not concerned with speed in word recognition or the specific acquisition of novel emotion words, characteristics of emotion language (i.e., valence and arousal) are key to its research questions. The first study is concerned with which emotion words are presented in SEL curricula across middle childhood. Study 2 addresses how emotion language relates to emotion representation/understanding across middle childhood. Lastly, Study 3 explores whether emotion language can impact interpersonal accuracy (understood as the abilities to represent the personality traits of others and subsequently make predictions about their likely behaviour) in young adulthood.

Feldman Barrett (2006) advances that valence plays a pivotal role in emotion as it is part of an individual's capacity to valuate and evaluate situations and as such, relates to individual differences in levels of responding. The role of valence as a dimension of emotion representation has been considered from a developmental perspective. In light of evidence supporting a bi-dimensional representation of emotion in adults, Nook et al. (2017) consider how emotion representation arises to address a broader question of how individuals represent their own emotions and emotional experiences as well as those of others. Mechanisms explored for their potential link to emotion representation development as mediators included: verbal knowledge, fluid reasoning, a general ability to represent non-emotional

stimuli bi-dimensionally, and task-related behaviours. In a sample of participants ages 6 to 25, children presented a mono-dimensional focus on valence to represent emotions, whereas adults showed a bi-dimensional focus on valence and arousal (consistent with previous research). A sequential mediation model revealed that verbal knowledge that increased with age ($\beta = .68$, $p < .001$) mediated an increased focus on the intensity of emotion terms ($\beta = .36$, $p = .002$). The increased focus on the intensity of emotion terms explained an increased bi-dimensional representation of emotion in turn ($\beta = .45$, $p < .001$). It is important to note that it was general language skill and not specific knowledge of emotion terms that mediated the developmental change in emotion concept representation. Nook et al. (2017) suggest that the development of non-emotional vocabulary may bootstrap more nuanced distinctions between emotion categories. The way emotion categories are structured, informed by language (whether at the level of emotion vocabulary or general language skill), is thus a meaningful avenue for deeper exploration and will now be further discussed within a review of theories on child emotion understanding development.

1.3.3 Theories of Child Emotion Understanding Development

Developing emotion understanding (EU) can be conceived of as acquiring a taxonomy and language for emotions to make sense of and to communicate emotional experience**.** Older children have been found to use a significantly higher amount of emotion term labels than younger children (Widen & Russell, 2010). The beginnings of emotion perception and emotional experience are understood to typically commence around 3 years of age (e.g., Larsen et al., 2007; Widen, 2013). Infants have been found to be able to categorize emotional facial expressions based on their valence, construed as the start of emotion identification ability (*see* Quinn et al., 2011 for review). However, EU also requires an additional level of conceptual reflection, namely: the understanding that emotions are tied to individual desires and beliefs about the world (Hadwin & Perner, 1991; P. L. Harris et al.,

1989; Ruffman et al., 2003; Vinden, 1999; Whitehouse & Hird, 2004), have both causes as well as consequences (e.g., Widen & Russell, 2004, 2010), and can be regulated (e.g., Lipman, 2016). Children also recognize from an early age that emotions have interpersonal meaning, whether the emotion is conveyed from self to other or vice versa (P. L. Harris, 1994).

Much of the evidence to support developmental trajectories in child EU stems from both longitudinal and cross-sectional studies. As an example of a longitudinal study, Brown and Dunn (1996) sought to identify potential continuities in EU from ages 3 to 6, finding that antecedents to EU at age 3 (including participation in discourse about emotion causality, positive interaction with older siblings, and language ability) were significantly related to EU levels at age 6. Female children showed higher levels of EU overall as compared to male children, with Brown and Dunn (1996) suggesting the difference may be due to quality of sibling relationships. Child report of negative experiences whether at home and/or at school was also related to child sensitivity to the experience of ambivalent emotions.

As an example of a cross-sectional study, Brody and Harrison (1987) used a sample of preschoolers, 3rd graders, and 4th graders (Years 4 and 5) to assess developmental changes in children's abilities to accurately match and label emotionally laden situations. Third and 4th graders were found to have higher emotion-matching scores than preschoolers overall, with protected univariate *F* tests finding significant age effects for frustration, guilt, gratitude, hope, jealousy, sadness, and satisfaction. Age had a stronger relationship with the ability to match similar situations as opposed to with emotion labelling ability. Thirty-one different emotions were included in study stimuli, and all emotions were found to be matched in a non-random way by all children except for embarrassment, fear, nervousness, and surprise.

Although not a cross-sectional study, R. Smith et al. (2019) used a sample of 94 undergraduate students to identify developmental trajectories for emotional awareness (EA).

The Levels of Emotional Awareness Scale (LEAS) was used as a measure of individual differences in EA. Based on findings from multiple regression analyses and observations as to which developmental measures accounted for portions of variance in LEAS scores, R. Smith et al. (2019) proposed that the LEAS can track three areas of development tied to EA from childhood to adulthood: 1) a transition from focusing on external/physical characteristics of emotions to internal/psychological ones; 2) conceptual complexity; and 3) self-other differentiation.

Regarding the relationship between EU and the experience of emotion across childhood, younger children often do not report experiencing multiple emotions simultaneously or emotions of opposing valence (i.e., mixed). Specifically, Wintre and Vallance (1994) advanced that children experience positive and negative emotions as separate until 8 years of age. There is evidence supporting the claim that it is not until age 11 that children can accept the possibility that individuals simultaneously experience feelings of opposing valence (Pons et al., 2004; Whitesell & Harter, 1989). Harter and Buddin (1987) found that a five-stage developmental acquisition sequence emerges from ages 4 to 12 to characterize a child's understanding of the simultaneity of two emotions. The sequence was as follows: level 0, no acknowledgement of simultaneous emotions; level 1, acknowledgement of simultaneous emotions (that persists across remaining levels) with the emotions being of the same valence and directed at the same target; level 2, emotions are of the same valence but each emotion is directed towards a different target; level 3, emotions are of opposing valence and each directed at a different target; and level 4, emotions are of different valence and directed towards the same target. More recent reports have found that both 3- (J. P. Smith et al., 2015) and 5-year-olds (Larsen et al., 2007) are able to identify mixed emotions, suggesting that there are effects related to task type and design that affect

performance rather than developmentally-based differences in ability concerning understanding the experience of simultaneous or mixed emotions.

Fischer et al. (1990) present a theory of emotional development that integrates functionalist theories of emotions with principles of skill development and characterizes emotions in terms of their generation from event appraisal, categories (further organized based on basic-emotion families), and prototypic event scripts. In effect, Fischer et al. (1990) "propose that the prototype for each basic emotion is a script of behavioural and social events for the best or most typical case of the emotion" (p. 92). Although the present study does not subscribe to the functionalist or BET approach to emotion, we agree with the Fischer et al. (1990) emotional theory to the extent that it supports a gradual developmental process, and that related EU skills can be understood as an ensemble of developmental levels or tiers as opposed to fixed traits. Fischer et al. (1990) do also flag the issue of how understanding child EU skill is tied to assessment conditions and emotional action tendencies.

Castro, Cheng et al. (2016) present the EUReKA (Emotion Understanding in Recognition and Knowledge Abilities) framework to conceptualize EU as "expertise in the meaning of emotion" (p. 259), encompassing two main abilities of *emotion recognition* and *emotion knowledge*. Emotion recognition is understood to rely on visual and/or auditory cues and comprises four different skill sets: 1) emotion awareness (i.e., that an emotion has been expressed), emotional facial expression labelling—2) prototypical and 3) non, and 4) contextually-relevant cue-based emotion identification and labelling. Emotion knowledge refers to the synthesized and stored information regarding emotion; specifically: a) internal and external causes, b) qualities (i.e., structure, timing, sequencing), c) consequences and functions, d) cultural rules and norms, and e) management/regulation strategies (including understanding of which strategy may be appropriate for a particular situation). The EUReKA model localizes EU in three foci: the self, specific others, and generalized others. The further

specification of types of 'others' noted as specific versus generalized is meant to refer to others that are known or with whom one has some form of relationship (e.g., family member, colleague) versus a stranger or someone in the general population.

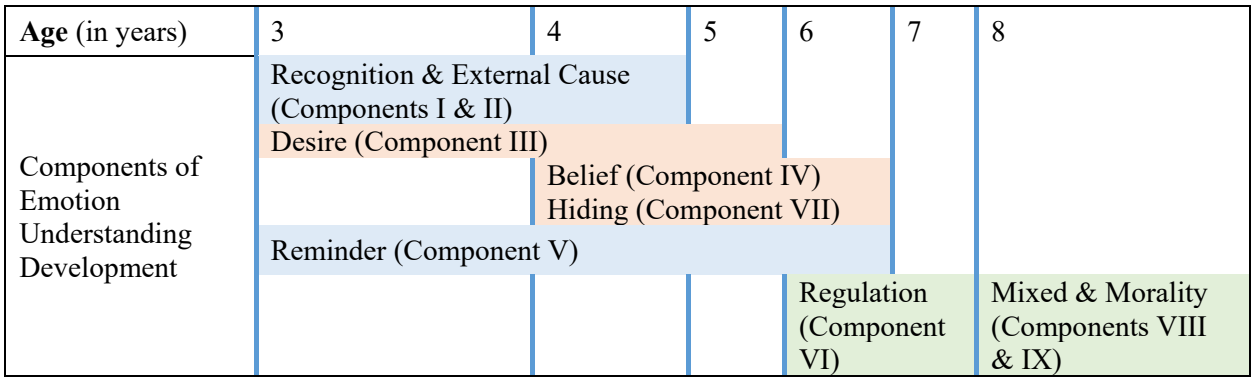
Castro, Cheng, et al. (2016) flag the difficulty of finding a single definition of EU that applies to an entire lifespan as "different skill sets are highlighted for different age groups" (p. 258). Specifically, the researchers advance that emotion identification skills (e.g., labelling emotional expressions, situation-specific emotion attribution) are emphasized more often in child EU, whereas EU in adults is portrayed as a combination of abilities to a) monitor and represent internal states, b) distinguish emotions (in the self and others), and c) understand social as well as moral functions. This characterization can be deemed an over-simplification when considering other research dedicated to charting EU development across childhood into adolescence and later adulthood, and the formation of emotion concepts, discussed next. The alleged age-based differential in levels of EU complexity may not necessarily hold true regarding other research conceptualizing child EU, but the critique can be more readily applied to the design of child EU measurements which Castro, Cheng, et al. (2016) also review.

Although a useful starting point for the organization of EU skills and related measurement issues, the EUReKA model does not include a temporal dimension in its representation of EU skills and foci in that it does not identify age-based milestone markers for skill acquisition, nor does it advance a particular hierarchy amongst EU skills in terms of complexity. In light of the present study's concern to adopt a developmental perspective to EU within the broader question of how emotional learning relates to social learning, we now turn the discussion to the 'Developmental Model of Emotion Understanding' proposed by Pons et al. (2004). Informed by both child emotion regulation and understanding research literature, this model charts EU development from ages 3 to 11 and comprises nine different

components of EU that emerge in threes over the course of three main developmental phases (*see* Figure 4).

Figure 4

Author-Generated Representation of Pons EU Developmental Model



Note. Reproduced from O'Grady (2018).

Components within a developmental phase are inter-correlated. There is also a hierarchical organization between components across phases, but not within one phase. This organization is based off a scalogram analysis that suggested the nine components were scalable and that the developed scale was valid (Pons et al., 2004). The first phase begins at age 3, and groups components of 'Recognition,' 'External Cause,' and 'Reminder' (Components I, II, and V). 'Recognition' refers to the ability to identify and label emotions from stimuli. 'External Cause' refers to the understanding that emotions are 'caused' in that they result from external events. 'Reminder' links memory and emotion in identifying the understanding that the intensity of an emotional experience can diminish over time and aspects of a present situation can trigger emotional states experienced in the past.

The second phase also begins at age 3 with 'Desire' (Component III), further grouped with 'Belief' and 'Hiding' (Components IV, and VII) that emerge later at age 4. 'Desire' captures the understanding that different individuals can have different emotional reactions to the same stimulus, shaped by their individual desires. 'Belief' notes the understanding that beliefs about a situation can shape emotional reactions to said situation. 'Hiding' refers to the

possibility that one's outward (i.e., externalized) emotional display does not necessarily match one's internal state.

The third phase begins at age 6 with 'Regulation' (Component VI), and further groups 'Mixed' and 'Morality' (Components VIII, and IX) that emerge at age 8. 'Regulation' refers to fact that emotional experiences can be regulated with different strategies. 'Mixed' notes that one can have multiple and even contradictory emotional reactions to a single stimulus. 'Morality' refers to the understanding that actions or behaviours considered morally reprehensible are linked to negative emotional states, and those deemed morally laudable are linked to positive emotional states.

The Test of Emotion Comprehension (TEC; Pons & Harris, 2000) was developed based on the Pons EU model. The measure is commonly used in studies with children ages 3 to 11 to operationalize child EU, and has been translated for research conducted in several countries (often with the test developers as part of the research team) including: China (Tang et al., 2018), Germany (Göbel et al., 2016), Italy (Albanese et al., 2010; De Stasio et al., 2014; Gavazzi & Ornaghi, 2011; Grazzani et al., 2018; Grazzani & Ornaghi, 2012; Lecce et al., 2010; Morra et al., 2011; Ornaghi et al., 2014; Sagone & Caroli, 2014), Norway (Bjørk et al., 2022), Portugal (Franco et al., 2017; Rocha et al., 2015), Russia (Veraksa et al., 2020), Spain (Aznar & Tenenbaum, 2013), the United Kingdom (Centifanti et al., 2016; Pons et al., 2002), and the United States (Weimer & Gasquoine, 2016). Multi-site studies conducted simultaneously in Canada and France (Pons et al., 2019), as well as in the US and UK (Tenenbaum et al., 2008) have also used the TEC.

Given its extensive use in child development research on emotion, Cavioni et al. (2020) (which also included one of the test developers Pons as part of the research team) investigated the TEC's factorial structure, measure-invariance across participant age and gender, and attempted to generate normative data. Based on a sample 1,478 children (n = 723

female) in Northern and Central regions of Italy ages 3 to 10 years, confirmatory factor analysis (CFA) indicated the proposed structure of the TEC with three levels (or factors) of EU (i.e., external, mental, reflective) and nine components was valid. Regarding gender, multi-group CFA indicated that the TEC did not perform differently for female children compared to male children in terms of its structure or the association between items and latent variables. Measurement invariance and strong invariance were also supported, lending support to the claim that items were not interpreted differently by either male or female children. This finding assists in further contextualizing the findings of Fidalgo et al. (2018) who found in a sample of 353 children ages 3 to 8 that there were no gender differences in TEC performance, except for on the belief component wherein girls outperformed boys (a finding the researchers linked to previous research on false-belief task performance). Based on effect size calculation, it was 1.75 more likely that female children would answer correctly than male children, adjusting for age (Fidalgo et al., 2018).

Although the Pons EU model provides a clear and systematic trajectory of EU development for a wide age band across childhood, a deeper discussion regarding the intensity and physiological aspects of emotion is lacking. The interrelated nature of emotion concepts is also not included, nor a component flagging the role of EU in social problem-solving. Furthermore, the model accounts for neither environmental influences (e.g., emotion socialization), nor genetic influences on emotion representation, and does not speak to EU development beyond the age of 11. Nook et al. (2020) found in a cross-sectional sample of 196 participants ages 4 to 25 that emotion comprehension (based on emotion word vocabulary) and the abstractness of emotion concepts (i.e., representing emotions as psychological states generalizable across situations) both increased with age, then experienced a plateau at different ages. Emotion work knowledge plateaued at around 11 years whereas emotion concept abstractness plateaued at roughly 18 years. Nook et al. (2020)

concluded that adolescence can be characterized as a period wherein emotion vocabulary is diverse and sufficiently developed in comparison to childhood, but the understanding of emotion concepts (i.e., level of abstractness) continues to mature until the onset of young adulthood—the age band of interest of Study 3.

The present study is focused on a multi-dimensional representation of emotion concerned with both the interconnected and interpersonal nature of emotion concepts, the influence of language and temperament/personality in their representation, and links with interpersonal accuracy from middle childhood to young adulthood. In light of the aforementioned reasons, the Pons EU Developmental Model is insufficient to serve as this study's sole theoretical framework. The Pons model is used in the present study to identify broad EU developmental phases across childhood. The Pons model is also used in the present study as a basis for the EU framework used to map SEL programme components in Study 1. We will now describe theories on emotion concept differentiation, conceptual blending, integrated emotions, and emotions as script that further inform the larger theoretical framework informing the present study. We will then end with a conceptualization of EU as presented in the componential approach to emotion in line with constructionism, a theoretical framework described earlier (*see Section 1.3.1)*.

The acquisition of EU can be considered as the process of forming and acquiring emotion concepts, in themselves adaptive to experience and other developmental processes (e.g., language skill, the development of temperament into dimensions of personality). It is possible that the underlying conceptual structure of emotion can influence the perception of emotions. As part of the discussion on how emotion concepts may shape the way emotions are identified in others (i.e., visually perceived), Brooks et al. (2019) conducted a multi-site neuroimaging study in Japan and the US with young adults (n = 40) focused on six emotion categories: anger, disgust, fear, happiness, sadness, and surprise. They adopted a

representational similarity analysis approach to compare level of correspondence between neural, perceptual, and conceptual representational structures for each emotion category, constructing dissimilarity matrices (DMs) for each representational structure type.

Individual emotion conceptual structure was operationalized as conceptual DMs for each emotion category calculated as a Pearson correlation distance between response vectors to linguistic stimuli in a conceptual ratings task. The conceptual ratings task required participants to rate the conceptual relationships between a set of 40 traits (i.e., thoughts, feelings, bodily reactions, associated actions) and its relationship to each emotion category assessed in the study. Neural representational structure was based on neural pattern similarity during an fMRI task wherein participants passively viewed facial expressions associated with each emotion category. Perceptual structure was based on performance on two categorization tasks (fMRI and mouse-tracking) wherein participants categorized static images of facial expression into one of the six emotion categories explored in the study. Perceptual DMs were calculated as the pairwise discordance between emotion categories that reflected how often participants would categorize a face as belonging to an emotion category different from the one considered to be targeted by the task.

Brooks et al. (2019) found there were individual differences in the conceptual structure of emotion that then predicted the individual perceptual structure of emotion categories (even when controlling for potential physical similarity in faces perceived) as well as cross-cultural differences in emotion perception. Although the present study does not involve neuroimaging, Brooks et al. (2019) present two important findings for this study's research scope: a) that the representation or conceptual structure of emotion can impact emotion perception based on external stimuli; and b) there is evidence of individual differences in the conceptual structure of emotion. The former is of interest to the study's focus on emotion identification in others and the link between emotion representation and

perception. The latter is of interest to this study's focus on what may influence emotion representation whether participation in a SEL programme (Study 1), emotion language (Study 2), or personality (Study 3) that can then result in individual differences.

The theoretical framework of *emotion concept differentiation* or *Differentiation Model* (Widen & Russell, 2003) advances that the acquisition of emotion categories is gradual (Bormann-Kischkel et al., 1990; Denham & Couchoud, 1990; J. A. Russell & Widen, 2002; Widen & Russell, 2008b). Emotions are first conceived of in terms of broad mental categories that undergo a 'narrowing' process to represent more adult-like categories that are more complex and specific. Largely undifferentiated emotional sensations are progressively organized through experience and assimilated into larger EU (*see* Bridges (1930) for *genetic theory of emotions*; Fischer, 1980). Across two studies with children ages 2 to 4 years and 11 months, Widen and Russell (2010b) found their hypothesis of emotion category differentiation a) was not disputed across conditions as the usage of emotion term labels was systematic, and b) fit their Differentiation Model regardless of mode of stimulus presentation (that was either the presentation of an emotional story or facial expression). Mode of stimulus presentation did have an important main effect ($F(1, 102) = 115.14$, $p < 001$) on tapping children's emotion concepts in a mixed design ANOVA ($\alpha = .05$), with children performing significantly better on emotion identification in the story mode as compared to the face mode.

It should be noted that the trajectory of emotion concept differentiation is not necessarily linear. Emotion differentiation, also referred to as emotional granularity, speaks to the separation of affective experiences into different emotion types. Nook et al. (2018) conducted a study with 143 participants ages 5 to 25 to assess the development of negative emotion differentiation. A nonlinear developmental trajectory (i.e., U-shaped) was found based on quadratic regression; negative emotion differentiation "fell from childhood to adolescence and rose from adolescence to adulthood" (Nook et al., 2018, p. 1346). Potential

mediators explored as mechanisms by which negative emotion differentiation might shift across ages included: 1) *single emotion experience*, operationalized as the average distance between the highest rated emotion on each trial of the study's negative emotion differentiation task from the four other emotion ratings; 2) *average emotion intensity*, operationalized as average rating of all emotions experienced provided on the differentiation task; and 3) *extreme scale use*,[3] calculated as the average distance between all participant ratings on the task from the scale's midpoint. Mediation analysis indicated only report of single emotion experience (i.e., the tendency to feel emotions one at a time) mediated emotion differentiation levels from childhood to adolescence. In general, single emotion experience decreased from childhood to adolescence, and high tendency to report feeling emotions one at a time was significantly related to high emotion differentiation scores.

Nook et al. (2018) focused specifically on the development of negative emotion differentiation due to an interest in implications for mental health. It would also be of interest to see if a similar trend could be replicated with the trajectory of positive emotion differentiation. Nook et al.'s (2018) findings help to inform a developmental evidence-base for how emotion is taught in the classroom. It would seem the valence of emotions addressed in SEL curricula could potentially shift depending on whether students are in primary versus secondary school to maximize support for positive social-emotional development.

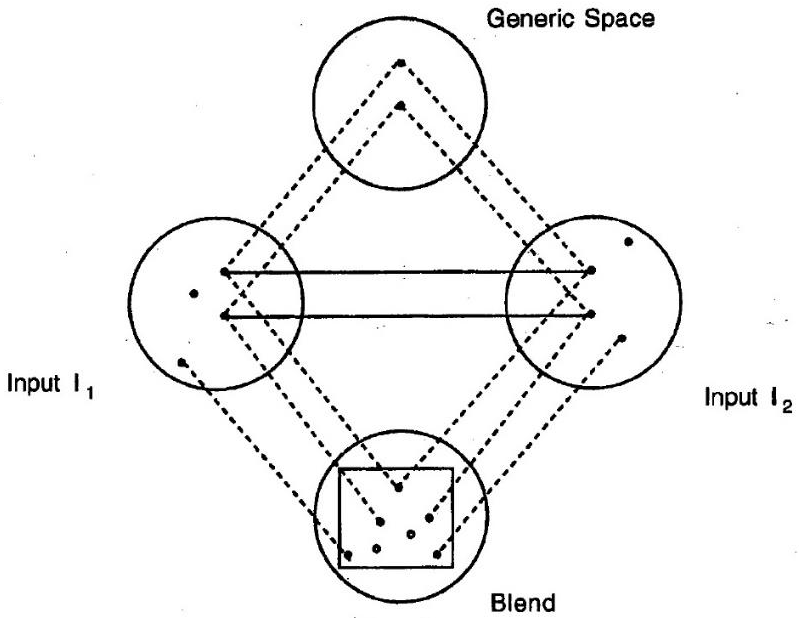
Emotion concept differentiation points to an understanding of emotion as a cohesive and dynamic representational system that has important implications for both the organization and visualization of emotion concepts systems—a primary aim of the present study. Emotion concept differentiation also aligns with the theoretical perspective of general cognition known as *conceptual blending,* also referred to as 'conceptual integration' or 'view

[3] This final potential mediator in Nook et al. (2018) was included in light of evidence suggesting younger children (in a sample of 5- to 12-year-olds split across three age bands of 5 to 6, 7 to 9, and 10 to 12 years) are more likely to provide extreme responses when rating emotional states as compared to older children, but not when rating physical tasks (Chambers & Johnston, 2002).

application.' *Conceptual blending theory* advances that a concept is formed through a synthesis of elements from different conceptual spaces; this synthesis is also termed a 'blend' (Fauconnier & Turner, 2002; Turner, 1996; Turner & Fauconnier, 1995). Conceptual blending theory describes a fundamental process of cognition: that of generating concepts. The formation of a conceptual blend, as described by Fauconnier and Turner (2002), is part of the mental ability to synthesize elements of information from different sources of input ('Input Space'), and to then generate a new mental space termed here a 'blend' (*see* Figure 5; within diagram, black dots represent 'elements of information,' and *Input Space* is represented by two circles marked 'Input I_1' and 'Input I_2').

Figure 5

The Conceptual Blend Process



Note. Reproduced from Fauconnier and Turner (2002, p. 46).

The concept of *integrated emotions* proposed by Cánovas (2010) applies conceptual blending theory to the way affective meaning is constructed. An emotion concept can be understood as the synthesis of various integrated simulations (e.g., physiological reactions, previous emotional experiences), a conceptualization also proposed by *emotion script theory*

discussed later on. Cánovas (2010) defines ‘complex’ emotions as blends of ‘basic’ and ‘object-oriented’ emotions that respectively describe emotions considered universal (i.e., innate) versus emotional states triggered by specific events. How previously acquired emotion concepts may relate to the acquisition of novel concepts is of interest. Conceptual combination (Baron & Osherson, 2011; Barsalou, 1987; Del Prato & Pylkkänen, 2014; Gagné & Spalding, 2013; Graves et al., 2010; Hampton, 1997; Hampton & Winter, 2017) is one mechanism proposed to facilitate such integration of novel concepts into a larger conceptual system of emotion.

Hoemann et al. (2021) present electrophysiological evidence in support of conceptual combination as a mechanism for the acquisition of novel emotion words. Specifically, electroencephalography (EEG) data were recorded as participants (n = 46; M_{age} = 20.91, SD = 2.91, 48% female) completed a semantic congruency task after being trained on 30 novel emotion combinations (comprising two emotion words in English and a target pseudo-word) so as to capture electrophysiological correlates of emotion concept learning when trained via conceptual combination. Participants judged whether a target (i.e., pseudowords that were correct or incorrect if trained, or new and untrained) was “a valid combination of the preceding components” (Hoemann et al., 2021, p.1). Event-related potentials (ERPs) refer to the measured brain response to a stimulus and can be measured via EEG. The N400 is used in neuroscience to refer to a component of ERPs (i.e., time-locked EEG signals) that peaks around 400 ms post-stimulus onset and has been used in research as an index of both predictive processing and conceptual knowledge activation (i.e., semantic access). Lucas et al. (2017) report that N400 potentials have reduced amplitude levels for presented invented (i.e., novel) concept pairs that have already been processed as integrated combinations. Hoemann et al. (2021) found that correct combinations recorded reduced N400 amplitude

compared to incorrect and untrained emotion pseudowords regardless of how preceding components were presented, taken as evidence of deeper semantic learning.

In light of presented neuroscientific evidence, we neither advance that the distinction between so-called 'basic' and 'complex' emotions can be easily made, nor that the representation of complex emotions can be fully described as combinations of basic emotions. As raised previously, we are not interested in establishing a hierarchy amongst emotions as found in BET, but rather in clarifying the taxonomy of emotion concepts for our focus on the relationships between emotion terms. Considering research on the clustering of emotion terms, we do propose that the 'blended' nature of emotion concepts can be echoed in semantic blends of emotion terms, that is to say in the way they are defined and understood in relation to one another, as advanced by Coulson (2001).

Another theoretical understanding of EU development across childhood pertinent to this study is the notion of *emotions as scripts*. Widen and Russell (2010a) advance that each emotion has a 'script' defined as an abstracted narrative unifying a facial expression, a linguistic label, physiological responses, an eliciting event, and consequences. The narrative unifies these emotion elements in both a causal and temporal sequential structure. Attributing an emotional state to either one's self or another person requires a certain degree of similarity between the situation experienced and an emotion's respective script that also includes a cognitive appraisal of the emotion's triggering situation and subjective experience of the state (Bullock & Russell, 1986). Multi-dimensional modelling echoes evidence of emotion grouping based on similarity at a representational level, suggesting that emotions are systematically perceived as inter-related (Russell & Bullock, 1985). Emotion scripts are understood to become generalized throughout development in that they may be initially formed by a specific experience, but a child then applies the emotion script to other situations

deemed similar. The appropriate use of emotion labels serves as evidence that a particular emotion script has been generalized.

Within the emotion script framework, emotions can be said to be 'situated' in that their associated scripts must be attached to specific contexts. The notion that emotions are represented along a valence axis is a dimensional attribution of emotion. In contrast, the situational attribution of emotion would be the script representation of an emotion. The acquisition of a script representation of emotion is understood to reflect a more complex conceptual representation as compared to the acquisition of the valence dimension of emotion (Balconi & Carrera, 2007). EU overall can then be defined as an individual's acquired inventory of related emotion scripts. Understanding emotions as scripts allows for a representation of emotion that is multi-modal and varied by individual experience. Further discussion of individual differences that shape emotion representation and social-emotional development is addressed in *Section 1.4.1* of this literature review, focused especially on language and personality.

In line with a componential approach to emotion as adopted in the present study, Sekwena and Fontaine (2018) present a redefinition and operationalization of EU (referred to as emotional understanding in their article). EU is defined as the ability to understand emotion processes that are likely to arise when an individual encounters a goal-relevant event. Emotion processes include appraisals, action tendencies, bodily reactions, expressions, and feelings. These emotion processes, understood as components, were included in the development of a new EU measure for adults (the 'Component of Emotional Understanding Test-South African Student version) presented in Sekwena and Fontaine (2018), and tested in a sample of 132 undergraduates. EU was found to be positively correlated with verbal cognitive ability, self-reported emotional intelligence, and well-being, and negatively correlated with somatic complaints. Hoemann et al. (2019), in their conceptual paper, lend

further support for a constructionist approach to understanding emotional development by equating it to that of the development of emotion concepts, part of which emotion words play a key role. The dynamic nature of emotion concepts is once again emphasized as concepts are continuously updated through social learning and language, along with being both embodied and culture specific.

In response to Hoemann et al. (2019), d'Arms and Samuels (2019) challenge an account of emotional experience advanced by both constructionist and embodied theories of emotion: that the acquisition of emotion concepts gives rise to the capacity to have emotions. Although they raise valid criticisms, D'Arms and Samuels (2019) do present a slightly misleading characterization of emotion concepts as described in the constructionist model, namely that emotion concepts once learned or acquired have a static or unchanging status. The dynamic nature of emotion concepts across development as espoused in the constructionist approach is thus overlooked. The main contention D'Arms and Samuels (2019) express lies in the distinction between having an emotion concept and the experience of an emotion (i.e., an instance of emotional experience). We are not concerned with the experience of emotion, but rather the individual ability to identify emotions based on external stimuli, and how the internal representation of emotion might shape this identification process. Consequently we will not discuss this point further, but agree that the issue raised by D'Arms and Samuels (2019) that simply thinking of an emotion[4] does not amount to the experience of the emotion requires further clarification and empirical justification in the constructionist approach. The constructionist componential model of emotion is still useful for our research purposes in theorizing about elements that form emotion concepts as well as

[4] Although this arguably requires a level of conscious awareness of the process which is not necessary to all cognition and does not necessarily discount the constructionist view that the categorization process of emotion components gives rise to emotion concepts.

contribute to their representation and larger understanding in social interaction across development.

1.3.3.1 Factor Structures of Child Emotion Understanding. Previous research has suggested different factor models of EU tied to specific age bands. Often a two-factor model comprising 1) recognition of emotional expressions and 2) understanding emotion-eliciting situations is attributed to the EU of children in Preschool (i.e., children roughly ages 3 to 5); these factors, although distinct, are understood to be interrelated. Bassett et al. (2012) tested this two-factor model via CFA,[5] finding the two-factor model of emotion knowledge better fit their data as compared to both a one-factor model (that espouses a unidimensional structure to emotion knowledge, combining expression recognition and situation understanding), and a three-factor model as proposed by Denham (1998) that distinguishes understanding of stereotypical situations versus that of non-stereotypical situations as separate factors, in addition to a third expression recognition factor. A validity model also indicated significant paths from a) expression recognition to situational understanding, as well as from b) situation understanding to teacher ratings of child learning behaviour and social competence (Bassett et al., 2012).

Earlier research by Leerkes et al. (2008) hypothesized a four-factor model of emotion and cognition in early childhood (specifically 3-year-olds) that included EU, emotion control, cognitive understanding, and cognitive control. Here emotion control was treated as a factor separate from child EU as opposed to being a component of EU (as advanced in this study). Nevertheless, findings from Leerkes et al. (2008) support the integration of emotion and cognition in models of early child development in light of the good fit of their four-factor model to their data based on SEM. Child EU processes (i.e., emotion labelling, affective

[5] See Bassett et al. (2012) for summary table (Table 1, p. 261) of four different theoretical models of emotion knowledge from toddlerhood to childhood, including Pons et al. (2004).

perspective-taking, and knowledge of emotion causes) as captured by researcher-administered tasks were positively associated with academic success factors. Child emotion control processes reported by parents, that included level of child soothability (i.e., the ability to calm down after stressful events), level of lability (i.e., how quickly emotional states/mood can change/negativity), and capacity for emotion regulation had an inverse relationship with child socioemotional problems. Socioemotional problems included both internalizing symptoms (e.g., anxiety, somatic complaints, social withdrawal) and externalizing symptoms that refer to a child's negative acting on the external environment. The Bassett et al. (2012) model concerned emotion knowledge (understood as expression recognition and emotion-eliciting situations) which does not encompass all EU components in light of other frameworks described here. However, Bassett et al. (2012) also provides empirical support for the hierarchical development to overall EU as it outlines expression recognition as a specific level in early childhood EU that precedes that of understanding emotion-eliciting situations.

With regards to older children, a three-factor model has been proposed by Castro, Halberstadt, et al. (2016) to describe EU in children entering the 3rd Grade (Year 4). This factor structure of EU is of particular interest to the present study as it pertains to children in middle childhood—the age band of focus in Study 1 as its SEL programme intervention population as well as the age band of participants who produced emotion definitions analysed in Study 2. Castro, Halberstadt, et al. (2016) tested the two-factor structure model found in Bassett et al. (2012) (also identified by Barbosa-Leiker et al., 2014 and Sette et al., 2015) in comparison to one-, three-, and four-factor models. Participants included 201 children who completed five measures of EU (that generated eight EU indices), and their mothers who completed two questionnaires on their child's socioemotional skills and problems.

In line with the theoretical assertion that EU becomes increasingly complex and differentiated in middle childhood, latent variable modelling indicated that three- and four-factor EU models (that included an advanced understanding skills factor and a regulation knowledge skills factor respectively) better fit the data. Castro, Halberstadt, et al. (2016) selected the three-factor model that included prototypical emotion recognition, prototypical emotion knowledge, and advanced EU over the four-factor model in favour of parsimony (Byrne, 2016) and because there were no statistically significant differences between the two models. The first factor of prototypical emotion recognition encompassed skills to identify prototypical emotion expressions in adults and children based on facial and/or physical cues. The second factor of prototypical emotion knowledge comprised a) knowledge of others' mental states and b) knowledge of emotion management or regulation (including abilities to differentiate and select situation-appropriate strategies). Knowledge of others' mental states included abilities to distinguish emotional states within and across situations as well as to attribute emotions to others based on an understanding of their beliefs and/or desires. The final factor of advanced EU included child skill to a) recognize parental emotion during an interpersonal discussion about conflict, and b) identify mixed and moral emotions in emotional situations. Castro, Halberstadt, et al. (2016) also found a unique relationship between prototypical emotion knowledge and maternal ratings of child social-emotional competence.

Findings from Castro, Halberstadt, et al. (2016) do not contradict those of Bassett et al. (2012), but rather extend the factor structure of EU to an older age band. Taken together, such research stresses the importance of adapting SEL programmes concerned with promoting EU to tailor to specific age bands. In effect, Castro, Halberstadt, et al. (2016) concede that their identified three-factor structure of EU for third-grade children may no longer be maintained in a sample of older children as EU continues to develop in complexity

as children grow. There already appears to be an issue in this brief discussion of child EU development and proposed factor models regarding interchangeable terminology and conceptualization (e.g., emotion knowledge versus EU, emotion regulation as part of or distinct from EU). Still, this review of EU theoretical models informs the present study's focus on the structure of emotion representation as a construct, concerned as such with the construct's different components and underlying dimensions that may account for variation in said components (Naragon-Gainey, 2018, p. 46). Given our specific focus on the representation (and subsequent identification) of emotion in others, we will now present the theoretical perspective that informs how this study understands the capacity to represent the internal states of others and its links to the development of social cognition.

1.3.4 A Conceptual Inventory of Other Minds

Social skill research with children has often focused on theory of mind (ToM) ability that refers to the capacity to represent an 'other' that increases with age (Wellman, 2014). ToM is typically operationalized as false-belief understanding (FBU)—the ability to understand that others can hold beliefs about the world not necessarily aligned with actuality (Wellman, 2010). Happé et al. (2017), in their review of the literature, assess the structure of social cognition and emphasize the interdependent nature of core processes; particular focus is given to imitation, biological motion, empathy, and ToM. The development of a self-other distinction is a common process identified in the review linking imitation, ToM, and false-belief task performance. Liszkowski (2013) advances theorizing about ToM should shift away from categorizing those who possess ToM by using a formalized definition to using a usage-based definition that does away with "artificial dichotomies" (p. 105) and assumes continuous development as well as an emergent structure based on analysis of ToM usage.

Mind-space (Conway, Catmur, et al., 2019) is a theoretical framework that presents a multi-dimensional conception of social skill to describe how individuals represent others.

Mind-space is understood as an abstract space akin to a mental inventory wherein others are represented as 'minds' defined as "whole cognitive systems" (Conway, Catmur, et al., 2019, p. 800) capable of processing stimuli, holding belief systems, motivations, etc. Each dimension within this abstract space represents any mental state or personality trait an individual can present. A 'mind' within Mind-space is the result of combining multiple points located at the intersections of multiple dimensions and as such, can be treated as a vector within this multi-dimensional space. Social skill within this framework is construed as a) the ability to locate an individual (i.e., a 'mind) within this representational space, and b) the related accuracy with which one makes inferences about this 'mind.' The Mind-space framework aligns with the present study's research interest in multi-modality as well as individual differences in both emotion concept representation and interpersonal accuracy. Given the framework's support of minds as whole cognitive systems, the present study is interested in how the way 'others' are placed in Mind-space might influence the way said others process emotions is represented, or vice versa (i.e., the way one represents an other's emotion processing influences their Mind-space placement).

Adopting the Mind-space framework, Conway, Coll, et al. (2019) focus on individual differences in accuracy of representing mental states. The source of individual differences is construed as individual differences in how the target mind is characterized—in itself influenced by the individual's structure of Mind-space and how they then place a mind in said space. Across four experiments with adult samples, Conway, Coll, et al. (2019) found that Mind-space accuracy (i.e., mind representation accuracy) was associated with ToM task performance (Experiment 1). Participants with a more accurate Mind-space were more accurate in estimating an individual's personality and intelligence based on a 'thin slice' of behaviour (i.e., brief video recordings of individuals reading a sentence). Participants were also more accurate on estimating the personality of a target individual when their personality

matched that of the participant (Experiment 2). Experiment 3 indicated that participants first located a target in their Mind-space before inferring the target's mental states; the location of the target's mind in Mind-space was related to the probability a participant would attribute certain traits to said target. Lastly, Experiment 4 indicated that when participants are given information about a target's mind that places it on a number of different dimensions related to traits and personality (i.e., source dimensions), participants then extrapolate the mind's location onto dimensions they believe to covary with source dimensions. How the represented mind is extrapolated onto these additional dimensions reflects the degree to which participants believe the dimensions to covary with the source dimensions previously presented to the participant. Overall, findings from Conway, Coll, et al. (2019) provide empirical support for Mind-space as a viable framework to assess individual differences in accuracy of how individuals represent minds in multi-dimensional conceptual space regarding personality structure.

In preceding sub-sections sections, we have presented the theoretical frameworks for EU and social skill that inform this present study. Now we will focus the literature review to how EU relates to social skill as well as research informing the discussion of how EU may underlie the development of social skill.

1.3.5 Emotion Understanding Underpinning Social Skill: Links with Theory of Mind

The ability to understand and identify emotions is understood to lay an important foundation to the development of social competence (Denham, 1998). In their meta-analytic review, Trentacosta and Fine (2010) found a mean effect size of $r = .22$ across studies that tested the relationship between emotion knowledge and social competence throughout childhood and adolescence. In a sample of children from economically-disadvantaged families assessed at ages 5 and 9, C. Izard et al. (2001) found emotion knowledge (i.e., the ability to recognize and label emotional facial expressions) predicted aggregate indices of

social behaviours (both positive and negative) and academic competence. Emotion knowledge also mediated the relationship between verbal ability and academic competence. Bosacki and Astington (1999) also found a positive relationship between child emotion understanding (EU) and social skill as rated by teachers, as well as their general vocabulary ability. The relationship between mental state knowledge and emotion knowledge for specific emotions has also been explored. For example, J. A. Nelson et al. (2013) found mental state knowledge at age 4 mediated the relationship between child emotion knowledge at age 3 and their understanding of gratitude (an arguably 'social emotion') at age 5.

Emotion regulation in particular, pertaining to understanding effective strategies for managing emotions, has empirical support for its links to social competence across development. McDowell et al. (2000) in a sample of 9-year-olds found children who demonstrated good understanding of emotion regulation strategies for negative emotions were judged to be more socially competent by their teachers and peers. Across two different studies that used a sample of 118 American and 103 German undergraduates respectively, Lopes et al. (2004) found emotion regulation (more specifically, the ability to effectively manage emotions) was linked to the quality of social interactions whether with friends (Study 1) or with individuals of the opposite biological sex (Study 2).

In studies with children ages 3 to 7, theory of mind (ToM) has been positively correlated with EU with *r* coefficients ranging from .23 (Tang et al., 2018) to .48 (Ornaghi et al., 2016) when EU is operationalized as score on the TEC. Tang et al. (2018) conducted a study with 192 children ages 4 to 6 in Hangzhou, China, finding verbal ability and ToM to be significant predictors of child EU assessed via the TEC (after controlling for age). O'Brien et al. (2011) found longitudinal associations between EU and ToM across a battery of tasks ranging from .13 to .16 ($p < .05$) and from .16 to .35 ($p < .01$) in a large sample of children

ages 3 (n = 263) and 4 (n = 244). Hierarchical regressions supported their first hypothesis that early EU predicts later ToM performance, but not the reverse.

In another longitudinal study with 240 children, Satlof-Bedrick et al. (2019) found EU at age 3 predicted later ToM skill at age 6, but this developmental pathway only held for children with low callous-unemotional (CU) traits and not for children with high CU traits. Such findings taken together support the claim that EU is a developmental precursor to ToM skill, and as such can be said to underlie ToM ability and greater social skill by extension. This is of particular interest to the present study's focus on EU in how it relates to the way emotion concepts are represented and further supports child ability to make predictions about the likely behaviour of others (i.e., interpersonal accuracy).

Interestingly, children present difficulty regarding identifying emotions tied to false beliefs, whether their own or those of others. Harris et al. (1989) found that children ages 3 to 7 understood that the emotional impact of a given situation depends not so much on the features of the situation, but rather the desires and beliefs of the individual experiencing the situation. In a study with children ages 5 to 7, Bender et al. (2011) found that there was a delay in child understanding of belief-based emotions (i.e., that certain emotions arise due to beliefs held) compared to an understanding of being able to hold false beliefs in general; this delay held regardless if children were asked about their own emotions versus those of others. More specifically, older children showed marked improvement in their FBU, but not in their understanding of belief-based emotions.

Language has been found to play a key role in the relationship between EU and ToM. Individual differences in FBU and EU in preschoolers have been associated with differences in language ability (Cutting & Dunn, 1999). Grazzani et al. (2018) found language ability (specifically receptive vocabulary) mediated the relationship between EU and ToM in children ages 3 to 8. Ornaghi et al. (2016) further found that FBU and language ability

mediated the relationship between emotion comprehension and prosocial orientation in preschoolers. A longitudinal study conducted by Lane et al. (2010) with a sample of 128 children assessed at 3.5 and 5.5 years found ToM and EU predicted moral reasoning and decision-making when negotiating prosocial moral dilemmas.

Loukusa et al. (2014) assessed ToM and emotion recognition skills in children ages 5 to 7 with developmental language disorder (DLD),[6] autism spectrum disorder (ASD), and typical development (TD) to identify potential differences across groups in social perception skill. Social perception abilities were assessed as affect recognition (of emotional facial expressions) and ToM that included both verbal tasks (measuring comprehension of figurative language and understanding of others' thoughts, ideas, beliefs, and intentions) and contextual tasks that capture child ability to attach emotions to specific social contexts. Various measures to capture language skill were used including word-finding ability, verbal working memory, and grammatical morphology knowledge (pertaining to how words are formed, grammatical word order rules, and the relationship of words to each other). Both children with ASD and DLD presented difficulties with verbal ToM (performing similarly) as compared to TD children, but only children with ASD additionally presented emotion recognition difficulties (scoring the lowest amongst the three groups). There were no group differences regarding contextual ToM. A negative correlation was found between emotion recognition and word-finding ability in TD children. Verbal ToM was correlated with grammatical morphology knowledge only for DLD children.

Although Loukusa et al. (2014) concede their study does not provide an explanation for the relationship between language and social perception, it does further support links between ToM and language by highlighting the importance of grammatical ability that has

[6] Developmental language disorder (DLD) was previously referred to as specific language impairment (SLI) as is the case in Loukusa et al. (2014); DLD refers to a disorder wherein significant deficits in language ability are observed, but there is no clear apparent biologically or physically based cause (e.g., impairments that are general cognitive, hearing)(ICD-11; World Health Organization (WHO), 2022)

also been linked to emotion comprehension in children. Morra et al. (2011) also found a significant positive correlation between grammar comprehension and EU in children ages 5 to 11. Ford and Milosky (2003) found that both typically developing children and children with DLD in Kindergarten (i.e., Reception) were able to identify and label facial expressions. However, children with DLD had difficulty inferring the emotional reactions of protagonists presented in various stories. Inference ability was also related to language comprehension.

Emotion understanding has also been reported to have a moderately strong correlation with affective/emotional perspective-taking (r = .56, Harwood & Farrar, 2006). Emotional perspective-taking, as opposed to cognitive perspective-taking, has also been found to correlate with preschooler perspective-taking during online language processing of a speaker's emotional prosody (e.g., intonation, stress, rhythm) to infer the speaker's emotional state and communicative intent (Khu et al., 2018). Affective perspective-taking is of interest to this study as we would like to consider not just how children represent the emotional states of others, but also how they represent the way others are likely to process and understand these emotions. We would like to pursue a line of inquiry wherein representing the internal states of an 'other' ties into a representation of the other person's affective processing ability.

Arguably, representing the way another person will identify and experience emotions amounts to an embedded representation of the other person's emotion concept system. Such a representation of another person's emotion concept system can then inform an individual's predictions of how an 'other' may react and experience events. How to describe the way an emotion concept system is represented requires further empirical evidence this current study aims to provide through analysis of emotion definitions produced by a sample of primary school-aged children (Study 2). The role of emotion language and emotion representation in interpersonal accuracy is taken up in Study 3, and will now be considered in this final sub-

section of the literature review concerned with how we develop a representation of the self and of others.

1.3.6 Emotion Representation, Social Problem-Solving, and Interpersonal Accuracy

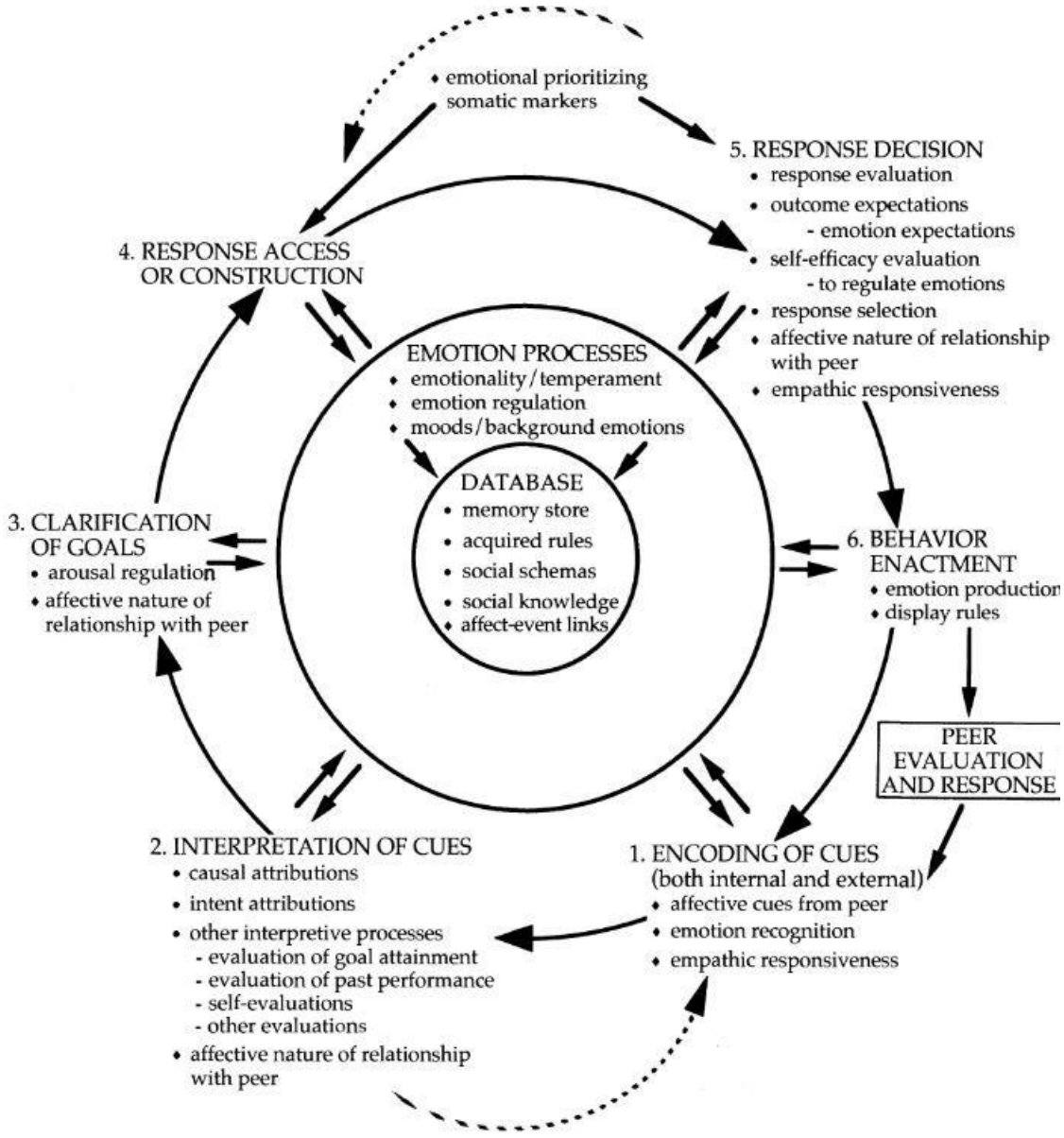
Social problem-solving relates to the framework of understanding emotions as social scripts in that it emphasizes how making decisions in social situations requires synthesizing information and cues from multiple inputs. Crick and Dodge (1994) propose the social information processing (SIP) model to describe cognitive processes involved in social interaction and decision-making. The model includes six steps: 1. *encoding of cues* wherein environmental cues (from an internal affective environment or external social/behavioural environment) are attended to; 2. *interpretation of cues* wherein event causes are analysed and inferences made about the intentions and/or perspective of others involved in the social situation; 3. *clarification of goals* where the child decides what they want to achieve in the situation (influenced by what is attended to in Step 1 and interpreted in Step 2); 4. *response access and construction* referring to the child's response selection process to achieve the goal identified in Step 3 wherein they generate possible responses/draw on a pre-existing response repertoire; 5. *response decision* that involves consideration of how likely the selected response will achieve a desired goal and a self-assessment of the child's competence to enact the response; and 6. *behaviour enactment* that is based on decisions made during the previous steps. T. Cooke (2017) reviews the history of the SIP model as well as evidence for each identified step, concluding that the SIP model is a useful framework for understanding how a child understands and behaves in social situations and furthermore, for education psychologists.

In response to a critique that proponents of the SIP model acknowledge, Lemerise and Arsenio (2000) present a revision to the SIP model that integrates emotional processes *(see* Figure 6). Specifically, three emotion processes are added to the model including:

temperament/emotionality, emotion regulation, and moods/background emotions. These processes are understood to exist in a bi-directional relationship influencing each step in the SIP model and to also influence what is termed a child's *database* that includes memory, acquired rules, social schemas, social knowledge, and affect-event links. The present study is most interested in the inclusion of emotion recognition in the first step of cue encoding and its subsequent relationship to the interpretation of cues and attributions of cause and intent in social interaction. Adopting the Lemerise and Arsenio (2000) SIP model in their longitudinal study with 127 children ages 3 to 4 and tracked into Kindergarten/Reception, Denham et al. (2002) advance that "children's substate of emotion knowledge serves them in decoding social encounters" (p. 901). Lower emotion knowledge at ages 3 and 4 was found to predict later levels of child aggression. Dunn and Herrera's (1997) longitudinal study also found that EU and mind-reading ability (as well as moral sensibility) at age 3 predicted the ability of 6-year-olds to solve interpersonal conflict with friends at school.

Figure 6

The SIP Model Integrated with Emotion Processes



Note. Reproduced from Lemerise and Arsenio (2000).

Emotion understanding and representation also hold important links with relationship formation. Cooke et al. (2016) undertook a meta-analysis of child EU and attachment (i.e., how children form emotional bonds with caregivers), finding a medium effect size of $r = .33$ for the relationship between child attachment security and EU. De Rosnay and Harris (2002) found the contribution of attachment security in explaining individual differences in EU for children ages 3 to 6 was maintained even after controlling for other individual differences

including age, verbal mental age, and gender. Lopes et al. (2011) with a sample of undergraduates (in Germany, Spain, and the US) found strategic emotion regulation ability was negatively related to interpersonal conflict, suggesting the importance of abilities to evaluate emotional situations and identify effective responses so as to successfully navigate interpersonal situations and form bonds. The relationship between strategic emotion regulation ability and conflict was not mediated by individual trait positive or negative affect.

Emotion attribution accuracy has been found to relate to strained interpersonal relationships, interpersonal behaviour, and aspects of personality. Schultz et al. (2000) focus on child ability to attribute emotions to others, specifically child accuracy in attributing anger to others on a test of emotion situation knowledge (ESK), with a sample of 93 preschoolers (M_{age} = 4.8 years). Greater anger attribution predicted higher levels of rejection by peers as reported by teachers. In male children, greater anger attribution bias prediction higher levels of aggression. Schultz et al. (2004) in a sample of children in 1st and 2nd Grades (Years 2 and 3) found emotionality (i.e., an individual's measurable reactivity to a stimulus indicating the observable behavioural and physiological component of emotion) was correlated with emotion processing. Three types of emotion processing were addressed in the study: emotion attribution accuracy, empathy, and emotion attribution bias. Schultz et al. (2004) found emotion attribution accuracy and empathy were related to the happiness component of emotionality, the anger component was linked to anger attribution bias, and the fear component was related to fear attribution bias.

Regarding the attribution of personality traits, children have been found to present a positivity bias in that they selectively attend to information in order to maintain positive evaluations of themselves and of others (Boseovski, 2010). Garner (1996) found in middle childhood that child attributions of aggression and denial were positively related to reports of

having negative peer interactions. Emotional perspective-taking and knowledge of prosocial display rules in interaction also positively predicted child prosocial behaviour.

1.4 Influential Factors for Social-Emotional Development

Beauchamp and Anderson (2010) present a developmental biopsychosocial model to explain the development of social skill called 'SOCIAL': the Socio-Cognitive Integration of Abilities. Although the integrative framework aims to explain the origins of dysfunctional social skill (incorporating findings from autism, schizophrenia, and traumatic brain injury research), it focuses on the emergence of social skills in childhood and adolescence. Social function is construed to include socio-emotional skills, attention/executive function, and communication—serving as the model's three main components of cognitive function that interact as well as impact social skill development and functioning, giving rise to social competence. Communication can be understood more broadly as 'language' and temperament/personality is identified in the model as an internal factor (intrinsic to the individual) that interacts with the cognitive function components bi-directionally–two factors that we will use to frame our discussion here as they pertain to the research scope.

Sources of individual differences in EU impact social interaction and have been found to appear quite early on in life. Arguably, a more detailed and comprehensive representation of emotion that includes links or relationships to other emotion concepts (in addition to consideration of the emotion's cause and associated cognitions, expression, physiological reaction, etc.) will accompany a richer level of EU, whether directed at the self or others (Pons et al., 2003). What then can contribute to the development of a rich representation of emotion? Pons and Harris (2005) conducted a longitudinal study testing 42 children (ages 7, 9, and 11) and two time points 13 months apart, finding individual differences in overall EU were quite stable (for both simple and complex components of EU), and that overall EU at Time 1 was a good predictor of overall EU at Time 2.

Multiple factors influence EU development including non-verbal intelligence (Albanese et al., 2010; De Stasio et al., 2014) and working memory (Morra et al., 2011). Skalická et al. (2019) also report on the impact of screen time on the development of EU in children ages 4 to 8. Kuppens and Tong (2010) present a framework to discuss individual differences in the experience of emotion tied to differences in how people appraise their circumstances, emphasizing thus the importance of contextualizing emotional experience. Fine et al. (2006) conducted a longitudinal study to examine individual differences in developmental trajectories for emotion situation knowledge (ESK), referring to a child's ability to infer the emotions of others based on situational cues. Participants were assessed at four different time points including Preschool, 1st Grade (Year 2), 3rd Grade (Year 4), and in 5th Grade (Year 6). Correlates of ESK included temperament and verbal ability. Preschool verbal ability predicted ESK growth scores for the emotion of shame over time as well as ESK specifically in the 1st Grade for the emotions of anger, fear, and joy. Preschool negative emotional intensity predicted slower ESK development over time as well as the development of ESK for anger and shame.

Doan and Wang (2010) studied child ESK in relation to maternal emotion-mental state (EMS) talk during storytelling with 3-year-old children. Maternal mental state language predicted child ESK and maternal reference to behaviours was negatively related to child ESK. Cross-cultural differences between European American mothers and Chinese mothers were observed: European American mothers made more references to internal states (i.e., emotions, thoughts) whereas Chinese mothers made more references to behaviours. In effect, maternal emphasis on mental states as opposed to behaviours during storytelling was found to partially mediate the impact of culture on child ESK. Findings from Doan and Wang (2010) support evidence identifying language input as an important source of individual differences in both child ESK and the ability to represent emotional states in context.

Language has been linked to theory of mind (ToM; *see* Astington & Baird, 2005; De Villiers & De Villiers, 2014 for reviews) and the development of social competence more broadly (e.g., Longobardi et al., 2014; McCabe & Meller, 2004) in addition to EU, as has temperament/personality (e.g., Blair et al., 2004; Miers et al., 2013; Verron & Teglasi, 2018). As such, both have a justified place in our focus on important factors impacting social-emotional development. Here the review will focus more on the role of language and temperament/personality as they relate to EU and the development of emotion concepts given the research study scope. Study 2 is concerned with the relationship between language and emotion representation. The use of emotion language in the classroom as part of SEL programmes is of interest to Study 1 as a systematic review. We also focus on the role of temperament and its relationship to EU development as it informs the later discussion of how personality relates to EU and interpersonal accuracy taken up in Study 3.

1.4.1 Language: A Source of Individual Differences

The relationship between language, EU, and ToM as well as the individual differences therein has been explored across childhood. In research with preschoolers, individual differences in EU and ToM (specifically false-belief) did not contribute to each other independently of age, language ability, and family background (i.e., parental occupational class and maternal education) (Cutting & Dunn, 1999). Bosacki and Moore (2004) found a positive correlation between child EU and general verbal ability as well as with parent perception of stereotypic feminine behaviours. Independent of verbal ability, female children scored higher than male children in emotion labelling and understanding of 'complex' emotions—pride in particular. Ruffman et al. (2003) found performance on syntax measures assessing child understanding of word order and embedded clauses was related to false-belief understanding (i.e., ToM skill) and emotion recognition skills. Language control tasks with relatively low syntactic demands also correlated well with false-belief understanding (FBU),

leading Ruffman et al. (2003) to advance that ToM at younger ages is related to general language skill as opposed to specifically syntactic (e.g., de Villiers & Pyers, 2002; Low, 2010) or semantic skill. There is a body of meta-analytic evidence supporting the relationship between language (regardless of domain tested) and FBU (Liu et al., 2008; Milligan et al., 2007; Nilsson & de López, 2016). Multilingualism has also been found to relate to developmental trajectories of EU in Preschool (Downs et al., 2007).

The relationship between language competence (LC) and emotional competence (EC) across middle childhood has received particular attention for links to school adjustment and social functioning. Extending the age range from preschool, Pons et al. (2003) in a sample of 80 children ages 4 to 11 found: age and language ability taken together explained 72% of the variance in child EU; age alone explained 20% of the variance; and language ability alone explained 27% of the variance. Language ability was assessed as understanding of grammatical contrasts in English measured with the Test for the Reception Of Grammar (TROG; Bishop, 1989). EU was assessed via the TEC. Beck et al. (2012) in a sample of 210 children 7- to 9-years-old assessed LC via measures of receptive vocabulary, verbal fluency, literacy, narrative structure, and the narrative use of evaluative devices. EC was measured as expressive emotion vocabulary, declarative emotion knowledge (i.e., explicit knowledge of emotion-related experience and expression), awareness of mixed emotions, and facial emotion recognition. Positive correlations between LC and EC were found ranging from r = .12 to .45. The strongest relationships were between LC measures of receptive vocabulary and literacy, and EC measures of emotion knowledge and awareness of mixed emotions.

1.4.1.1 Language and Conceptual Representation. Gentner and Goldin-Meadow (2003) note a resurgence in research focus to disentangle the relationship between language, thought, and cognition echoed in studies that examine how emotion perception is affected by straining access to language (i.e., emotion term labels). Disrupting linguistic access is

generally achieved through the technique of semantic satiation (wherein participants hear a repeated word to a certain threshold) that has provided interesting insights in the context of emotion research as the achieved result is a temporary dissociation of a facial expression from its emotion term label. Specifically, Lindquist et al. (2006) found that participant ability to categorize emotional facial expressions was slower and less accurate once they no longer had access to associated emotion term labels. Gendron et al. (2012) found that participants encoded the same facial expressions differently depending on whether or not they had access to associated linguistic terms. Having already been presented a facial expression earlier did not enhance categorization performance in instances where the associated emotion label was unavailable.

Lindquist et al. (2014) add to the discussion of the role of language in emotion concept representation in their study of patients with semantic dementia as they demonstrated that emotion perception of discrete emotional faces was affected by semantic memory loss, but not affective perception of the emotional valence of faces. Although these patients had lost their ability to understand emotions as distinct units with associated facial expressions (i.e., emotion perception), they were still able to perceive whether or not facial expressions belonged to a broader valence dimension (i.e., affective perception). These studies show how emotion language is not just part of vocabulary acquisition, but also has implications for the conceptual representation of emotion.

Furthering a constructionist view of the brain, Lindquist et al. (2015) review evidence from social-cognitive, neuropsychological, cross-cultural, and neuroimaging studies to advance that language not only communicates emotion, but also constitutes emotional perception in that emotion words cohere sensations into consistent and distinct categories (e.g., of ‘anger,’ ‘disgust,’ or ‘fear’). The categorization of sensations within these emotion categories gives rise to what we understand the emotional experience of them to be. Although

we do not make the claim that an emotion term is the emotion in itself, Lindquist et al.'s (2015) review prompts a more moderate consideration of interest to the present study: how semantic information tied to emotion terms can shape how emotions are processed, highlighting how language structures conceptual representation.

Lindquist et al. (2015) further advance that the acquisition of emotion term labels supports the organization of both semantic and conceptual representations of emotional states, tying in an older consideration of how language in general affects perception, summarized most succinctly by the Linguistic Relativity Hypothesis (LRH) (Whorf, 1956). The LRH has been the subject of much debate in research as it advances that acquired linguistic labels determine perceptual category boundaries, leading to the contentious implication that the language one speaks shapes one's experience of the world—inherently problematic for universalist accounts of human development of which language development is a part. Universal experiences of perceptual categories, namely that of colour (e.g., Berlin & Kay, 1969; Heider, 1972) have been the main source of challenge to the LRH, but more recent evidence has shown that language does influence how people categorize colour along a spectrum (Davidoff, 2001; Roberson et al., 2000).

We are not concerned with evolutionary accounts of language and emotion processing, but the present study aims to further disambiguate how language interacts with emotion concept representation within a given language community (Studies 1 and 2), and its potential implications on behaviour and cognition with our focus on interpersonal accuracy (Study 3). Gopnik (2001) advances that Whorfian ideas about language and concept formation can be integrated with advances and evidence from modern-day cognitive science in the study of perception and conceptual representation.

Further support for the importance of language for emotion representation stems from research on alexithymia and interoception. Alexithymia[7] (and more specifically trait alexithymia) refers to a subclinical phenomenon wherein individuals have difficulty describing and recognizing physical sensations tied to emotional experience or arousal (Goerlich, 2018; López-Muñoz & Pérez-Fernández, 2020; Nemiah et al., 1976; Stephenson, 1996). Across two experiments, Cook et al. (2013) found alexithymia was correlated both with how precise individuals were in attributing emotions to facial expressions and their level of difficulty in interpreting the emotional content of facial expressions.

Alexithymia has also been linked to academic achievement. In a sample of undergraduates, Parker et al. (2005) focused on a moment considered stressful in the lifespan as part of their exploration of the relationship between academic achievement and alexithymia: that of starting university. Despite being at similar levels academically upon university entry, participants who were non-alexithymic had higher academic success compared to alexithymic participants by the end of their first year at university.

Interoception broadly refers to the ability to sense or perceive one's internal physiological states (e.g., hunger, thirst) (Ceunen et al., 2016; Craig, 2002, 2003, 2017). Connell et al. (2018) focus on how interoceptive information supports the perceptual grounding of both concrete and abstract concepts. Interoception was found to be especially important for emotion concepts, specifically negative emotions tied to fear and sadness as compared to other concepts of equal valence and abstractness. Furthermore, individual differences in interoceptive ability have been correlated with individual differences in emotional conceptualization (Ventura-Bort et al., 2021). Maternal interoceptive knowledge has also been found to predict child emotion regulation and social skill in middle childhood

[7] From Ancient Greek, the combination of the prefix '*a*' (meaning 'not'), '*léxis*' ('speech'), and '*thȳmós*' ('soul') to mean quite literally having no words for emotions or internal states; Sifneos who coined the term alexithymia interpreted *thȳmós* as 'mood'(Oxford English Dictionary (OED), n.d.).

(MacCormack et al., 2020). Findings from such studies on alexithymia and interoception when taken together support a notion key to the present study: one's ability to identify emotions is related to how one represents emotional states.

1.4.1.2 Emotion-Mental State Language: Support for Conceptual Development.

The question of the benefit of domain-specific vocabulary to conceptual acquisition is pertinent to SEL programmes as lesson plans are often focused on particular emotions. Some programmes focus exclusively on emotion vocabulary, for example (e.g., 'RULER Feeling Words' curriculum; Brackett et al., 2012) tied to a logical assumption better communication about internal states requires knowledge of words that accurately capture said states. Each emotion word has an associated meaning (that we will also refer to as its semantic representation), acquired through a combination of input from explicit learning (e.g., being told what an emotion word means) and experience. The representation of an emotion concept reflects both a synthesis and feedback loop between semantic representation (anchored by language in the form of an emotion term), and emotional experience (referring to both specific events that elicit an emotion as well as associated internal states and physiological responses). In other words, the way we understand an emotion (i.e., an emotion concept) is tied to the semantic value attached to emotion terms. The acquisition of emotion words can then facilitate the development of emotion concepts.

Whether acquiring a variety of emotion-mental state (EMS) verbs directly causes increased ability to represent the mental state of others (whether emotional or regarding their thought processes, motivations, etc.) is up for debate. EMS vocabulary has been found to relate to child perspective-taking skills (both visual and emotional) and less so to an understanding of the desires of others, with children presenting a more developed EMS vocabulary performing better on perspective-taking tasks (Chiarella et al., 2013). Gopnik and Meltzoff (1997) highlight the difficulty of disentangling concept learning from word learning,

opting for a perspective that views them as parallel interrelated processes developing together where “one is not the prerequisite of the other “ (Widen & Russell, 2008, p. 308). Learning mental state terms (MST)s provides children with labels for mental states that then aid in the acquisition of mentalistic concepts (W. S. Hall, 1987).

Language in general (i.e., in addition to EMS vocabulary) has been construed as a means of cognitive representation that helps anchor a child’s understanding of mental states and emotion concepts—the conceptual inventory that can be accessed when knowledge of internal states is needed whether to effectively identify emotions in a social situation or to regulate them, for example (Cole et al., 2010; Pons et al., 2003; Streubel et al., 2020). Emotion term labels have been considered helpful for young children (e.g., 3-year-olds) in particular when they encounter unfamiliar emotions, with the specific label supporting the organization of disparate emotional information into a cohesive meaningful category for the child (e.g., Ogren & Sandhofer, 2022).

Child use of mental state language (i.e., mental state talk) in middle childhood has been moderately related to ToM skill (Grazzani & Ornaghi, 2012) and negatively correlated with child aggressiveness and emotional instability (Longobardi et al., 2014). Child EU has been correlated with both use and comprehension of emotional state talk, a specific form of mental state talk dedicated to emotional states (Ornaghi & Grazzani, 2013). However, regression analyses conducted by Ornaghi and Grazzani (2013) indicated that comprehension of emotional state language rather than its use played a more significant role in explaining child EU in a sample of 100 children ages 7 to 10. Grazzani and Ornaghi (2012) also found that comprehension of MSTs had higher correlations with ToM ability (as compared to usage). As such, it is of interest to further consider how children acquire and learn to understand EMS words.

The acquisition of EMS vocabulary does not follow a direct linear trajectory that consistently increases across the lifespan. Across two studies with preschoolers (ages 3 to 5), Shablack et al. (2020) tested whether linguistic or situational cues supported children to understand novel words denoting emotion concepts as opposed to action or physical state concepts. In Experiment 1 focused on linguistic cues (i.e., sentence frames), novel words were introduced to children via brief videos of puppet animals talking about aliens. Children were then asked to select images depicting the novel word across two different tasks. Experiment 2, focused on situational cues, presented children with narrated videos of aliens experiencing emotional situations. Overall, 5-year-olds appeared to rely more on situational cues and better able to glean grammatical consistency across sentence frames containing novel emotion words as compared to 3- and 4-year-olds. The researchers speculated that mapping emotional states and physical states onto words may be more difficult than mapping physical characteristics onto novel words as mapping states depends on mental state inferences. In effect, the difficulty young language learners have in acquiring mental-content verbs (e.g., think, believe, imagine, hope) (also referred to as mental predicate vocabulary) has been found to relate to the informational demands of mapping and not age-related cognitive deficiency (Papafragou et al., 2007).

Baron-Cohen et al. (2010) conducted a developmental survey to track English emotion word comprehension in participants ages 4 to 16. Between the ages of 4 to 11, the emotional lexicon was found to double in size every two years. In contrast, the growth of the emotional lexicon plateaued between the ages of 12 to 16. Grosse et al. (2021) compared child and adult patterns of emotion word use in a sample of 153 German participants in addition to tracking emotion vocabulary development in children ages 4 to 11 (n = 123). Emotion vocabulary was understood "as a connected representational system across different age groups" (Grosse et al., 2021, p. 159). There was convergence between adult usage of

emotion words and that of older children, however emotion word usage was far from adult-like, even for children at ages 10 or 11. Children produced more emotion words as they aged but to a lesser degree than that found in adult production. Valence (i.e., differentiating negative versus positive words) was a well-established semantic dimension across both age groups, with the use of broad emotional terms (e.g., good, bad) being produced earlier on as compared to specific discrete emotion labels (e.g., happiness, sadness).

Bazhydai et al. (2019) focused on emotion vocabulary acquisition in adolescence in a sample of students in 5th to 8th Grades (Years 6 to 9). Participants were asked to complete a task wherein they had to generate emotion words for five emotion categories: angry, happy, nervous, relaxed, and sad. Similar to findings from Grosse et al. (2021) with younger children, Bazhydai et al. (2019) found older adolescents produced more emotion words than younger adolescents, with younger adolescents producing more non-emotion words in the category task (e.g., someone who is happy was described as ‘smiley’ or ‘friendly).

When considering EMS vocabulary acquisition, it is also equally important to consider sources of EMS language input the child may experience in their surrounding environment. Teacher use of mental state language has been found to facilitate child receptive vocabulary growth (e.g., Barnes & Dickinson, 2018). Longitudinal evidence supports a relationship between conversations with peers about mental states and development of a child’s understanding of both mind and emotion. Hughes and Dunn (1998) found associations between child references to mental states in conversations with their friends and improved performance on ToM and affective perspective-taking tasks. No gender differences were observed on task performance, but female children did produce more mental state language than male children in peer conversations. Individual differences in ToM, EU, and mental state talk were also stable throughout the 13-month period of the study.

The contribution of caregiver language production and mental state talk (especially that of mothers) to child MST production, ToM skill, and greater social-emotional development has been commonly researched (De Rosnay et al., 2004; *see* De Rosnay & Hughes, 2006 for review; Ensor et al., 2014; Ensor & Hughes, 2008; P. L. Harris, 1994, 1999; P. L. Harris et al., 2005; Laible, 2004; Laible & Song, 2006; Laible & Thompson, 2000; Meins et al., 2001, 2013; Meins & Fernyhough, 1999). Parental mental state talk has presented little correlation with parental ToM ability, but has predicted later FBU in preschoolers (Devine & Hughes, 2019). Specific conversations about emotions between parent and child can support child emotion representation as parental use of emotion labels has been correlated with child EU in children ages 4 to 6, with only maternal emotion label use predicting child EU; paternal emotion label use was correlational (Aznar & Tenenbaum, 2013).

Maternal mental state language has been found to predict levels of child mental state talk and EU in both infants and toddlers (Taumoepeau & Ruffman, 2006, 2008). In a seven-year longitudinal study (i.e., the Social Understanding and Mental State Talk project) with 53 mother-child dyads, Carr et al. (2018) found that mother and child mental state talk were stable from preschool to later childhood, and that early maternal mental state talk explained unique variance in both later child behavioural adjustment and mental state talk (in line with previous research supporting the link between maternal and child mental state talk). There was also a longitudinal relationship between both early maternal and child mental state talk and later child ToM skill. Maternal MST usage, specifically increased references to cognitive states (e.g., thinking, knowing), when children were ages 3 or 4 was related to lower externalizing behaviour when children were 10. How mothers talk about feelings with their children in early childhood is also significant for their social-emotional development. For example, Laible et al. (2013) found that aspects of reminiscing quality (i.e., co-construction

of meaning, child engagement) of a past negatively-valenced emotional event in mother-child dyads when the child was 42 months old was related to child levels of EU, empathy, relationship representation, and moral-self at 48 months.

Interactions within the larger family surrounding EMS talk are also of import to both child EU development and production of EMS talk. Jenkins et al. (2003) in their longitudinal study on family dynamics pertaining to discussion of cognitions and feelings found EMS talk by family members when children were ages 2 to 4 (Time 1) predicted change in child EMS talk two years later. Focused on child interactions with mothers and siblings, Dunn et al. (1991) found differences in family discourse on feelings with 36-month-old children were correlated with child emotion recognition ability on an affective perspective-taking task at age 6. Discourse differences included frequency, whether the discussion was causal, diversity of themes, and whether it was a dispute. Correlations between discourse differences and child emotion recognition were independent of child verbal ability and how much family members talked to each other in general.

The acquisition of emotion-specific vocabulary and its link to conceptual development has also been addressed in the study of individual differences in EU. Streubel et al. (2020) compared the contribution of emotion-specific vocabulary compared to that of general language ability to the conceptual development of EU in children ages 4 to 9. When measured via expressive tasks, emotion-specific vocabulary was found to play a more important role than general language in explaining differences in early- and later-acquired components of EU. Streubel et al. (2020) found *size* of emotion-specific vocabulary (i.e., number of different emotion words used) explained knowledge of emotion regulation strategies in Preschool, aligning with previous research underscoring the role of language in the development of emotion regulation (e.g., Cole et al., 2010). In contrast, Streubel et al.

(2020) found *depth* of emotion-specific vocabulary (i.e., adult-like use of emotion words) was more important in primary school as it was associated with individual differences in EU.

1.4.2 Temperament/Personality

Temperament is another influential factor for the representation of mental states (of the self and of others) addressed in the research literature (*see* Shiner et al., 2012 for a historical review of research on temperament and future directions). Temperament has been defined as a child's natural responses to stimuli, physiologically-based (Degnan, 2017; M. K. Rothbart et al., 2001). Social situations are understood as part of external stimuli to which children respond (M. K. Rothbart et al., 1994). Evidence supporting the relationship between temperament and social-emotional factors is largely with younger children as personality is often used instead as a construct for adolescent and adult study populations. There is debate regarding the relationship between temperament and personality as there is significant overlap between the two, however there is agreement that temperamental traits appear early in life, are relatively stable, and are genetically-influenced (e.g., Caspi, 2000). Temperament can be understood as more of a collection of constitutionally based predispositions that personality builds upon, modified by both experience and the development of other cognitive abilities (Rettew & McKee, 2005).

In the present study, a developmental perspective will be adopted to understand the relationship between temperament and personality, informed by longitudinal evidence that early temperamental traits are associated with later personality dimensions. Hagekull and Bohlin (1998) found preschool temperament ratings predicted personality in middle childhood, with the personality dimension of extraversion being most clearly linked to temperament. Caspi et al. (2003) found child temperament at age 3 was linked to adult personality traits assessed at age 26. Temperament also relates to individual differences in reactivity and self-regulation in childhood (Henderson & Wachs, 2007) and as such, can be

argued to lay the foundation for dimensions of personality observed later in adulthood (Denham et al., 2009). In effect, Denissen et al. (2013) have proposed an integrative developmental framework that advances self-regulation underlies the link between temperament and personality.

Additionally, temperament has been found to relate to a variety of social-emotional factors including social skill, cognition, and interaction (Kiliç & Güngör Aytar, 2017; Miers et al., 2013; Szewczyk-Sokolowski et al., 2005; Walker & Henderson, 2012), emotion understanding (LaBounty et al., 2017; Pérez-Edgar & Fox, 2007), theory of mind (Lane et al., 2013), and emotion regulation (Blair et al., 2004; Sullivan et al., 2015). Lane et al. (2013) assessed links between temperament and ToM (specifically FBU) in a sample of 102 preschoolers from China and the US. Temperament was assessed via parental report of child behaviours and physiological measures of child reactivity via salivary cortisol. Children who were more aggressive or both socially withdrawn and physiologically reactive (i.e., children with certain types of reactive temperaments) were found to have poorer FBU. Physiological reactivity predicted more advanced FBU (i.e., ToM skill), a finding researchers attribute the possibility that heightened reactivity to the external environment can support social engagement and attention to social stimuli. Interestingly, children who were socially withdrawn but with a non-reactive temperament were also found to have advanced levels of ToM skill; this association was particularly strong for Chinese children.

As such, findings from Lane et al. (2013) suggest that different kinds of child temperaments (e.g., both socially interactive and withdrawn) can be beneficial to advanced socio-cognitive development. Longobardi et al. (2017) also present evidence of an inhibited approach to social interaction supporting FBU in young children. The researchers considered six different temperament traits and their relationship to both cognitive and affective ToM. The temperament traits included were : 1) *attention/persistence* to refer to attention focusing

or attentional/behavioural control when completing tasks; 2) *inhibition to novelty* whether unfamiliar people, situations, or environments, or in evaluative contexts[8]; 3) *motor activity,* capturing child physical activity level assessed in frequency and duration in a given time unit; 4) *negative emotionality*—the frequent experience of intense negative affect and high frustration when goal-directed behaviour is interrupted or being easily upset by minor discomfort; 5) *positive emotionality*—the experience of frequent and intense positive emotions; and 6) *social orientation*, also referred to as extraversion or sociability to capture a preference of being with others.

In a sample of 168 children ages 3 to 5, Longobardi et al. (2017) found inhibition to novelty predicted higher levels of cognitive ToM in 4- to 5-year-old children. Across all ages, higher levels of social orientation predicted more advanced comprehension of the external aspects of emotion. As such, temperament dimensions appeared to interact differently with specific aspects of cognitive and affective ToM in young children in order to support advanced social-emotional development. A stronger preference to be with others over being alone (i.e., higher social orientation or extraversion) also supported increased EU development for all children, whereas avoiding unfamiliar individuals and situations was a positive predictor for advanced ToM skill for 4- to 5-year-old children.

In effect, temperament has been found to act on social competence via EU. Verron and Teglasi (2018) in a sample of 142 preschoolers found temperament had statistically significant indirect effects on social competence when tested via emotion situation reasoning but not via emotion situation knowledge. Positive and negative affective reactivity were also strongly correlated with EU. Chang et al. (2012) tested a mediated moderation model wherein emotion regulation was included as a potential mediator on relations between cumulative risk and negative emotionality (i.e., temperament), understood as independent variables—a

[8] Inhibition to novelty is also referred to as behavioural inhibition, shyness/withdrawal, or fearfulness.

mediated interaction that then impacts social competence (i.e., the dependent variable) in the transition from Preschool to school. It was hypothesized that early cumulative risk assessed at ages 1.5 to 2 years would predict later emotion dysregulation in Preschool at age 3.5 years, and that relationship would be moderated by levels of negative emotionality assessed at 1.5 years. The strength of the relationship between cumulative risk (assessed via measures of contextual risk factors) and emotion dysregulation was found to be amplified for children with greater negative emotionality.

Furthermore, temperament has been found to influence interpretation of social situations and social behaviour as it impacts emotion processing and the potential frequency of social interactions for an individual. For example, if one has a shy temperament, it might make one less likely to engage in social interaction (Cheek & Buss, 1981; Greco & Morris, 2001). Posner et al. (2005) highlight a link between temperament and the appraisal of emotions in that a predisposition to ascribe negative valence to emotional states could signal the development of future affective disorder. In a longitudinal study with 209 children in 2nd (Year 3) and 4th Grade (Year 5) conducted across two years, Bengtsson and Arvidsson (2011) found moderate levels of emotional reactivity (i.e., temperament) were related to more developed perspective-taking skills. The combination of high emotional reactivity and good perspective-taking skills was associated with the ability to effectively regain a neutral affective state post emotional arousal. Across the two-year assessment period, children who made positive gains in perspective-taking skill became more moderate in their negative emotional reactivity, and showed an increased ability to down-regulate strong positive emotions. The researchers concluded that quality perspective-taking skills were used by children as a way to optimize emotion regulation in middle to late childhood.

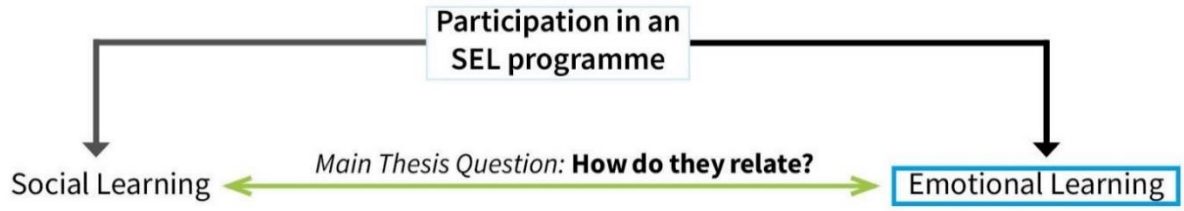
Personality and emotion regulation strategies have also been linked to how emotions are potentially experienced. Schindler and Querengässer (2019) induced a sad emotional state

in 82 undergraduate participants who also completed self-report measures of personality and emotion regulation strategies. Participants were also assessed at a different time point in a neutral state. A bi-directional relationship was found wherein the experience of sadness was linked to decreased extraversion and elevated neuroticism. Neuroticism was found to predict susceptibility to sadness, but said susceptibility had no relationship to self-reported emotion regulation strategies. However emotion regulation, specifically expressive emotional suppression, was linked to slower remission of sadness. Abe and Izard (1999) had mothers rate their child (aged 3.5 years) on the five-factor model of personality, and coded child facial expressions of emotions when completing the 'strange situation' task. Correlations between maternal ratings of child personality and child facial expressions were found. Specifically, full-face negative emotional expressions were positively linked to neuroticism ratings, and inversely related to ratings of agreeableness and conscientiousness. Ratings of extraversion and openness to experience were positively related to positive facial expressions. The relationship between emotion expression and maternal ratings of child personality dimensions was not mediated neither by attachment security nor by levels of emotional reactivity. As such, how emotions were physically expressed (and in other words observable to others) was directly linked to aspects of how caregivers perceived dimensions of the child's personality. Interestingly, which dimensions of personality were correlated with a child's particular emotional facial expression were split by the valence of said facial expressions.

1.5 Relating Emotional Learning to Social Learning—A Study in Three Perspectives

Figure 7

Broad Research Focus of the Present Study



It is telling that emotional development is highlighted in SEL as this supports how 'emotional learning' can be treated separately from 'social learning' while still being linked to the social development of students. Although the present study is not an intervention, it aims to engage with the question of how social learning relates to emotional learning across development in educational settings by focusing on how we develop the ability to identify emotions in others and its implications for social interaction. Three perspectives are adopted across three studies to address this broad research focus. The first concerns the impact of SEL interventions on child emotion understanding (EU), noting which EU areas have been targeted by SEL programmes in order to identify trends in school-based child emotion socialization practices. Study 1 aims to prompt discussion centred on the implications of emphasizing certain EU components over others in primary school. Study 1 is the first to the researcher's knowledge that will provide a direct account of how emotions have been taught in schools across middle childhood via SEL programmes, as well as evidence of SEL programme impact on child EU development as previous meta-analyses have focused either on academic or social-emotional composite outcomes. This perspective on how children are 'taught' emotions, informed by an overview of the SEL research literature and assessment of cumulative evidence, is then contrasted with a second perspective on emotion in Study 2: that of the child.

Study 2 analyzes emotion definitions to gain a broader sense of child EU as it relates to language and the potential semantic structure of a child's emotion concept system. Particular focus is placed on interrelationships between emotion concepts in line with the study's theoretical stance. Previous theoretical models may provide useful visualizations of dimensions by which we can define emotions, but cannot speak to how emotion concepts are represented in relation to each other within a whole conceptual system. Although children may develop the ability to represent emotions along a dimension of arousal or intensity (having acquired the understanding of emotions in terms of their valence), this study advances that a child's understanding of emotion is more complex and will use linguistic evidence derived from the analysis of child emotion definitions to test this proposal. Exploring how children talk about emotions provides a perspective that links to a larger discussion on the influence of social-emotional experiences and language on emotion representation across development. Study 2 focuses on emotion language as an indicator and influential factor on the way individuals understand emotions. Study 3 extends the focus on emotion language to see its potential impact on interpersonal accuracy (IA), specifically whether additional access to emotion language in character descriptions can facilitate more precise representation of the personality traits of others and trait-based behaviour prediction.

The final perspective in this study (presented in Study 3) considers which individual-level factors influence representing the emotional states of others and subsequent IA in an older age band of students: undergraduates. Factors of interest include personality and individual levels of emotion understanding/awareness as well as sense of social connectedness. This study sets a precedent for simultaneously researching the relationships between emotion representation, IA, personality, and levels of social connectedness, and for directly testing the role of emotion representation on IA via an emotion language manipulation on a novel researcher-developed IA task. Social-emotional learning can be

integral to learning at any age as education is an inherently social process. As research expands its focus from early years education to institutions of higher learning regarding social-emotional development (e.g., Oberst et al., 2009; Vaida, 2016; N. Wang et al., 2011, 2012), it is important as a field to cohesively understand the impact of direct social-emotional skill promotion across a student's trajectory through formal education settings. Even if SEL programmes are not commonly administered at the undergraduate level, it is still important to understand potential distal impacts of SEL programme participation in primary school on later social-emotional development. Much of the research on SEL programme participation has focused primarily on proximal outcomes, and only a handful on follow-up effects, but only while participants are in primary or secondary school. As such, the current study aims to clarify the development of emotion representation (within the self and of others) across three studies for its import to interpersonal behaviour across education settings at different timepoints.

1.5.1 Theoretical Stance

Understanding social skill in an educational context first calls for an account of the variety observed in child ability to both negotiate and make predictions within a school's social environment. Evidence of age-based differences in emotion representation and emotion term processing justify a focus on the developmental progression of how language and EU interact, and further reinforce the need to tailor the way emotion is apprehended by SEL programmes depending on the target age range. The present study adopts a constructivist view in its understanding of social skill as an iterative, predictive, and adaptive process concerned with behaviour—of the self and of others. The componential approach to emotion, complementary to a constructionist view of the brain, is adopted in support of the interconnected and interpersonal nature of emotion concepts. Emotions as such are understood to be multi-modal.

We aim to further the Mind-space framework by considering both emotion concept representation as it relates to social skill, and potential developmental trajectories that structure Mind-space. Given that a 'mind' in Mind-space is a whole cognitive system, we argue that within any one representation of a 'mind' is an embedded representation of how that mind processes and understands emotions. We stress that one's ability to identify emotions in others is tied to one's ability to represent one's own emotional states. An important implication of this is that the way an individual represents emotions necessarily impacts how they will construct them to be experienced by others. Emotion understanding can be said to underlie interpersonal behaviour in that how one understands an 'other' to be feeling not only relates to questions of empathy and affective perspective-taking, but also to how one will predict the reaction of an 'other' or identify their needs (if the situation is prosocially oriented).

Furthermore, we advance that within an individual's representational system of emotion, any one emotion is understood and defined in relation to another. Whether or not this inter-relationship between emotion concepts is explicitly expressed depends on task demands. We will use language as our empirical focus to examine structural and organizational components of emotion concept systems, in line with the notion that produced language to describe emotion can reflect its conceptual representation, and to test relationships between emotion understanding, personality, and interpersonal accuracy.

1.5.2 Method Overview

1.5.2.1 Design. The present research comprising three studies adopts a multimethod approach to address its main question of how emotional learning relates to social learning within the education context by developing the ability to identify the emotions of others. The primary focus is on the representation of others' emotional states and potential influential factors on this representation that include participation in a SEL programme in childhood,

language, and temperament/personality. The studies undertaken are largely exploratory, each with a related respective focus and set of research questions, and include: a systematic review and meta-analysis of SEL intervention studies to assess the impact of programme participation on emotion understanding and related emotion representation in middle childhood (Study 1); a linguistic analysis of child emotion definitions to address the relationship between emotion representation and language as well as implications for the organization of an individual's conceptual system of emotion (Study 2); and lastly, an online cross-sectional experimental study with undergraduates on the relationship between emotion representation/understanding, language, interpersonal accuracy, and social connectedness (Study 3).

Findings from Study 1 provide a basis to the discussion of emotion in education as they indicate a) which emotion components have been emphasized in practice across the past decade and b) whether SEL programme participation does indeed promote EU development specifically. Participation in a SEL programme can be considered part of a child's emotion socialization and as such, which aspects of EU are emphasized in school can have an important role in shaping student emotion representation, impacting how they represent the emotions of others in turn. The analysis of previously conducted interventions will provide an overarching perspective on how child emotion representation and its relationship to social skill have been defined and promoted in practice that will then be contrasted with child-generated emotion representation (in the form of emotion term definitions) in the linguistic analysis study (Study 2). Noting the content of child emotion definitions in Study 2 adds to the broader research aim of understanding how individuals process and interpret emotional states from a developmental perspective (whether within the self or of others), emphasizing the inter-related nature of emotion concepts and further complementing the practice of teaching children in a school setting about the experience of emotions (the focus of Study 1).

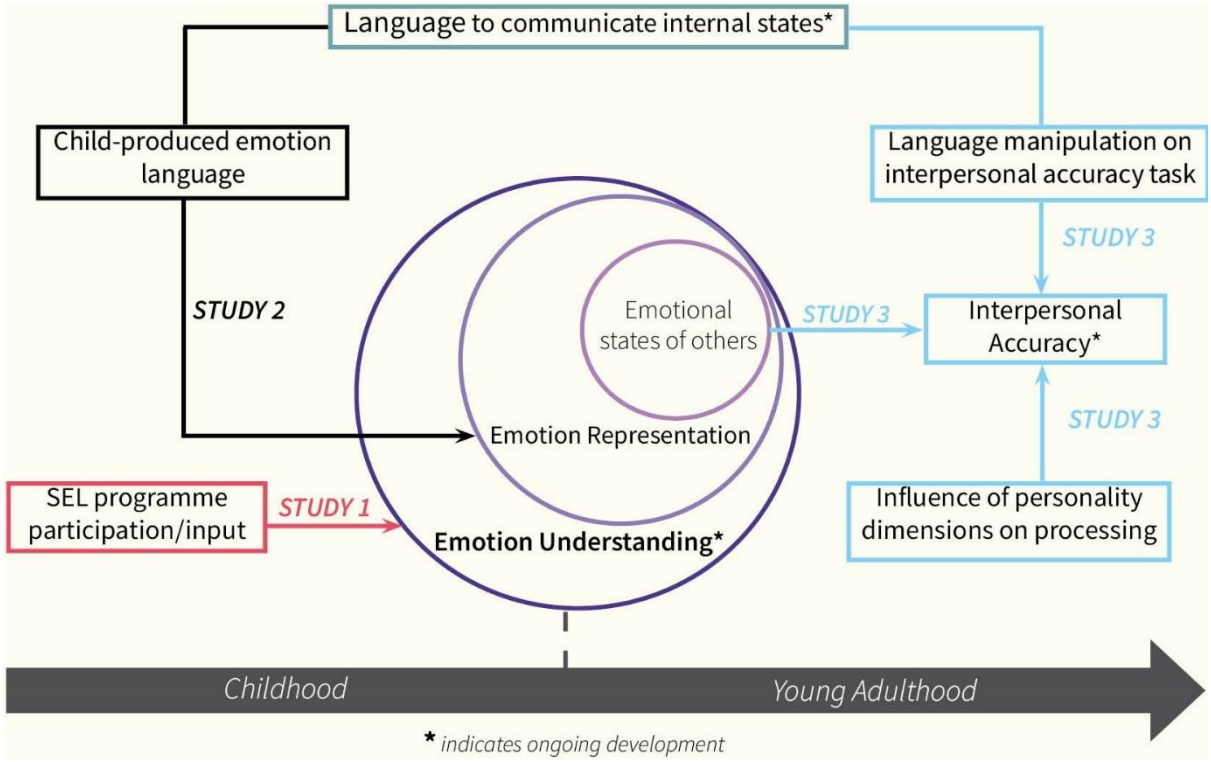
Study 2 also includes a protocol for visualizing emotion representation based on language, specifically emotion term co-occurrence, to provide a representation of an emotion concept system at the individual level. Understanding the contribution of language to emotion representation in an effort to better glean the organization of an individual's larger conceptual emotion system can be helpful for understanding individual differences in emotion representation that can then impact emotion identification in others and furthermore interpersonal accuracy (IA)—the main dependent variable addressed in Study 3.

Study 3 focuses on the role of representing the emotional states of others in IA and decision-making, while also considering the potential influence of emotion language in character descriptions as it constitutes information regarding how others experience emotional states. Personality is addressed in Study 3 as an additional factor that may influence IA as well as EU and relatedly, how an individual represents the emotional states of others. Findings from Study 3 will enrich the larger discussion of child emotion representation and whether or not this type of social information (i.e., emotional information regarding others) can support IA or is readily accessed when needing to make trait-based behaviour predictions of others.

How variables of interest to the present research and its three studies interrelate is represented here (*see* Figure 8):

Figure 8

Research Study Foci and Explored Variable Interrelationships



1.5.2.2 Research Questions. The research questions for each study will now be described. Study 1, a systematic review and meta-analysis of school-based universal social-emotional learning interventions with a focus on EU, addresses the following research questions:

S1.1) Which areas of emotion understanding (EU) have been promoted across school-based social-emotion learning (SEL) interventions from the past decade?

S1.2) Have school-based SEL interventions impacted EU development across middle childhood?

The review and subsequent meta-analysis of Study 1 operationalizes EU as an ensemble of components informed by a theoretical framework highlighted in the literature review (*see Sections 1.3.1* and *1.3.3*) and discussed further in Chapter 2. The aims of Study 1 are to identify which components of EU have been most frequently targeted by SEL

programmes, whether participation has improved the development of EU, and implications for overall child emotion representation and SEL practice.

Study 2, a linguistic analysis, addresses the relationship between emotion representation and emotion language, as well as the inter-related nature of emotion concepts, and another form of language pertinent to social-emotional development: non-emotional mental state terms (i.e., cognitive MSTs). The following research questions are addressed:

S2.1) Which emotion terms co-occur across emotion definitions?

S2. 2) Do emotion term co-occurrence patterns in emotion definitions shift depending on:

a) participant age and gender?

b) an emotion term's valence or intensity?

S2.3) Does mental state term (MST) production in emotion definitions shift depending on:

a) emotion term co-occurrence patterns?

b) participant age or gender?

c) emotion term intensity or valence?

S2.4) Are there specific scenarios or topics common across emotion definitions?

Study 2 operationalizes emotion representation and its relationship to EU in its linguistic form—that is to say via emotion term labels and the language used to define emotions, with a particular emphasis on emotion term co-occurrence (i.e., emotion blends) to highlight potential inter-relationships between emotion concepts.

Study 3, focused on the relationship between emotion representation, language, personality, interpersonal accuracy (IA), and social connectedness addresses the following research questions:

S3. 1) Are personality trait attribution and trait-based behaviour predictions influenced by the availability of emotional information about others and/or time spent at university?

S3.2) Do trait attribution and trait-based behaviour predictions shift depending on:

a. levels of social connectedness?

b. the ability to identify and describe one's own emotional states?

c. personality?

S3.3) Is trait covariance representation impacted by:

a) the availability of emotional information?

b) the ability to identify and describe one's own emotional states?

S3.4) Is there a relationship between personality and the ability to identify and describe one's own emotional states?

1.5.2.3 Analytic Procedure. Each study part of the present research project had its specific analytic procedure (*see* Appendix B for summary table). Study 1 first adopted a descriptive analysis in its review of SEL interventions, including a mapping exercise of SEL programme components to an EU framework to address its first research question. A meta-analysis was computed using Hedge's *g* effect sizes inputted into *JASP 0.14.1* software to address Study 1's second research question.

A descriptive analysis including frequency tables was undertaken to address Study 2's first research question. Statistical analysis was undertaken using *IBM SPSS Statistics (Version 28)* to address the second and third research questions. For the second research question, emotion term co-occurrence patterns were operationalized both as 'participant blend score' to indicate the number of emotion term co-occurrence pairs a participant produced, and 'emotion term blend score' to indicate the number of unique co-occurrence pairs a target emotion term (i.e., one that was defined) had. A one-way ANOVA was run to test the

relationship between participant blend score and age, and a series of independent samples *t* – tests were run to test relationships between participant blend score and gender, emotion term blend score and emotion term valence, and between emotion term blend score and emotion term intensity.

For Study 2's third research question, mental state term (MST) production was captured at the participant level, operationalized as 'participant MST production' to indicate average number of MSTs produced across all definitions, as well as at the emotion term level, operationalized as 'emotion term MST score' to indicate average number of MSTs per target emotion term defined across all participants. Simple linear regression was run to test the relationship between participant MST production and participant blend score. Kruskal Wallis H Tests were run to test the relationship between participant age and participant MST production as well as between emotion term MST score and emotion term intensity. Lastly, a series of independent samples *t* – tests were run to test relationships between emotion term MST score and gender as well as valence. Thematic analysis was undertaken to address Study 2's fourth and final research question.

Statistical analysis was also undertaken to address Study 3's research questions (again in SPSS). Data were not normally distributed for some variables of interest to research questions 1, 2, and 4 and as such, non-parametric tests were used. Specifically, Mann Whitney U tests were conducted to address Study 3's first research question, and Spearman rank correlations were run to address the second and fourth research questions. An independent samples *t*-test and its non-parametric equivalent the Mann Whitney U test were conducted to assess the impact of task condition on personality trait covariance ratings depending on whether the data was normally distributed to address Study 3's third research question.

1.5.3 Ethical Considerations

Ethical considerations for this research are considered at the broader level of undertaking a research project focused on social-emotional learning in education settings, and also at the study level. Each study part of the present research has its own relevant ethical considerations in light of the different methodologies adopted. The main ethical concerns of minimizing harm, protecting privacy, and respecting autonomy as well as reflecting on the balance between what is ethically necessary compared to practically possible in education research (L. Cohen et al., 2017) both framed the development of each study and informed how they were conducted.

The choice to administer a SEL programme in general, akin to any other education intervention programme, should be accompanied by a rationale justifying its implementation and not incur any detriment to the school (Hammersley, 2017). Although evidence of SEL programme impact can form the basis of such a rationale, with the further consideration that it is unethical to continue to implement a programme in a school when it appears to have no benefit, how we determine beneficial impact requires further reflection. Suri (2020) flags that given resources can be limited in education, "an important question for educators is […] what interventions are likely to be most effective, and under what circumstances?" (p.44). Education research in turn can help provide a response.

SEL programmes are part of a larger commitment to the holistic development of students, but building an evidence base reliant on statistical significance or standards for 'meaningful' effect sizes can be problematic in education research, especially when not contextualized (Fan, 2001; Hill et al., 2008). The inclusion of SEL programmes in education can also reflect a particular pedagogical ethos or element of school culture—values about teaching and learning that form a school's identity regardless of quantifiable performance standards. Do conversations about social-emotional development not have a place in a

classroom without statistical justification? Does a SEL programme matter only if it improves academic performance, or is evidence of social-emotional skill promotion sufficient?

Both the systematic review and meta-analysis in Study 1 consist of synthetic research efforts and as such, ethical considerations largely pertain to the search strategy, decisions surrounding study inclusion, and transparency in reporting (Wormald & Evans, 2018). Considering the ethics of synthetic research efforts from a research values perspective (as opposed to practicalities), Study 1 can be deemed an ethically sound research effort in that it is a worthwhile contribution to the literature. There is a variety of available SEL programmes yet a limited body of evidence regarding SEL programme impact on social-emotional outcomes and none, to the researcher's knowledge, on the promotion of emotion understanding development across middle childhood.

Suri (2020) outlines three guiding principles for quality research synthesis[9] in systematic reviews: 1) *informed subjectivity and reflexivity* provided by a researcher's clear statement of an appropriate epistemological orientation; 2) *purposefully informed selective inclusivity* pertaining to reasons for including specific studies; and 3) *audience-appropriate transparency* that can maximize the impact of review findings, construed as an ethical imperative given the nature of systematic review work as a report on cumulative evidence. The epistemological stance of post-positivism[10] informed how Study 1's systematic review was conducted in that an *a priori* synthesis protocol was developed in the form of an emotion understanding framework to which SEL programmes across intervention studies were then mapped. The mapping exercise served as the synthetic narrative approach used to identify as objectively as possible trends in teaching emotions to children in primary school Years 4 to

[9] Also previously presented in Suri and Clarke (2009) and Suri (2018).
[10] Here post-positivism is understood to reject the traditional positivist stance that the researcher is an independent observer of the world when studying human behaviour, and instead accepts the need to contend with potential biases that stem from a researcher's ideas and identity (Chilisa & Kawulich, 2012) in the pursuit of 'objective' answers to explain the underlying structures of observable phenomena as opposed to uncovering generalizable laws, universally applicable (McGregor & Murnane, 2010).

6—the review's first aim. The review's second aim was to explain particular trends in educational practice by considering research on child EU development (i.e., what is appropriate to teach children when about emotions), and the goals of teaching emotion in an education context (e.g., self-regulation, classroom management, positive interpersonal interactions with peers/classmates and teachers).

Which SEL programme intervention studies were included in the systematic review was based on results of a quality rating process after an initial database search. There is debate within the field as to whether grey literature should be consulted, and if included studies should only be those that are peer-reviewed. Relatedly, search databases used can be another source of selection bias for study inclusion. The search strategy (including choice of search terms and databases) for Study 1 was developed in consultation with the departmental subject librarian in Education at the University of Oxford to minimize selection bias. International databases and one dedicated to grey literature were consulted, and every effort was made to include a variety of search terms that reflected ones most common in the wider SEL literature.

As for the quality rating process of articles generated by the search, the criteria used were based on relevancy to Study 1's research questions regarding SEL programmes and aspects of study research design that also align with a post-positivist approach. Specifically, study rating criteria pertained to generalizability of findings and replicability of the study (e.g., presence of a control group, random assignment to intervention group, transparent reporting of both method and SEL programme components). Studies included in the meta-analysis were taken from those already included in the systematic review and as such, did not involve further consultation of research databases, but did involve an additional set of inclusion criteria and rating process. The inclusion criteria were pragmatic in that they only considered what would be necessary to conducting the meta-analysis (i.e., presence of a

control group, a standardized measure of child EU, and reporting of data that would allow for effect sizes to be calculated). Information provided in published articles is considered public and as such, typically does not require specific permission from authors to be used in synthetic research efforts (Suri, 2020).

This study's meta-analysis inclusion criterion regarding whether studies reported data that could be used to calculate effect sizes was an additional source of ethical consideration as authors were contacted for further access to their data—a practice that cannot be assumed to be part of said researcher's original ethics application, but an anticipated aspect of larger research practice when studies are published given the inclusion of author contact information (H. Cooper & Dent, 2011). Although aggregate data would have sufficed for how the effect sizes were calculated in Study 1's meta-analysis, often authors of included studies shared datasets with individual participant data—the use of which is considered a superior approach in meta-analysis by H. Cooper and Patall (2009). However, all shared data was stripped of any identifying information by contacted authors in order to avoid a potential ethical breach and shared datasets are not reproduced here.

Quality rating of studies included in the meta-analysis was undertaken using a rating tool developed for the public health field and as such, can be considered further aligned with a more traditional positivist understanding of the scientific method. Although we do not consider Study 1 as pertinent to clinical settings, systematic objectivity in our assessment of studies and subsequent analysis of their findings was important. Consequently, the combined inclusion criteria and definitions of quality used in Study 1 led to the inclusion of studies with particular research designs (especially for the meta-analysis), namely randomized controlled trials (RCTs) or quasi-experiments that reflect only one approach to education research. As such, Study 1 findings are based on a very specific type of study and as such, are not taken to be an exhaustive representation of all education efforts within the past decade to promote

child EU via SEL programmes, but rather a starting point for this discussion given the lack of research precedent for Study 1's exact research questions.

Studies 2 and 3 did involve direct data collection with participants and these research studies received ethical approval from the Central University Research Ethics Committee (CUREC) at the university of Oxford (references: ED-C1A-19-203; ED-C1A-19-096; ED-C1A-20-015). CUREC protocols and professional guidelines for education researchers were also followed in conducting research for these studies including British Educational Research Association Ethical (BERA) Guidelines for Educational Research, the British Psychological Society (BPS) Code of Ethics and Conduct, and the Social Research Association Ethical Guidelines. Ethical concerns of minimizing harm, maintaining anonymity, and controlling data storage were of particular focus especially in light of the UK General Data Protection Regulation (GDPR) and Data Protection Act 2018.

There were different sources of identifying data collected across Studies 2 and 3 that needed to be anonymized as part of a larger research effort to protect participant privacy and minimize potential harm not just during data collection, but also post. Participant children in Study 2 were enrolled in the study after parental/caregiver consent was provided and a demographic questionnaire completed (again by the parent). Demographic information collected in Study 2 (via parents/caregivers) was the same as in Study 3 (although participants provided the information directly) and included age, sex, number of siblings, and cultural language background (i.e., how many and which languages they spoke). Course of study at university was also collected in Study 3 as participants were undergraduates. All participants were randomly assigned participant identification numbers linked to demographic information and task performance measures. Password-protected spreadsheets linking participant IDs to participant names for each study were housed on the researcher's

personal computer, separate from datasets used in analysis that only made use of participant IDs.

In order to create the emotion definition corpus that was then analysed in Study 2, the voices of participant children were recorded during the definition task. Given the easily identifiable nature of voice recordings, audio clips of child emotion definitions were transcribed for both data analysis and storage purposes. Audio recordings were deleted upon transcription. For Study 2, there was also slight concern that completing the emotion definitions task could inadvertently cause distress to the child participant or trigger unpleasant memories in the discussion of internal states. As such, task instructions were simple and open-ended in that children were only asked to say what they thought the 'feeling word' meant. Children were not required to describe personal experience in order to provide definitions of the emotional states included in the task. Children were also told they could stop participating at any time as well as choose to not define a particular emotion word without needing to provide a justification to the researcher or penalty. Verbal assent on the part of the child was received before beginning the definitions task and after the researcher explained the context of the research study and why the child participant was there so as to ensure the child did understand the research purposes and did not feel pressured to participate (even if their school and parent/caregiver had previously consented to their participation). Such efforts were made in support of participant agency in the research process, even more so given the younger age of participants in Study 2.

A debriefing script for children was also developed as is standard practice for concluding research with live participants, but also as a way to minimize potential harm in Study 2. The script included a component that spoke to the possibility that unpleasant thoughts or feelings may have arisen while the child participated and encouraged the child to either raise them with the researcher or with an adult they trusted. During the data collection

session itself, the researcher allocated time for the child to voice any potential negative or confusing experience as well as to ask questions. Child participants as well as participating schools and parents/caregivers who gave consent for a student to participate were also provided with the institutional contact information for both the graduate researcher and principal investigator should any questions or concerns arise post study participation.

Lastly, Study 3 raised additional ethical concerns specific to online recruitment and data collection, compensation, and direct email communication with participants. Social media as a platform for online recruitment has raised particular ethical concern within the research community (Ferrigno & Sade, 2019; Gelinas et al., 2017). Bamdad et al. (2022) reflect on the ethical 'grey areas' that arose when recruitment occurs online and data collection had to occur remotely in reaction to the COVID-19 pandemic, as was the case for the design of Study 3. These grey areas are purportedly tied to a lack of established guidelines for internet research, however the present study was still informed by available professional guidelines; specifically, BPS guidelines on internet-mediated research, the 2019 ethical guidelines for internet research produced by the Association of Internet Researchers (AoIR), and the second edition of the guide to internet research ethics published in English in 2019 by the National Committee for Research Ethics in the Social Sciences and Humanities (NESH).

The issue of privacy protection arose when developing the recruitment strategy that involved both social media posts and email communication. In order to add a layer of protection to the researcher's identity and information, an institutional email was created for the study for all communication with participants, study queries, and recruitment emails. It was decided that only verified UK-based university societies in psychology and linguistics would be contacted via email. Regarding social media recruitment, only Facebook was used as a platform. A specific Facebook page not associated with the researcher's personal

Facebook profile was created for Study 3, and all posts were published via the study page. The researcher's personal Facebook profile was also set to private, and the name displayed did not match that included in the description of the study's Facebook page. To express interest in participating in the study, participants completed a form developed in Qualtrics that did ask for a contact email. Although there was limited capacity to verify the identity of participants who signed up for the study, a university email address was requested in order to be enrolled in the study and the graduate researcher confirmed that each enrolled participant had a unique Internet Protocol (IP) address as captured when they completed the Qualtrics form.

Chapter 2

How Is Emotion Taught? A Systematic Review and Meta-Analysis of SEL interventions across Middle Childhood (Study 1)

Concern for the social-emotional well-being of students, and how education as well as institutions can be of support, has seen a concentrated interest worldwide. In 2009, several reports were produced in the realm of social and public policy relevant to social-emotional development, informing the current systematic review's scope. For example, in the US, the National Research Council and Institute of Medicine (2009) drafted a report on how the prevention of mental, emotional, and behavioural disorders among 'young people' could be accomplished, citing the promotion of mental health as a national top priority. In the same year, Elias (2009) called for the social-emotional and character development (SECD) of students to be a prominent concern in American educational policy making. Within the UK, the National Institute for Health and Clinical Excellence (2009) produced public health guidance, at the request of the Department of Health (DH), on how the social-emotional well-being of young people could be promoted via secondary education. The Social and Emotional Aspects of Learning (SEAL) programme was implemented in 90 percent of UK primary schools, and 70 percent of UK secondary schools by 2010 (Humphrey et al., 2010).

On a more global scale, UNESCO (The United Nations Educational, Scientific and Cultural Organization) stressed the importance of student social-emotional development for schools in their 2009 review of initiatives in 16 countries, calling for the implementation of an inclusive school model to improve education (Govinda, 2009). A few years prior, the World Health Organization (WHO) prepared a document (part of a series on school health) that underscored the importance of a healthy psychosocial environment within schools in order to promote student emotional and social well-being (World Health Organization, 2003). More recently, the 2018 European Union international evidence review has positioned social-

emotional learning as a core curricular area to be taken up across European Union member countries (Cefai et al., 2018). The Organisation for Economic Co-operation and Development (OECD) (2021) report on their survey of social-emotional skills in students ages 10 and 15 reaffirmed support of country efforts to reorient education policy towards social-emotional skill development.

Efforts to define SEL have largely been dominated by initiatives in the US and UK, but there has been a recent rise in frameworks for new contexts, developed in a variety of locations including: China, Lebanon, India, Latin America and the Caribbean, and the African Diaspora. UNICEF China introduced standards for social-emotional learning and programmes in 2011 that involved extensive translation and conceptualization efforts to identify social-emotional skills most pertinent to the development of Chinese students. As part of the QITABI (Quality Instruction Towards Access and Basic Education Improvement) 2014 initiative undertaken by the Ministry of Education and Higher Education (MEHE) and Center for Educational Research and Development (CERD), Lebanon has worked towards developing a nationally relevant and contextualized SEL framework in response to the absence of SEL in Lebanese pedagogic practice. The Indian Social-Emotional Learning Framework was launched in 2019 by the Teacher Foundation based on CASEL, SEAL, and WHO Life skills frameworks, drawing also on their work begun in 2012 to develop standards for social-emotional learning in Indian schools.

As part of UNESCO's Education 2030 Agenda, guidance documents have been developed by the regional bureau to detail a perspective relevant to Latin America and the Caribbean on social-emotional education for both children and teenagers (UNESCO, 2021), including a regional map of social-emotional skill promotion (UNESCO, 2019). The Africa ALiVE (Assessment of Life Skills and Values in East Africa) is an initiative spearheaded in 2020 by the Zizi Afrique Foundation and RELI (Regional Education Learning Initiative) to

make SEL part of mainstream education for students ages 13 to 17. Marsay et al. (2021) conducted a study to assess perceptions of the nature and value of SEL skills in four African countries (Burkina Faso, South Africa, Togo, and Uganda), and identified seven common SEL themes: self-knowledge, self-control/regulation, empathy and compassion, valuing and accepting cultural diversity, interpersonal relationships, decision-making, and respect. Now more than ever there is a need for synthetic evidence efforts regarding SEL programmes and their implementation in order to meaningfully inform the continued commitment to student social-emotional development seen on an international scale.

When planning for the present systematic review was underway in 2019, numerous reviews, meta-analyses, reports, and policy guidance were available from the past decade. Mahoney et al. (2018) reflect on the promotion of SEL within the US in particular, reviewing meta-analyses of SEL programmes conducted by Durlak et al. (2011) and Wigelsworth et al. (2016) that were focused on immediate effects post SEL programme participation, as well as meta-analyses by Sklad et al. (2012) and Taylor et al. (2017) that were focused on follow-up effects. Such reviews included studies conducted in both primary and secondary schools, and that assessed impacts on a wide variety of student outcomes: social-emotional skills, helping others, positive social behaviours, conduct problems, emotional distress, academic performance, and attitudes about the self, school, drug use, and violence. The present review's focus was narrower, concerned with the promotion of emotion understanding specifically via SEL programme implementation at a universal level within primary schools across middle childhood.

2.1 Method

2.1.1 Rationale

When the search strategy for Study 1 was developed in March 2019, there were several relevant reviews and meta-analyses pertaining to the promotion of student social-emotional skill via universal school-based programmes:

- Durlak et al. (2011), considered the first large-scale meta-analysis on school based social-emotional development programmes, that focused on the impact of SEL programmes targeting students ages 5 to 18/implemented in Kindergarten through High School (i.e., from Reception until the end of Sixth Form) on social-emotional skills and attitudes, positive social behaviour, conduct problems, emotional distress, and academic performance. Their analysis also included consideration of the influence of intervention format and other moderating factors on programme outcomes. Included studies were those written prior to December 31st, 2007.
- Sklad et al. (2012) who conducted a meta-analysis of social, emotional, and/or behavioural programmes administered during the school day to primary or secondary school students. There were seven main categories of outcome measures: social skills, antisocial behaviour, substance abuse, positive self-image, academic achievement, mental health, and prosocial behaviour. Included studies were published between 1995 and 2008 to reflect current conditions at the time, with 1995 selected as the starting point as it was the year *Emotional Intelligence* by Goleman (1995) was first released (10-year and 25-year anniversary editions now also exist).
- Taylor et al. (2017) focused on SEL interventions implemented in Kindergarten through High School for their impact on positive youth

development including social emotional assets as well as positive and negative indicators of well-being, with particular emphasis on studies that reported follow-up effects collected from 6 months to 18 years post-intervention. Included studies were those written prior to December 2014.

- Corcoran et al. (2018) focused on the impact of SEL programmes on the academic performance of students in pre-Kindergarten through 12th Grade (Reception to end of Sixth Form) in the areas of reading, mathematics, and science achievement. Included studies were those written between 1970 and 2016.
- Siddiqui and Ventista (2018) focused on interventions conducted in schools that targeted non-cognitive skills—specifically motivation, social and communication skills, self-regulation, self-esteem, resilience, emotional literacy, and well-being. Included studies had participants aged 6 to 12 years, and were published after 1995.
- Connolly et al. (2018) published a protocol for a systematic review focused on the impact of SEL programmes on children ages 3 to 11 enrolled in preschool and/or primary school. Studies to be included were cited as only randomized or cluster randomized controlled trials to assess SEL programme effectiveness, but specific publication years were not included.
- Goldberg et al. (2019) focused on interventions adopting a "whole school" approach to improve child social-emotional and behavioural adjustment and academic achievement, and to decrease internalizing symptoms. "Whole-school" referred to programmes that included activities coordinated across school curriculum, school ethos, and environment, as well as family and community partnerships. Studies included in the meta-analysis were

> conducted with participants ages 4 to 18 and published after 1998—the year of the World Health Organization's (WHO) recommendation for schools to adopt a whole-school approach for health promotion (WHO European Working Group on Health Promotion Evaluation & World Health Organization. Regional Office for Europe, 1998).

Previous SEL programme reviews do not primarily focus on the content of the programmes themselves at the level of lesson plans, but rather constrain research questions to a) whether participation in the SEL programme has an impact on student outcomes immediately post-intervention (with some studies concerned with maintenance of programme effects by including follow-up assessments), or b) implementation factors such as dosage (i.e., level of exposure to the programme), who administered the programme, or fidelity to treatment. Knowledge of how social-emotional skills are taught through these programmes is of equal importance to better understand and contextualize the evidence provided by previous meta-analyses in support of the impact of SEL programme participation on student development. Without such specificity at the level of SEL programme content, especially considering the variety of programmes available to schools and practitioners, it is difficult within the field to ascertain how exactly SEL programme participation benefits student social-emotional development. Cumulative SEL research, as cited above, supports a relationship between SEL programme participation and positive student development (of both academic and social-emotional factors), but further precision in how various SEL programmes achieve such gains across different educational years is needed.

The current review focused on the impact of SEL programmes on social-emotional outcomes, specifically emotion understanding, to address the larger study question of how the development of emotion understanding relates to that of social skill. Of interest were SEL programmes universally administered to all students during the school day (as opposed to

after-school; *see* Durlak et al., 2010 for meta-analysis of such programmes) to look at how they can be incorporated into the daily curriculum, ideally by teachers, as this is seen as one way to make SEL programme integration more effective within school settings (Fenwick-Smith et al., 2018).

With regards to the current review's scope, it was deemed beneficial to focus on an age band wherein social-emotional development in primary school takes on more complex aspects (e.g., social problem-solving ability and decision-making), that may become more pressing as students enter adolescence and secondary school, as opposed to mainly emphasizing the development of emotion identification and regulation—the primary concern of early years education (*see* Blewitt et al., 2018 for systematic review and meta-analysis). Furthermore, previous reviews of school based SEL programmes have included a wide range of school years, and even though they account for the importance of student age, results from such reviews do not provide information on specific developmental phases, such as middle childhood.

The age band of interest to this review was constrained to Primary Years 4 to 6 after consultation of developmental theories of emotion and primary school education stages. This age band also aligned with the sample used in Study 2 to collect child emotion definitions. The Pons et al. (2004) model, that tracks emotion understanding development from ages 3 to 11, was particularly influential in deciding which age band to focus on as it advances 8 years to be the age when most components of emotion understanding have been acquired and a moral sense begins to develop.

2.1.2 Objectives

This review of SEL programmes aimed to identify which areas of child emotion understanding were most frequently targeted by programmes administered to typically developing children ages 8 to 11 during the school day, in a whole-classroom setting. The

primary goal was to contribute to the SEL research field as part of reflective practice by describing how emotional learning has recently been promoted within schools, and to further clarify its construed relationship to social skill development. The systematic review addressed the following research question: which areas of emotion understanding have been promoted across school-based social-emotion learning interventions from the past decade? A conceptual mapping of SEL intervention programme content to a theoretical framework of emotion understanding was performed. The theoretical framework adopted in this review largely follows that proposed in the Pons et al. (2004) model that organizes the development of emotion understanding into three distinct hierarchical levels ('external,' 'mental,' and 'reflective'), each with their own collection of emotion understanding facets.

The goals of the meta-analysis were to test whether participation in SEL programmes impacted child emotion understanding development, as this is not often addressed by previous research studies, and to further complement findings on the positive impact of emotion understanding training studies on emotion understanding development. SEL research frequently focuses on social-emotional competence composites to assess child social-emotional skill. However, composite measures do not necessarily help clarify causal mechanisms by which SEL interventions promote child emotional skill development, especially if measures do not have subscales specifically capturing emotion understanding. The fact that composite measures are still consistently used in research to capture social-emotional skill reflects the stance that this form of assessment is more accurate to represent child social-emotional skills from a holistic perspective (McKown, 2017). The composite design of SEL assessments also alludes to the difficulty of disentangling social skill development from that of emotional skill development. This is not to say there is no overlap between the two, however greater precision in which areas of development are impacted by SEL programmes is needed to deepen understanding of SEL programme effectiveness.

Only studies in the present systematic review that included both a control group and an outcome measure explicitly measuring a facet of emotion understanding were included in the meta-analysis. The research question addressed by the meta-analysis was: have school-based social-emotional learning interventions impacted emotion understanding development in middle childhood? It was expected that if there was an observable effect of SEL programme participation on child emotion understanding development, the largest effect would be observed in studies measuring the level of emotion understanding most frequently targeted by SEL programmes within the past decade (as identified by systematic review findings). PRISMA guidelines were followed to report on this systematic review and meta-analysis (Moher et al., 2010) (*see* Appendix A for PRISMA checklist).

2.1.3 Search Method and Study Selection

The search for relevant articles to be included in the systematic review had two approaches: 1) a search of online databases using predetermined search terms (S1 in Figure 9); and 2) consultation of meta-analyses conducted from 2009 to 2020 on the topic of social skills interventions to cross-reference and complement the online database search (S2 in Figure 9). A total of 17 databases in the fields of psychology, education, and linguistics were consulted as part of the online search (*see* Table 1).

Table 1

Databases Used for Systematic Review Online Search

Psychology/Science	**Education**	**Linguistics**
PsycInfo	British Education Index (BEI)	ProQuest Linguistics Collection: Linguistics and Language Behaviour Abstracts (LLBA)
Web of Science (WOS) Web of Knowledge (WOK) Science Citation Expanded	Education Abstracts (EBSCO)	
Scopus	ProQuest Education Collection (ERIC/Education Database)	
Child Development and Adolescent Studies (EBSCO) (development of children up to 21)	**Social Sciences**	**International**
	Web of Science (WOS) Core Collection Social Sciences Citation Index (SSCI) & Conference Proceedings Citation Index Social Science & Humanities (CPCI-SSH) 1900-present	Shamaa (Arab Educational Information Network)
General		African Journals Online (AJOL)
SOLO (Search Oxford Libraries Online)		Hong Kong Journals Online
	ProQuest International Bibliography of the Social Sciences (IBSS)	Chinese Academy of Social Sciences (CASS) National Social Sciences Database
	ProQuest Social Science Database	OpenGrey (formerly SIGLE—System for Information on Grey Literature in Europe)

The following search terms were used:

(Abs)	social skill OR emotion OR socio(-)emotional OR social(-)emotional OR SEL OR social(-)emotional learning OR socio(-)emotional learning OR social competence
OR	Emotion understanding OR emotion OR emotion regulation OR emotional competence OR empathy OR perspective-taking
AND	children OR primary education OR school grade OR primary school
AND	Intervention OR programme* OR curriculum
OR	[Name of specific SEL intervention programme/curriculum (e.g., PATHS, RULER, Feeling Words Curriculum, 3Cs, 4Rs)
AND	Date limit: January 2009 – December 2020

Names of specific SEL programmes were searched based on the list recommended by the Collaborative for Academic, Social, and Emotional Learning (CASEL) 2013 guide of

effective and evidence-based SEL programmes (Collaborative for Academic Social and Emotional Learning, 2013).

Meta-analyses that might include relevant articles, despite having a different research question from the present study, were identified by searching SOLO (Search Oxford Libraries Online) using the following search terms:

Title	meta-analysis OR systematic review
NOT (Title)	parent* OR at risk OR disorder OR autism OR ASD
AND (any field)	social skill OR emotion OR socio(-)emotional OR social(-)emotional OR SEL OR social(-)emotional learning OR socio(-)emotional learning OR social competence OR positive youth development OR PYD
AND (any field)	Intervention OR programme*
AND (Subject)	children OR primary school
AND	Date limit: January 2009 – December 2020

The search via online databases returned 11,249 records that were then uploaded to Rayyan QCRI, the systematic review web-based application for pre-screening of titles and abstracts. Sixty-eight records were manually identified from the reference lists of 18 different meta-analyses. After deduplication, the combined total number of records for pre-screening was 11,225, that were then pre-screened using the following criteria (*see* Table 2).

Table 2

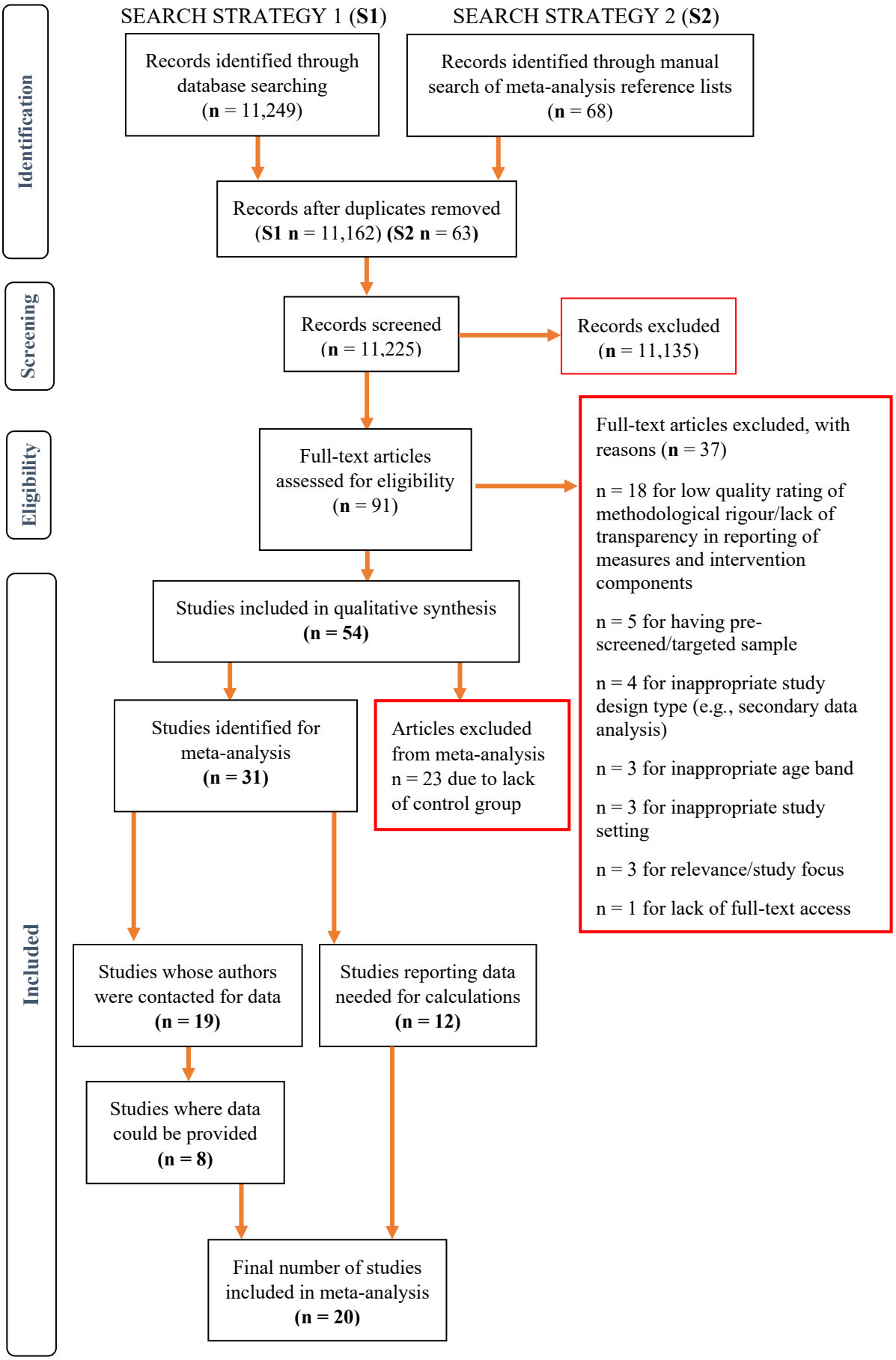
Systematic Review Study Inclusion/Exclusion Criteria

Inclusion Criteria	**Exclusion Criteria**
Study published 2009 – 2020 Peer-reviewed article Full-text available Written in English, French, German, or Spanish Presence of SEL Programme that: • Has an explicit component dedicated to developing at least one facet of emotion understanding • Is school-based/delivered during school day • Is universal for classroom participants • Intervention study focused on impact of SEL programme: randomized controlled trial, pre-/post-test, quasi-experiment study designs **Participants:** typically developing children ages 8 to 11/in Years 4 to 6	Study published prior to 2009 or post December 2020 Not an article from peer-reviewed journal (e.g., conference proceeding, thesis) Full-text unavailable Written in language not understood by researcher Lack of SEL programme or programme does not have explicit emotion understanding promotion Not an intervention study/focus is not on the impact of participation in a SEL programme on student outcomes SEL programme administered after-school or in home/family **Participants:** sample is atypical or targeted; there is pre-screening for participation in SEL programme**;** does not include students in Years 4 to 6

An initial pre-screening of titles and abstracts reduced the number of records to *n* = 91. Figure 9 reflects the study flow from article search, to review, to inclusion decisions for both the systematic review and subsequent meta-analysis.

Figure 9

PRISMA Search Flow Diagram



2.1.4 Quality Rating

All full-text articles assessed for eligibility in the systematic review underwent a quality rating process by two independent reviewers[11] focused on relevancy and methodological rigour, informed by Mertens' (2015) criteria. Each article was assigned a quality rating on a scale of 1 to 4, with 1 indicating “low quality” and 4 indicating “high quality.” Studies rated as ‘1’ or ‘2’ were excluded. A Cohen’s kappa was calculated to establish inter-rater reliability after a third of full-text articles had been read and rated (n = 30). The calculated Cohen’s kappa value was 0.412, considered “moderate” based on interpretation guidelines (D. G. Altman, 1999; McHugh, 2012). Consequently, it was decided that both reviewers would read and quality rate all remaining full-text articles before making final inclusion decisions for the systematic review. The description of each quality rating value was also further specified (*see* Table 3 for finalized quality rating criteria).

[11] The first reviewer was the graduate researcher. The second reviewer had a background in child development and social-emotional learning interventions and acted as second reviewer for all article screening, quality rating, and mapping exercises undertaken as part of both the systematic review and meta-analysis.

Table 3

Systematic Review Quality Rating Criteria

Low Quality Studies	
Rating of 1 (Poor)	**Rating of 2** (Average)
Absence of control group No random assignment to control/intervention conditions Outcome measures do not align with research questions/intervention focus Significant differences between participant groups (if present) Lack of transparency in reporting of methodology and results, & description of intervention programmes Study rationale is illogical Findings are not generalizable Lack of treatment fidelity	Absence of control group No random assignment to control/intervention conditions Lack of capture of baseline competencies; only outcome measures some differences between groups imbalanced sample and across age groups Unclear reporting of methods/study intervention components (inconsistent logic in study rationale) Findings are not generalizable Questionable treatment fidelity
Quality Studies	
Rating of 3 (Fair)	**Rating of 4** (Good)
Absence of control group Random assignment or partial to control/intervention conditions Superficial description of sample demographics/composition Capture of baseline competencies some differences between groups Balanced gender sample and across age groups Clear/transparent reporting of methods Logical study rationale & interpretation of findings Minimal description of intervention: should have enough content to map each lesson to the EU framework; ok if there is a reference to the intervention description with further detail that we then look up Choice of outcome measures is reliable overall (need not all be standardized, potential mixture of standardized and non) Reporting of psychometric properties of measures may not be present Findings are limited in level of generalizability, but provide insights for future studies/relevance for other population samples Dropout is low/minimal impact on findings (study checks for potential significant differences between final sample & first sample during analysis to consider impact of dropout on findings) Measures fidelity to treatment	Presence of control group Random assignment to control/intervention conditions Clear description of sample demographics/composition (control & intervention) Capture of baseline competencies No significant differences between intervention and control groups Balanced gender sample and across age groups Clear, transparent & sufficient detail in reporting of methods & intervention components (lessons + activities) (external validity) Has a clear table or written description of all lesson plan aims/activities Internally valid: has logical study rationale & interpretation of/conclusions regarding findings Choice of outcome measures: reliable (e.g., standardized OR if researcher-developed, efforts made to increase psychometric properties) Reporting of psychometric properties of measures Findings are generalizable Low dropout from study participation, start to finish Measures fidelity to treatment

In instances where there was disagreement regarding inclusion and exclusion decisions, both reviewers discussed their reasoning behind their respective quality ratings to reach a final inclusion decision. The following information was extracted from articles that received a quality rating of 3 or 4: study design, sample size, country in which the study was conducted, sample age band and school grade, SEL programme used, as well as lesson names/aims and associated activities for the conceptual mapping exercise to the emotion understanding framework developed for the systematic review, described next.

2.1.5 Compiling a Framework to Define Emotion Understanding

Prior to data extraction from included studies, a theoretical framework to describe core components of emotion understanding was synthesized from relevant literature concerned with models of emotion understanding (EU) development. The Pons et al. (2004) model was deemed the most comprehensive (as compared to the Castro et al., 2016 EUReKA model), identifying nine components organized into three empirically-verified hierarchical levels of EU: external, mental, and reflective (*see* Figure 4). The Pons model was previously adopted by Sprung et al. (2015) in their meta-analysis of emotion understanding training studies that also involved a conceptual mapping exercise, and informed the method for the current systematic review.

However, one facet of emotion understanding was not captured in the Pons model, namely the role of emotion understanding in social cognition and behaviour, as presented in the Crick and Dodge (1994) SIP model wherein emotion identification informs an individual's preliminary steps for decision-making in a social situation. As such, an additional label of 'Decision/Action' was added to the nine included from the Pons model to reflect this construct wherein a child considers the emotional consequences and goals of a particular course of action as part of the social problem-solving process. The final ten-facet

emotion understanding framework adopted for the systematic review's conceptual mapping exercise is presented in Figure 10.

Figure 10

Study 1 Ten-Facet Emotion Understanding (EU) Framework

Level	Facet			
EXTERNAL	**Recognition**	**External Cause**		**Reminder**
	Ability to identify and label emotions.	Emotions are 'caused' in that they result from external events.		The intensity of an emotional experience can diminish over time and aspects of a present situation can trigger emotional states experienced in the past.
MENTAL	**Desire**	**Belief**		**Hiding**
	Different individuals can have different emotional reactions to the same stimulus, shaped by their individual desires.	Beliefs about a situation can shape emotional reactions to said situation.		One's outward (i.e., externalized) emotional display may not necessarily match one's internal state.
REFLECTIVE	**Regulation**	**Mixed**	**Morality**	**Decision/Action**
	Emotional experiences can be regulated with different strategies.	One can have multiple and even contradictory emotional reactions to one stimulus.	Actions or behaviours considered morally reprehensible are linked to negative emotional states; those deemed morally laudable are linked to positive emotional states.	Considering emotions (of self or other) to inform decision/action in social situation

2.1.6 Narrative Synthesis: Mapping SEL Programmes to an EU Framework

To complete the narrative analysis part of the systematic review, SEL programme lesson names and aims were extracted into a spreadsheet based on information provided in included studies. Lessons were mapped, based on their focus, onto facets of the EU framework, and coded with a value of '1' to indicate the SEL programme lesson had targeted a particular EU facet. Two researchers independently coded lessons from each SEL programme to the EU framework before deciding upon final SEL programme mapping

decisions. A Cohen's kappa was calculated in SPSS after 20% of programmes (i.e., seven programmes) were coded to establish inter-rater reliability. The kappa was 0.46 ($p < .001$), indicating moderate agreement between raters based on guidelines proposed by Landis and Koch (1977). It was then decided that both raters would map remaining programmes independently onto the framework and then compare mapping decisions, so that how to map programme components from each SEL programme had input from both reviewers. Instances of disagreement that arose after mapping the remainder of SEL programmes were discussed until a final mapping decision was reached before the analysis of EU mapping trends. A frequency table was generated to reflect which areas of child EU were targeted across the different SEL programmes used in intervention studies. An EU facet was considered "frequently" targeted across SEL programmes if it had been coded for in at least half of SEL programmes.

2.1.7 Study Selection and Data Abstraction for Meta-Analysis

Studies included in the systematic review ($n = 54$) were screened for inclusion in the meta-analysis based on the following criteria: 1) presence of a standardized outcome measure to assess child emotion understanding; 2) presence of a control group; and 3) reporting of data to calculate effect size (i.e., means and standard deviations, *F*-values, or change scores) for participant and control groups on EU outcome measures. This resulted in a selection of $n = 31$ studies included in the systematic review that were then abstracted for information to determine suitability for meta-analytic calculations (e.g., samples sizes for both control and experimental groups, means and standard deviations for dependent variables of interest), identify outcome measures of EU, and subsequently underwent a second round of quality rating of evidence. The quality rating framework used for the second round of quality assessment was that adopted by Sprung et al. (2015) in their meta-analysis of EU training

studies, and developed by the Effective Public Health Practice Project (EPHPP; Thomas et al., 2004) (*see* Appendix C).

In instances wherein studies were a) longitudinal, b) had multiple years of SEL programme participation, and/or c) included more than one data collection timepoint in addition to post-test (e.g., follow-up assessment), only post-test data collected directly after the intervention's first year of implementation was extracted. Post-test data also needed to have been collected at a time when child participants were still enrolled in a target school grade (i.e., Years 4 to 6/3rd to 5th Grades). As such, all effect sizes calculated in this meta-analysis only reflect the impact of SEL programmes on child EU directly after participation during a single academic year, and are based on assessment data collected in the final years of primary school.

Authors of 19 studies were contacted via email in instances where there was insufficient data to calculate effect sizes and/or where it was impossible to disaggregate relevant performance data needed for effect size calculations (either for participants in the target age band or for subscales of interest). Measures of child EU would often be captured by specific subscales part of a larger social-emotional competence composite, or in measures of executive function. For the sake of consistency across measures of external, mental, and reflective levels of understanding, studies that did not provide relevant subscale data that assessed an EU facet as outlined in the framework were excluded from meta-analytic calculations.

As part of the data abstraction process, EU outcome measures were coded by two independent researchers to a particular facet of the 10-facet EU framework (as was done for SEL programme lessons). Once coded to a particular EU facet, outcome measures were further categorized as targeting one of three EU levels identified in the Pons et al. (2004) model (i.e., external, mental, or reflective)—a method also adopted in Sprung et al. (2015).

Effect size analyses were conducted based on these EU level categorizations, meaning the effect size of all studies measuring external EU was calculated separately from that of all studies targeting mental EU and reflective EU, respectively.

2.1.8 Statistical Analysis

Effect sizes were calculated for continuous measures of EU across included intervention studies using Hedges' *g,* a variation of Cohen's *d* effect size that corrects for potential biases in study results that may stem from small sample size and uses pooled weighted standard deviations (Goulet-Pelletier & Cousineau, 2018; Hedges & Olkin, 1985). Guidelines for interpreting Hedges' *g* effect size match those proposed for interpreting Cohen's *d,* with an effect size of 0.2 being considered small, 0.5 considered medium, and 0.8 considered large (J. Cohen, 1977; Durlak, 2009; Ellis, 2010). In line with Sprung et al. (2015), instances where studies employed multiple assessments to capture change in the same level of EU (e.g., one study included two different outcome measures assessing external EU) were addressed by computing an average Hedges' *g* for the EU level assessed in the study (e.g., the final *g* for the study assessing external EU is the mean of the two Hedges' *g* calculated for either outcome measure).

The current study adopted the Hedges' *g* formula that corrects for the upwards bias in small samples (i.e. < 50): $g = \frac{M1-M2}{SD*Pooled} \times \frac{N-3}{N-2.25} \times \sqrt{\left(\frac{N-2}{N}\right)}$, with M_1 the mean change score for the intervention group, M_2 the mean change score for the control group, N the total sample (i.e., intervention and control groups combined), and *SD*Pooled* the pooled standard deviations at pre-test for both intervention and control groups. This method to calculate effect size is recommended by Morris (2008) for pre-test/post-test control group designs (i.e., intervention group mean pre-post change minus control group mean pre-post change, divided by the pooled pre-test standard deviation), having compared several measures of effect size for studies with repeated measures in both intervention and control groups based on level of

bias, precision, and robustness to heterogeneity of variance. Morris (2008) supports the use of pre-test standard deviations so that exposure to intervention has no influence on standard deviation.

An alternative for calculating the standard deviation of change scores (SD_{change}) in a pre-test/post-test design with control group as recommended in the Cochrane Handbook for Systematic Reviews of Interventions Version 6.2 (Higgins et al., 2021), and a technique presented by Follmann et al. (1992) and Abrams et al. (2005), is to use the following formula for both intervention and control groups: $SD_{change} = \sqrt{(SD^2{}_{baseline} + SD^2{}_{final} - (2 \times Corr \times SD_{baseline} \times SD_{final})}$, with *Corr* the correlation coefficient for pre- and post-test scores per study group, SD standing for standard deviation, *baseline* referring to pre-test data, and *final* referring to final post-test calculations of interest. However, correlation coefficients were not reported in included studies, and not provided by authors when contacted for missing data.

The Cochrane Foundation further suggests the correlation coefficient that is missing in a particular study can be based on the change-from-baseline standard deviation for the same outcome measure used in a different study. However, rarely did intervention studies adopt the same outcome measure, and none reported the standard deviation for change-from-baseline scores. As such, the effect size calculation method proposed by Morris (2008) was still considered to be more appropriate and precise given available information from included studies for the present meta-analysis.

Calculated Hedges' *g* effect sizes and standard errors for each outcome measure of interest were inputted into *JASP 0.14.1,* a freely available and open-source statistical software supported by the University of Amsterdam (JASP Team, 2020). The standard error (SE) for effect sizes was calculated using the formula for a mean difference, with s_1 the standard

deviation of the intervention group, n_1 the sample size of the intervention group, s_2 the standard deviation of the control group, and n_2 the sample size of the control group:

$$\mathrm{SE} = \sqrt{\left(\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}\right)}$$

Once again pre-test standard deviations for both intervention and control groups were used as they were also used to calculate the pooled standard deviation in the effect size formula, as recommended by Morris (2008).

In the meta-analysis, both a) pooled effect size estimates with a 95% confidence interval using a random effects model and b) heterogeneity were calculated for all included studies, as well as for each level of EU (i.e., external, mental, and reflective) targeted by outcome measures. A random effects model assumes the studies in the meta-analysis do not share a common true effect, and that there is significant heterogeneity amongst included studies (Hedges & Vevea, 1998). In this meta-analysis, it was likely that there was significant heterogeneity amongst included studies given the variety of EU outcome measures, SEL programmes, study populations, and sample sizes found across studies despite their inclusion of a similar age band.

Furthermore, Field and Gillett (2010) suggest a random effects approach be the norm for the social sciences as some researchers argue that real-world data collected in the social sciences is likely to have variable population parameters (e.g., Hunter & Schmidt, 2000), supported in part by findings from meta-analyses conducted in psychology, for example, where standard deviations for reported effect sizes vary, ranging from 0 to 0.3, and most frequently in the range of 0.10 to 0.16 (Field, 2005). Importantly, in a random effects model, the weight of a given study in the meta-analysis depends on the effect size distribution within the study and not its sample size, and assumes that studies included in the meta-analysis only reflect a randomly selected sample of all possible studies from a given sampling frame, that is

to say the larger universe of studies with different populations (Borenstein et al., 2010). Random-effects models also allow for inferences that extend to studies beyond those included in the meta-analysis (Field & Gillett, 2010).

In *JASP,* there are multiple options regarding which type of random effects model can be used. A Restricted Maximum Likelihood (REML) model was adopted (also the default in *JASP,* Grasman, 2017), as it is recommended given the ML variance estimator is biased in that it either under- or over-estimates true variance due to the use of an unknown estimator for the mean to compute said variance estimator; in contrast, REML is considered an unbiased variance estimator as it takes into account degrees of freedom used to estimate fixed effects when estimating variance (H. K. Brown & Kempton, 1994; Corbeil & Searle, 1976; Rukhin, 2019).

2.1.9 Risk of Bias: Within and Across Studies

Level of bias within studies included in the meta-analysis was initially assessed via ratings using the EPHPP instrument, and further complemented by using the Cochrane Risk of Bias Tool that is a domain-based evaluation (https://training.cochrane.org/handbook/current/chapter-08#_Ref524701847). The current tool is revised to assess risk of bias in randomized trials (RoB 2; Sterne et al., 2019), but it can also be useful when applied to intervention studies that are not randomized trials as it addresses the following areas: bias tied to the randomization process of allocating participants to either intervention or control group; bias due to deviations from the intended intervention procedure; bias due to missing outcome data; bias in measurement of outcomes; and bias in selection of result reporting. For each domain, there is a series of signalling questions to elicit information on studies pertinent to assessing risk of bias. Possible responses to signalling questions are ‘yes,’ ‘probably yes,’ ‘probably no,’ ‘no,’ and ‘no information.’ Once signalling questions are answered, a risk of bias judgment is assigned to each domain (either ‘low risk

of bias,' 'some concerns,' or 'high risk of bias'), and then an overall risk-of-bias judgement is made for each study outcome included in meta-analysis (once again 'low risk of bias,' 'some concerns,' or 'high risk of bias').

With regards to assessing bias across studies, a triangulation of different methods is recommended (Schmidt & Hunter, 2017). In line with Field and Gillett (2010), three methods were used in this present meta-analysis to detect bias: 1) calculating a fail-safe N (Orwin, 1983; Rosenthal, 1979, 1991; Rosenthal & Rubin, 1988) to estimate the number of unpublished studies with an effect size of zero needed to nullify the significant effect; 2) the rank correlation method, proposed by Begg and Mazumdar (1994), to assess correlation between study sample size and effect size, with significant correlations indicating that bias may exist; and 3) the production of funnel plots (Sterne & Egger, 2001), that graph effect sizes against sample sizes or the standard error, with the resulting figure resembling an inverse funnel in instances where there is no detected bias.

2.1.10 Moderator Analyses

Sprung et al. (2015) found based on their moderator analyses that effect sizes of EU training studies varied depending on: length of a training session; year of publication; the delay (i.e., number of weeks) between the training's conclusion and post-test data collection; the country in which the study was conducted (categorized as 'America,' 'Europe,' or 'Other'); the study's "Global Rating," generated using the EPHPP tool; and the combination of training components (i.e., whether a SEL programme targeted multiple areas of EU or just one). As such, the present meta-analysis also explored whether effect sizes varied depending on intervention session length, publication year, post-test delay (in weeks), study country (organized by continent), EPHHP Global Rating, and intervention component combination. A mixed effects model was used in *JASP,* with the REML method. EPHHP Global Rating,

intervention component combination, and study continent were entered as factors; publication year, intervention session length, and post-test delay were entered as covariates.

2.2 Results

2.2.1 Systematic Review

2.2.1.1 Study Characteristics. Table 4 describes characteristics of intervention studies from the past decade included in the systematic review:

Table 4

Studies Included in Systematic Review

Study [Country]	Design	Child Participants (n)	Age Band (Years)/UK School Grade	Social-Emotional Learning (SEL) Programme
Ahlen et al. (2018) [Sweden]	Cluster-randomized Effectiveness Study	695	9 to 10/Years 4 and 5	FRIENDS for Life
Akay (2019) [Turkey]	Single group pre-test/post-test	1,224	6 to 10/Years 2 to 5	Researcher-developed emotional awareness/anti-bullying programme
**Amundsen et al. (2020) [UK—England]	Pre-test/Post-test (with waitlist & active controls)	108	9 to 10/Year 5	Living Mindfully Programme, UK
Bavarian et al. (2016) [USA]	Matched-pair Cluster Randomized Controlled Trial	1,170	8 to 14/Years 4 to 9	Positive Action (PA)
**Beaudoin et al. (2016) [USA]	Pre-test/post-test (with waitlist control)	353	8 to 10/Years 4 to 5	Narrative Therapy
Berger et al. (2014) [Chile]	Quasi-experiment	647	8 to 10/Years 4 and 5	BASE (Bienestar y Aprendizaje Socioemocional)
Brackett et al. (2012) [USA]	Quasi-experiment	273	9 to 13/Years 6 and 7	RULER Feeling Words Curriculum
**Carroll et al. (2020b) [Australia]	Pre-test/Post-test within subjects	524	8 to 12/Years 5 to 7	KooLKids Whole of Class
Cartmel et al. (2019) [Australia]	Mixed method evaluation study	185	10 to 12/Years 6 and 7	Journey to the Island of Calm
*Coelho et al. (2016) [Portugal]	Quasi-experiment	1,237	9 to 10/Year 5	Programme Positive Attitude
*Coelho & Sousa (2017) [Portugal]	Quasi-experiment	982	10 to 12/Years 6 and 7	Positive Action (PA)
**Collins et al. (2014) [UK—Scotland]	Between subjects; 3 (group) x 3 (time) mixed design	317	9 to 10/Year 4	Researcher-developed CBT-based
*Crean & Johnson (2013) [USA]	Cluster-randomized Trial	779	8 to 11/Years 4 to 6)	Providing Alternative Thinking Strategies (PATHS)
**Daunic et al. (2012) [USA]	Randomized Controlled Trial	1,296	7 to 12/Years 3 to 7	Tools for Getting Along (TFGA)
**de Carvalho et al. (2017) [Portugal]	Quasi-experiment	454	8 to 10/Years 4 and 5)	MindUp
Duncan et al. (2019) [USA]	Cluster Randomized Controlled Trial	1,169	8 to 14/Years 4 to 9	Positive Action
**Filella-Guiu et al. (2014) [Spain]	Quasi-experiment pre-test/post-test (with control)	651	6 to 12/Years 2 to 7	Social Skills Improvement System Classwide Intervention Programme (SSIS-CIP)
*Flook et al. (2010) [USA]	Randomized Controlled Trial	64	7 to 9/Years 3 and 4	InnerKids Programme
Fraser et al. (2014) [USA]	Sequential Cohort-Control	688	8 to 9/Year 4	Making Choices Programme
**Gallegos et al. (2013) [Mexico]	Quasi-experiment (non-equivalent control group)	1,030	8 to 13/Years 5 and 6	FRIENDS for Life (Spanish Version)

Study [Country]	Design	Child Participants (n)	Age Band (Years)/UK School Grade	SEL Programme
*Goossens et al. (2012) [The Netherlands]	Quasi-experiment	1,223	5 to 11/Years 1, 4, and 6	Providing Alternative Thinking Strategies (PATHS)
*Humphrey et al. (2016) [UK—England]	Randomized Controlled Trial	4,516	7 to 9/Years 3 and 4	Providing Alternative Thinking Strategies (PATHS)
*Humphrey et al. (2018) [UK—England]	Cluster Randomized Controlled Trial Two-arm	5,218	7 to 9/Years 3 to 5	Providing Alternative Thinking Strategies (PATHS)
Isensee et al. (2014) [Germany]	Prospective Cluster Randomized Controlled Trial (with follow-up)	3,444	10 to 12/Years 6 and 7	Eigenständig werden 5+6
Johnstone et al. (2014) [Australia]	Randomized Controlled Trial	370	8 to 9/Year 4	Aussie Optimism Programme Positive Thinking Skills (AOP-PTS)
Joyce et al. (2010) [Australia]	Pre-test/Post-test within subjects (pilot)	743	10 to 13/Years 6 and 7	Researcher-developed Mindfulness Programme
**Kiviruusu et al. (2016) [Finland]	Cluster Randomized Controlled Trial	3,704	6 to 9/Years 2 to 4	Together at School
**Kraag et al. (2009) [The Netherlands]	Cluster Randomized Control Trial (delayed intervention with random assignment)	1,467	11 to 12/Years 6 and 7	Learn Young, Learn Fair
Lee et al. (2018) [South Korea]	Pre-test/post-test (with control)	54	10 to 11/Year 6	Researcher-developed empathy programme
**Lewis et al. (2016) [USA]	Cluster Randomized Controlled Trial	1, 178	8 to 14/Years 4 to 9	Positive Action
**Mateu-Martinez et al. (2013) [Portugal]	Quasi-experiment, pre-test/post-test (non-equivalent control group)	94	8 to 12/Years 4 to 7	Researcher developed CBT programme
*Mira-Galvañ & Gilar-Corbi (2020) [Spain]	Quasi-experiment, pre-test/post-test (non-equivalent control group)	86	9 to 12/Years 4 to 6	OKAPI (emotional education programme)
Panayiotou et al. (2020) [UK—England]	Cluster Randomized Controlled Trial	5,218	7 to 9/Years 3 and 4	Providing Alternative Thinking Strategies (PATHS)
**Papieska et al. (2019) [Poland]	Quasi-experiment, pre-test/post-test	339	8 to 9/Year 4	EMOScope
*Pophillat et al. (2016) [Australia]	Randomized Controlled Trial	206	6 to 9/Years 2 to 4	Aussie Optimism Programme: Feelings and Friends (AOP-FF)
**Raimundo et al. (2013) [Portugal]	Quasi-experiment	318	9 to 10/Year 5	Slowly but Steadily
Rivers et al. (2013) [USA]	Cluster Randomized Controlled Trial	3,824	10 to 12/Years 6 and 7	RULER Feeling Words Curriculum
Rooney et al. (2013a) [Australia]	Nested cohort (with 1 random factor and 2 fixed factors)	910	9 to 10/Year 5	Aussie Optimism Programme Positive Thinking Skills (AOP - PTS)

Study [Country]	Design	Child Participants (n)	Age Band (Years)/UK School Grade	SEL Programme
Rooney et al. (2013b) [Australia]	Longitudinal Randomized Controlled Trial	910	9 to 10/Year 5	Aussie Optimism Programme Positive Thinking Skills (AOP - PTS)
**Santos & Langill (2020) [Canada]	Stratified Randomized Controlled Trial (no treatment control)	98	7 to 9/Year 4	MindMasters 2
*Schonert-Reichl & Lawlor (2010) [Canada]	Quasi-experiment	246	9 to 13/Years 5 to 7	MindUP
*Schonert-Reichl et al. (2012) [Canada]	Quasi-experiment	585	8 to 12/Years 5 to 8	Roots of Empathy (RoE)
**Schonert-Reichl et al. (2015) [Canada]	Randomized Controlled Trial	99	9 to 11/Years 5 and 6	Mindfulness Education (ME)
Schonfeld et al. (2012) [USA]	Longitudinal Randomized Controlled Trial	1,394	8 to 12/Years 4 to 7	Providing Alternative Thinking Strategies (PATHS)
Schonfeld et al. (2015) [USA]	Cluster Randomized Controlled Trial	705	8 to 12/Years 4 to 7	Providing Alternative Thinking Strategies (PATHS)
Sheard et al. (2012) [UK—Northern Ireland]	Longitudinal Randomized Controlled Trial	1,711	4 to 10/Reception to Year 2, Years 4 and 5	Providing Alternative Thinking Strategies (PATHS)
**Sibinga et al. (2016) [USA]	Randomized Controlled Trial	300	10 to 14/Years 6 to 9	Mindfulness-Based Stress Reduction (MBSR) programme, adapted
Stallard et al. (2014) [UK—England]	Cluster Randomized Controlled Trial	1,448	9 to 10/Year 5	FRIENDS for Life
**Terjestam et al. (2016) [Sweden]	Pre-test/post-test (with control)	358	10 to 14/Years 6, 8, and 9	COMPAS (Compassion and Attention in the Schools)
**Viguer et al. (2017) [Spain]	Pre-test/post-test (with control)	228	10 to 11/Year 6	EDI Programme
von Marees & Petermann (2010) [Germany]	Quasi-experiment	372	6 to 10/Years 2 to 5	Verhaltenstraining in der Grundschule
Waldemar et al. (2016) [Brazil]	Pre-test/post-test (waitlist control)	132	10 to 11/Year 6	Mindfulness and Social-Emotional Learning (MSEL)
**Wang & Goldberg (2017) [USA]	Quasi-experiment	84	8 to 9/Year 4	Bullying Literature Project (BLP)-Moral Disengagement (MD)
Yamamoto et al. (2017) [Japan]	Quasi-experiment, 2 (group) x 2 (time) between-subjects	125	9 to 10/Year 5	You Can Do It! (YCDI) Education Programme

Note. Studies marked with an asterisk (*) were flagged for inclusion in meta-analysis; ** indicates data was included in meta-analytic calculations reported later.

2.2.1.2 Mapping SEL Programmes to an Emotion Understanding Framework.

Thirty-eight different SEL programmes were identified across studies included in the systematic review (n = 54). The number of total SEL programmes was less than that of included studies as some intervention studies used the same SEL programme. Mapping frequencies of SEL programmes onto the full EU framework are presented in Table 5.

Table 5

Frequency Table of Social-Emotional Learning (SEL) Programme Mapping

Recognition	**External Cause**	**Reminder**	**Belief**	**Desire**
38	30	4	26	20
Hiding	**Regulation**	**Mixed**	**Morality**	**Decision/Action**
1	33	4	12	33

Which emotion understanding facets and related hierarchical level of emotion understanding (i.e., external, mental, or reflective) were targeted by each SEL programme is presented in Table 6.

Table 6

Emotion Understanding Facets Targeted by SEL Programmes in Systematic Review Studies

SEL Programme \/\/\/	EXTERNAL			MENTAL			REFLECTIVE			
	Recognition	External Cause	Reminder	Belief	Desire	Hiding	Regulation	Mixed	Morality	Decision /Action
AOP - PTS	x	x	x	x	x		x			x
AOP - FF	x	x		x	x		x		x	x
BASE	x	x		x	x		x			x
BLP-MD*	x						x		x	x
COMPAS*	x	x					x		x	
EDI Programme*	x	x		x	x		x	x		x
Eigenständig werden 5+6	x	x		x	x		x			x
EMOScope*	x	x		x	x					x
FRIENDS for Life*	x			x			x			x
InnerKids Programme	x			x						x
Journey to the Island of Calm	x						x			x
KooLKids Whole of Class*	x	x					x			x
Learn Young, Learn Fair*	x	x		x			x			x
Living Mindfully Programme, UK*	x			x						
MC Programme	x	x					x		x	x
MSEL	x	x					x		x	x
ME*	x	x		x	x		x			x
MBSR programme*	x		x	x			x			
MindMasters 2*	x	x					x			x
MindUp*	x	x	x	x			x			x
Narrative Therapy*	x	x		x	x	x	x	x	x	x
OKAPI	x	x					x			x
Positive Action*	x	x					x		x	x
Programme Positive Attitude	x	x		x	x		x		x	x
PATHS	x	x		x	x		x		x	x
Researcher-developed CBT programme*	x	x					x	x		x
Researcher-developed CBT-based programme*	x	x		x	x		x			x

SEL Programme ∨	EXTERNAL			MENTAL			REFLECTIVE			
	Recognition	External Cause	Reminder	Belief	Desire	Hiding	Regulation	Mixed	Morality	Decision /Action
Researcher-developed emotional awareness/anti-bullying programme	x	x		x	x		x	x	x	x
Researcher-developed empathy programme	x	x		x	x					
Researcher-developed mindfulness programme	x	x					x			
Roots of Empathy	x			x	x					x
RULER Feeling Words Curriculum	x	x	x	x	x		x			x
Slowly but Steadily*	x	x		x	x		x		x	x
SSIS-CIP*	x	x			x		x			x
Together at School*	x	x		x	x		x			x
TFGA*	x	x		x	x		x			x
Verhaltenstraining in der Grundschule	x	x		x	x		x		x	x
You Can Do It!	x			x			x			x

Note. AOP – PTS = Aussie Optimism Programme – Positive Thinking Skills; AOP – FF = Aussie Optimism Programme – Feelings and Friends; BASE = Bienestar y Aprendizaje Socioemocional; BLP – MD = Bullying Literature Prevention Project – Moral Disengagement; COMPAS = Compassion and Attention in the Schools; MSEL = Mindfulness and Social-Emotional Learning; ME = Mindfulness Education; MBSR = Mindfulness Based Stress Reduction; PATHS = Promoting Alternate Thinking Strategies; RULER = Recognizing emotions, Understanding the causes and consequences of emotions, Labelling emotions with nuanced vocabulary, Expressing emotions adaptively, and Regulating emotions effectively; SSIS – CIP: Social Skills Improvement System – Classroom Intervention Programme; TFGA = Tools for Getting Along; * indicates programme was used in a study included in meta-analysis.

2.2.2 Meta-Analysis

Studies originally identified for inclusion in the meta-analysis (n = 31) were conducted in 12 different countries, with a total of 21,406 children ages 8 to 11 *(see* Appendix D for original list). However, further contact with authors was necessary to obtain data, either only for participants ages 8 to 11, or for specific subscales that assessed emotion understanding (as part of a larger composite of social-emotional skill). Only certain researchers were able to provide data requested. Meta-analytic calculations reported here

pertain to data from 20 studies conducted in 12 different countries, with a total of 10,482 children ages 8 to 11. Studies included in the meta-analysis used a variety of outcome measures to assess emotion understanding *(see* Table 7), and largely received a global quality rating of 'moderate' using the EPHPP instrument *(see* Table 8).

Table 7

Mapping of Emotion Understanding Outcome Measures Used in Meta-Analysis Studies

Study [Country]	n*	External	Mental	Reflective
Amundsen et al (2020) [UK—England]	108	Positive and Negative Affect Schedule for Children (PANAS-C): Positive and Negative Subscales	-	Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA)
Beaudoin et al. (2016) [USA]	191	Problem-Solving Stories: Self-Awareness and Social Awareness subscales	-	Problem-Solving Stories: Self-Management and Responsible Decision-Making subscales
Carroll et al. (2020b) [Australia]	739	Social and Emotional Competence Questionnaire (SEC): Self-awareness and Social Awareness subscales	-	Social and Emotional Competence Questionnaire (SEC): Self-management subscale
Collins et al. (2014) [UK—Scotland]	97	-	-	Coping Strategy Indicator (CSI): Problem-Solving Subscale
Daunic et al. (2012) [USA]	1,118	-	-	Anger expression scale for children (AESC): Anger control subscale; Behavior Rating Inventory of Executive Function (BRIEF): Emotion Control subscale from Behavioral Regulation Index (BRI); Social Problem Solving Inventory
de Carvalho et al. (2017) [Portugal]	454	Positive and Negative Affect Schedule for Children (PANAS-C): Positive and Negative Subscales	-	Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA): Reappraisal and Suppression subscales

Study [Country]	n*	External	Mental	Reflective
Filella-Guiu et al. (2014) [Spain]	372	Bar-On Emotional Intelligence ICE: NA: Intrapersonal and Interpersonal subscales	-	Bar-On Emotional Intelligence ICE: NA: Adaptability and Stress Management subscales
Gallegos et al. (2013) [Mexico]	1,030	-	-	Coping Skills
Kiviruusu et al. (2016) [Finland]	853	Multidimensional Anxiety Scale for Children (MASC): Empathy Subscale	Multidimensional Anxiety Scale for Children (MASC): Empathy Subscale	-
Kraag et al. (2009) [The Netherlands]	2,922	-	-	Social Problem-Solving Inventory (SPSI): Emotion-focused Coping subscale
Lewis et al. (2016) [USA]	1,170	Children's Empathic Attitudes Questionnaire	Children's Empathic Attitudes Questionnaire	Social-Emotional and Character Development Scale (SECDS): Self Control subscale; Belief in Moral Order scale: Positive/Negative Morality subscales; Altruism (Solomon et al., 2000); The Social Skills Problem Solving Measure: Aggressive & Competent Problem Solving subscales
Mateu-Martinez et al. (2013) [Portugal]	98	Social Emotional Intelligence Test: Empathy and Self-Awareness subscales	-	Social Emotional Intelligence Test: Self-Control and Social Abilities subscales
Papieska et al. (2019) [Poland]	339	Levels of Emotional Awareness for Children (LEAS-C): Self subscale, Other subscale; Social-Emotional Competence Domino Test	-	-

Study [Country]	n*	External	Mental	Reflective
Raimundo et al. (2013) [Portugal]	318	Assessment of Children's Emotional Skills (ACES)	-	Scale A of the School Social Behavior Scales (SSBS-2): Self-Management/Compliance subscale
Santos & Langill (2020) [Canada]	91	Assessment of Children's Emotional Skills (ACES)	-	-
Schonert-Reichl et al. (2015) [Canada]	99	Interpersonal Reactivity Index (IRI): Empathy and Perspective-Taking subscales	Interpersonal Reactivity Index (IRI): Empathy and Perspective-Taking subscales	Resiliency Inventory (RI): Emotional Control subscale
Sibinga et al. (2016) [USA]	73	Differential Emotions Scale (DES); Positive and Negative Affect Schedule for Children (PANAS-C): Positive and Negative Subscales	-	STAXI (State-Trait Anger Expression Inventory): Reactive and Temperamental Expressivity subscales; Brief COPE: Negative and Positive Coping subscales; Children's Response Style Questionnaire (CRSQ): Distraction, Problem-Solving, and Rumination subscales; Coping Self-Efficacy Scale (CSE); Resiliency Inventory (RI): Emotional Control subscale
Terjestam et al. (2016) [Sweden]	98	General Stress Scale (GSS)	-	-
Viguer et al. (2017) [Spain]	228	Emotion Quotient Inventory - Spanish Version (EQ-i: YV): General Mood, Interpersonal, and Intrapersonal subscales	-	Emotion Quotient Inventory - Spanish Version (EQ-i: YV): Adaptability and Stress Management subscales
Wang & Goldberg (2017) [USA]	84	Social Emotional Assets and Resilience Scales-C (short form for Grades 3–6; SEARS)	-	Moral Disengagement Scale (MDS); Social Emotional Assets and Resilience Scales-C (short form for Grades 3–6; SEARS)

* indicates sample size of child participants ages 8 to 11.

Table 8

Quality Rating of Meta-Analysis Studies

Study	Selection Bias	Study Design	Confounder	Blinding	Data Collection Method	Withdrawals/ Dropouts	Global Rating
Amundsen et al. (2020)	3	3	3	2	1	1	2
Beaudoin et al. (2016)	3	3	2	2	1	1	2
Carroll et al. (2020b)	3	3	2	3	1	1	2
Collins et al. (2014)	3	3	1	3	1	3	2
Daunic et al. (2012)	2	1	1	3	1	1	2
de Carvalho et al. (2017)	2	3	2	2	1	1	2
Filella-Guiu et al. (2014)	2	3	3	2	1	1	2
Gallegos et al. (2013)	1	3	3	3	1	1	2
Kiviruusu et al. (2016)	1	1	2	3	2	1	2
Kraag et al. (2009)	1	1	2	2	1	1	1
Lewis et al. (2016)	2	1	2	2	1	3	2
Mateu-Martinez et al. (2013)	3	3	3	2	1	2	2
Papieska et al. (2019)	2	3	3	2	1	3	2
Raimundo et al. (2013)	2	3	2	3	1	1	2
Santos & Langill (2020)	2	1	3	2	1	1	2
Schonert-Reichl et al. (2015)	1	1	1	3	1	1	1
Sibinga et al. (2016)	2	1	2	1	1	1	1
Terjestam et al. (2016)	1	3	3	3	1	1	2
Viguer et al. (2017)	2	3	3	2	1	1	2
Wang & Goldberg (2017)	2	3	2	2	1	1	2

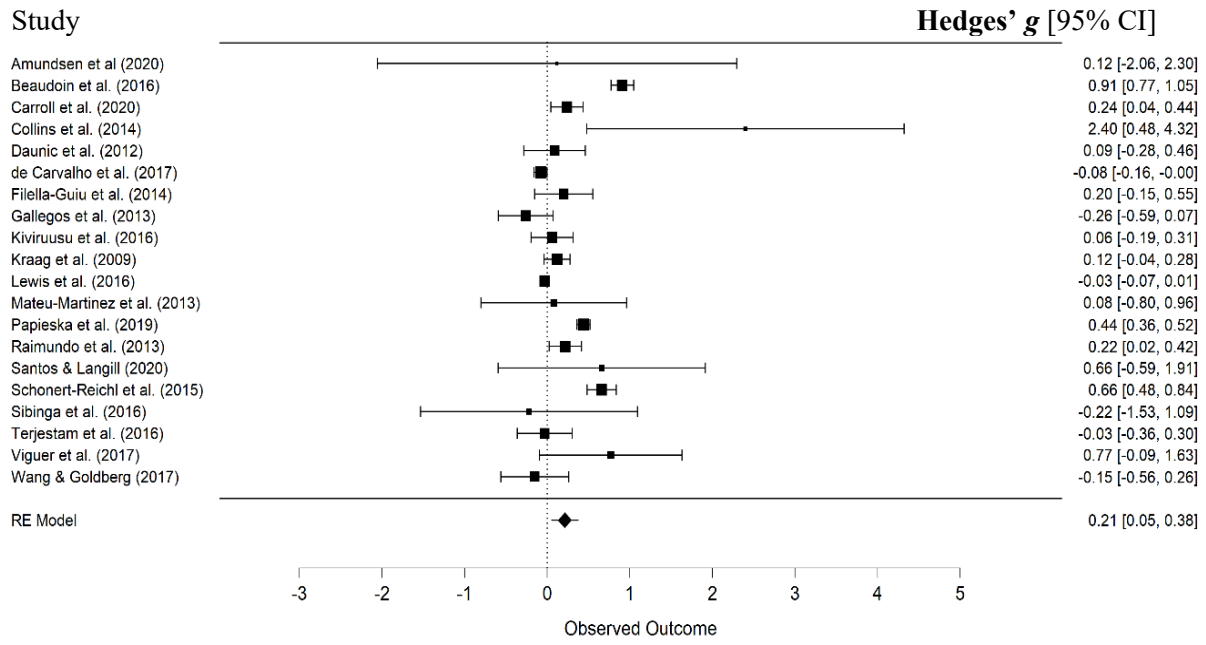
Note. 1 = 'Strong'; 2 = 'Moderate'; 3 = 'Weak'; 'Global Rating' computed as average of ratings across six rating domains. *See* Appendix C for further description of quality ratings.

The effect size analysis described next includes data for a total of 20 intervention studies that evaluated the effect of SEL programme participation on emotion understanding in typically developing children across middle childhood. Effect size analysis indicated a small overall pooled effect size estimate (Hedges' $g = 0.215$, $SE = 0.09$), suggesting SEL programme participation slightly increased overall emotion understanding, as compared to children who did not participate in a SEL programme/formed the control group (*see* Figure 11). The confidence interval (CI) for the effect size estimate ranged from 0.05 to 0.38, indicating the true mean effect size in the universe of studies comparable to those included in the present meta-analysis could fall anywhere within this range. Although the lower bound

value of the CI is low, the range does not include 0, which suggests that the true mean effect size is probably not 0. The *Z* value to test the null hypothesis (i.e., that the effect size is 0.0) is 2.576, with $p < 0.05$; as such we can reject the null hypothesis and initially conclude that on average, SEL programme participation does increase child emotion understanding development (as captured by emotion understanding outcome measures and in comparison to a control group) in the universe of student populations comparable to those included in the analysis.

Figure 11

Forest Plot Summary of Overall Effect Size of Emotion Understanding (EU) Development across Social-Emotional Learning (SEL) Intervention Studies



The Q-statistic provides a test of the null hypothesis that all studies in the meta-analysis shared a common effect size. If all studies share the same effect size, the expected value of *Q* would be equal to the degrees of freedom (in this instance, $df = 19$). *JASP* provides two values of *Q*: one for the Omnibus test of model coefficients, that tests the null hypothesis that all effect sizes are zero, and one for the test for residual heterogeneity, that tests the null hypothesis that all the effect sizes in the studies are equal (the homogeneity of

effect sizes) (Goss-Sampson, 2020; Grasman, 2017). The reported *Q*-value for the omnibus test of model coefficients was 6.637, with one degree of freedom and $p = 0.01$. The reported *Q*-value for the test for residual heterogeneity was 326.43, with 19 degrees of freedom and $p < .001$. In both instances we reject the null hypothesis: we reject that all effect sizes of studies included in the meta-analysis are zero, and we reject that all effect sizes of included studies are equal.

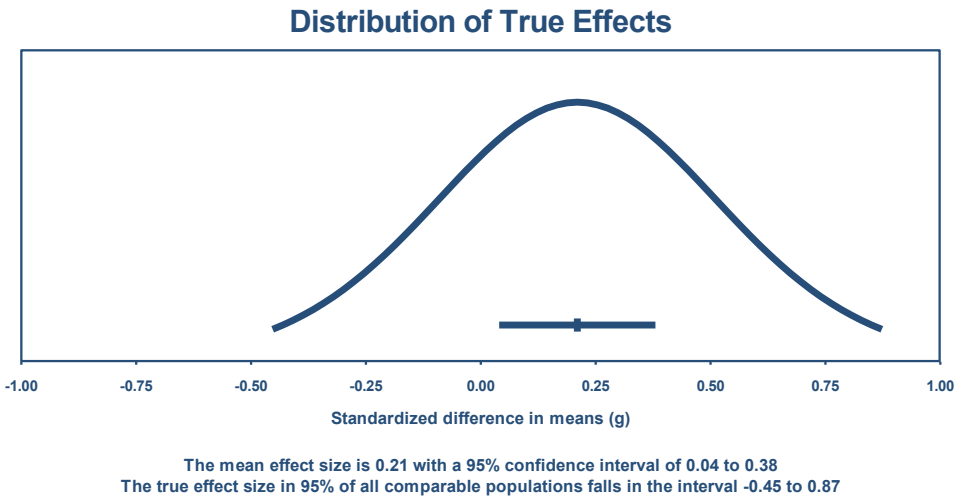
The I^2 statistic that measures the extent of heterogeneity not due to sampling error was 93.79%; this statistic is classified as indicating the presence of considerable heterogeneity amongst studies included in the meta-analysis (Higgins et al., 2021), justifying sub-group analysis to further explain sources of heterogeneity. The variance of true effects and estimate of the total amount of heterogeneity τ^2 was 0.092 (CI = 0.041 to 0.320), and the standard deviation of true effects τ was 0.303.

The prediction interval was calculated using *CMA Prediction Intervals* software and ranged from -0.45 to 0.87 (*see* Figure 12), indicating the effect size varied substantially across studies included in the meta-analysis. The distribution also indicates that in some instances, participation in a SEL programme does not lead to positive development of child emotion understanding.

H^2 reflects the between-study variance determined by equating the *Q* statistic to its expected value. H^2 is 1 in the case of homogeneity, and heterogeneity is assumed to be present when $H^2 > 1$. Here, H^2 was equal to 16.11 (CI = 7.70 to 53.67), and as such, heterogeneity was assumed to be present amongst included intervention studies.

Figure 12

Plot of Effect Size Dispersion



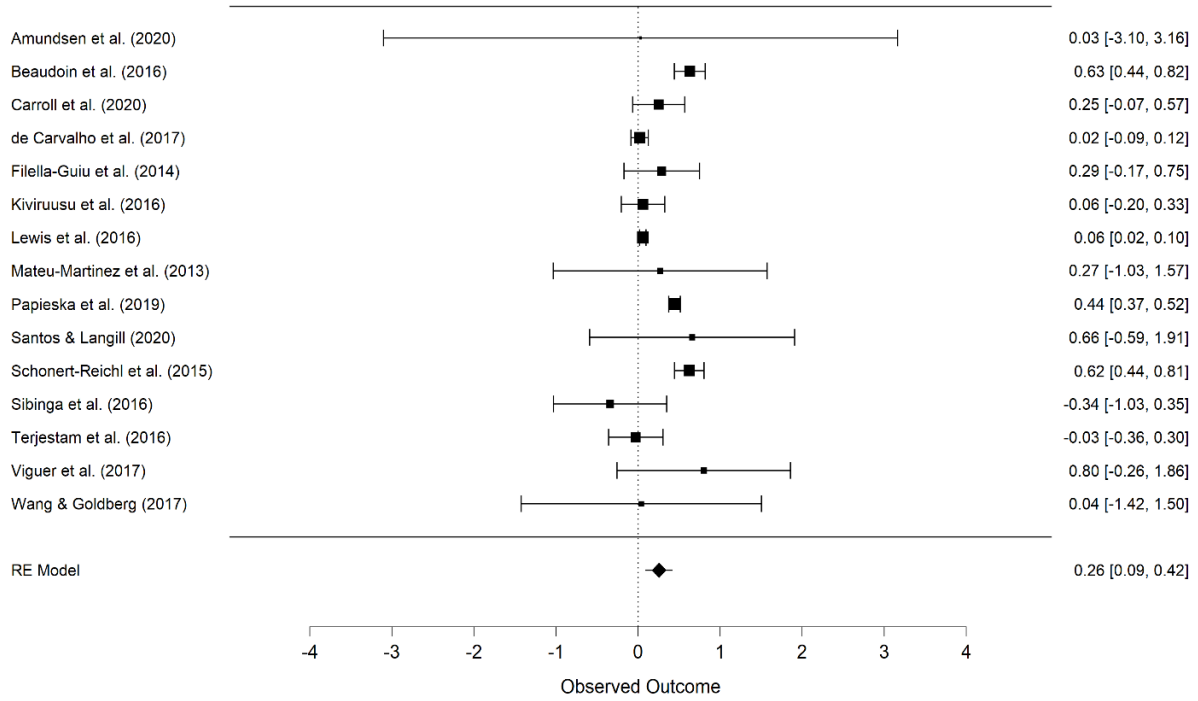
Note. Produced by CMA Prediction Intervals Software.

Results of additional effect size analysis conducted for studies that targeted a particular level of emotion understanding (i.e., external, mental, or reflective), in line with the effect size analysis method adopted by Sprung et al. (2015), are reported next.

2.2.2.1 Promoting External Aspects of Emotion Understanding. The effect size analysis for external EU included 15 studies and indicated a positive small to medium pooled effect size estimate: Hedges' $g = 0.26$, $SE = 0.09$, 95% CI [0.09, 0.42], $z = 3.015$, $p = 0.003$ (*see* Figure 13). The Q-statistics from the Omnibus test of Model Coefficients ($Q = 9.09$, $df = 1$, $p = 0.003$) and Test of Residual Heterogeneity ($Q = 150.93$, $df = 14$, $p < .001$) were also statistically significant. τ^2 was equal to 0.06 (95% CI [0.015, 0.15]) and I^2 to 90.58% (95% CI [71.19, 96.04]).

Figure 13

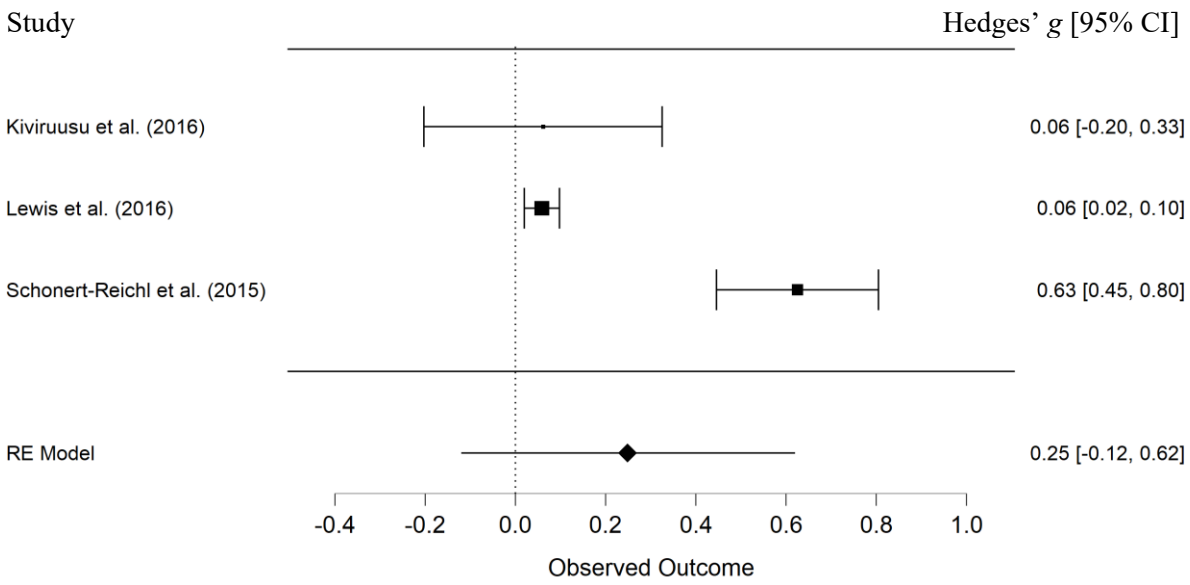
Forest Plot Summary of External Emotion Understanding (EU) Promotion across SEL Intervention Studies



2.2.2.2 Promoting Mental Aspects of Emotion Understanding. The effect size analysis for mental EU included three studies in the meta-analysis and indicated a positive small pooled effect size estimate: Hedges' $g = 0.25$, $SE = 0.19$, 95% CI [-0.12, 0.62], $z = 1.315$, $p = 0.19$ (*see* Figure 14). The Q-statistic from the omnibus test of model coefficients ($Q = 1.728$, $df = 1$, $p = 0.189$) was not statistically significant, whereas the Q-statistic from the test of residual heterogeneity ($Q = 36.546$, $df = 2$, $p < .001$) was. T^2 was equal to 0.099 (95% CI [0.021, 4.2]) and I^2 to 94.23% (95% CI [77.72, 99.86]).

Figure 14

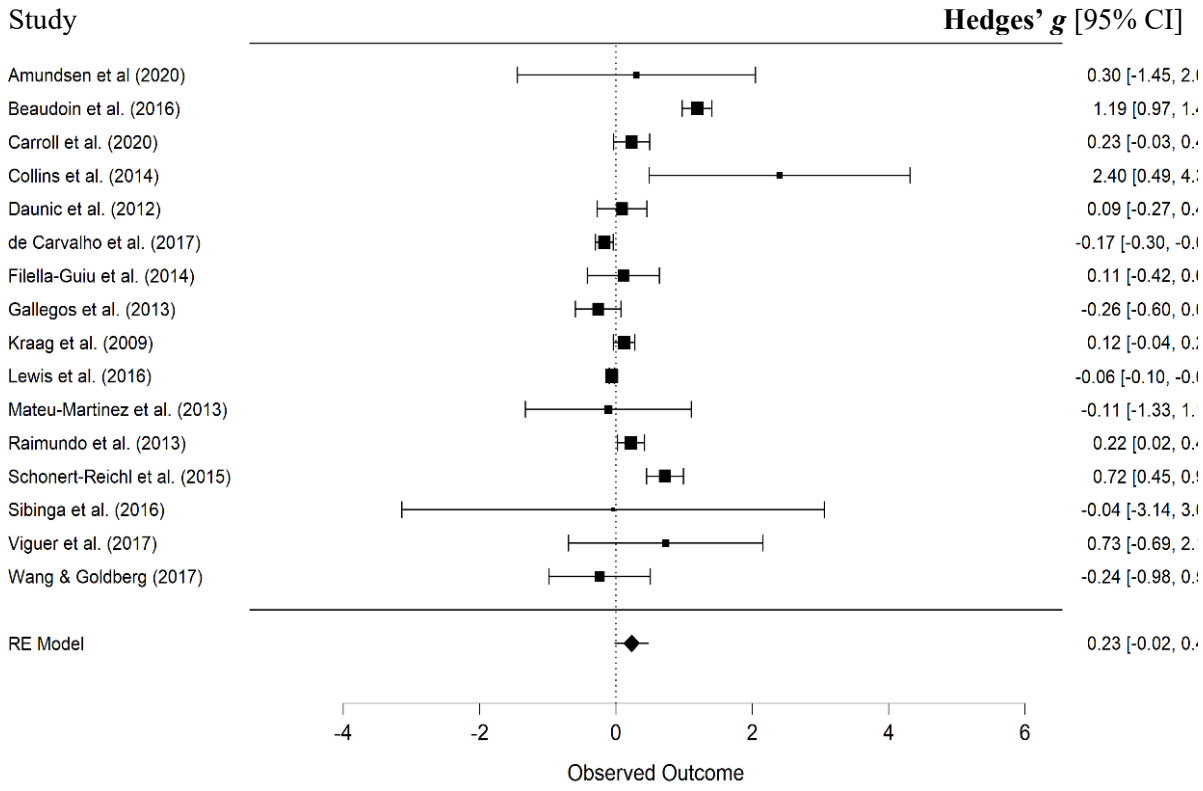
Forest Plot Summary of Mental Emotion Understanding (EU) Promotion across SEL Intervention Studies



2.2.2.3 Promoting Reflective Aspects of Emotion Understanding. The controlled between-group effect size analysis included 16 studies in the meta-analysis and indicated a small to medium pooled effect size estimate: Hedges' $g = 0.23$, $SE = 0.17$, 95% CI [-0.03, 0.64], $z = 1.77$, $p = 0.08$ (*see* Figure 15). The Q-statistic for the omnibus test of model coefficients ($Q = 3.12$, $df = 1$, $p = 0.08$) was not statistically significant, whereas the Q-statistic for the test of residual heterogeneity was ($Q = 127.07$, $df = 10$, $p < .001$). The residual heterogeneity estimates τ^2 was 0.202 and I^2 was 90.88%.

Figure 15

Forest Plot Summary of Reflective Emotion Understanding (EU) Promotion across SEL Intervention Studies



2.2.2.4 Risk of Bias. In addition to quality ratings using the EPHPP instrument *(see* Table 8), risk of bias within studies included in meta-analytic calculations (n = 20) was assessed using the *RoB 2 tool Excel spreadsheet v. 8* (containing macros), indicating that 13 studies presented low risk of bias overall, and seven studies presented some risk based on the domains assessed (*see* Figure 16). The main sources of concern for bias were the lack of random assignment to either intervention or control condition, and in choice of outcome measure as they were often self-report measures or completed by teachers. In SEL intervention studies, teachers were aware of participant intervention status, and it is extremely likely child participants were aware of their status as well.

Publication bias analysis (i.e., fail-safe N, rank correlation, funnel plot) was computed using *Meta-Essentials* Microsoft Excel Workbooks (version 1.5) (Suurmond et al., 2017).

Fail-safe-N tests indicated a needed number of 535 studies averaging a *z*-value of 0 to render the combined effect size statistically insignificant based on the Rosenthal method (the estimated number of missing studies is considered large; Rosenthal, 1979), and that 22 studies with average effect size 0 would be needed to reduce the combined effect size to the criterion value (set at 0.05) based on the Orwin (1983) method. Begg and Mazumdar's rank correlation test indicated a Kendall's τ coefficient of -0.01 that was not statistically significant ($p = 0.366$), suggesting no evidence of publication bias. The funnel plot produced (*see* Figure 17) indicated slight asymmetry around the combined effect size of included studies, and that five additional studies would need to be added to render the funnel plot symmetrical via the trim-and-fill method (Duval & Tweedie, 2000).

Figure 16

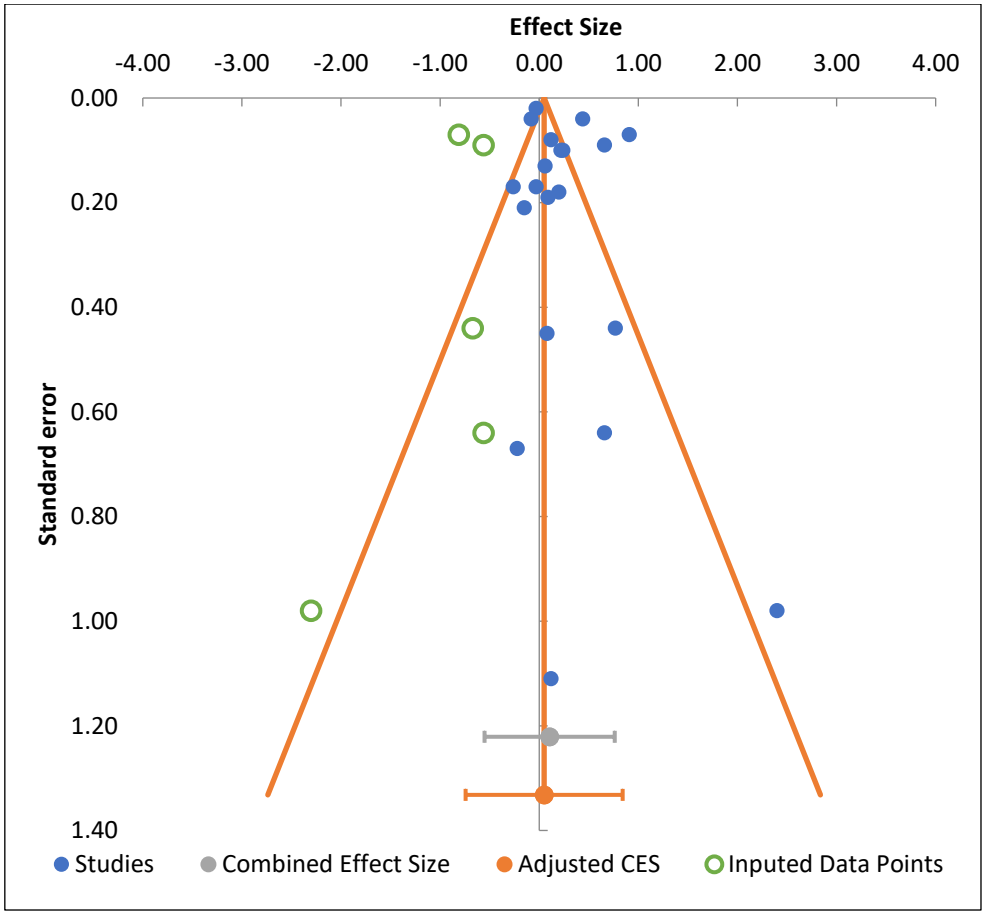
Risk of Bias in Meta-Analysis Studies



Note. Generated via RoB 2 Tool.

Figure 17

Funnel Plot of Meta-Analysis Studies



Note. Produced using Meta-Essentials Software.

2.2.2.5 Moderator Analyses. Meta-regression analyses were conducted using *JASP,* with publication year, intervention session length (in hours), and post-test delay (in weeks) entered as covariates, and EPHHP Global Rating, intervention component combination, publication year, and study continent entered as factors. There were no significant moderating effects of either continuous variables (*see* Table 9) or categorical variables (*see* Table 10) on child emotion understanding.

Table 9

Moderator Analyses (Continuous Variables)

					95% Confidence Interval	
	Estimate	**Standard Error**	**z**	**p**	**Lower**	**Upper**
intercept	-6.500	74.815	-0.087	0.931	-153.135	140.135
Publication Year	0.004	0.037	0.094	0.925	-0.069	0.076
Session Length (in hrs)	-0.587	0.439	-1.337	0.181	-1.448	0.274
Post-test Delay (in weeks)[a]	0.025	0.017	1.453	0.146	-0.009	0.059

Note. Wald test.
[a] Excluded studies: Filella-Guiu et al. (2014), Kiviruusu et al. (2016), Lewis et al. (2016), Mateu-Martinez et al. (2013), Terjestam et al. (2016), and Viguer et al. (2017) as relevant data not reported.

Table 10

Moderator Analyses (Categorical Variables)

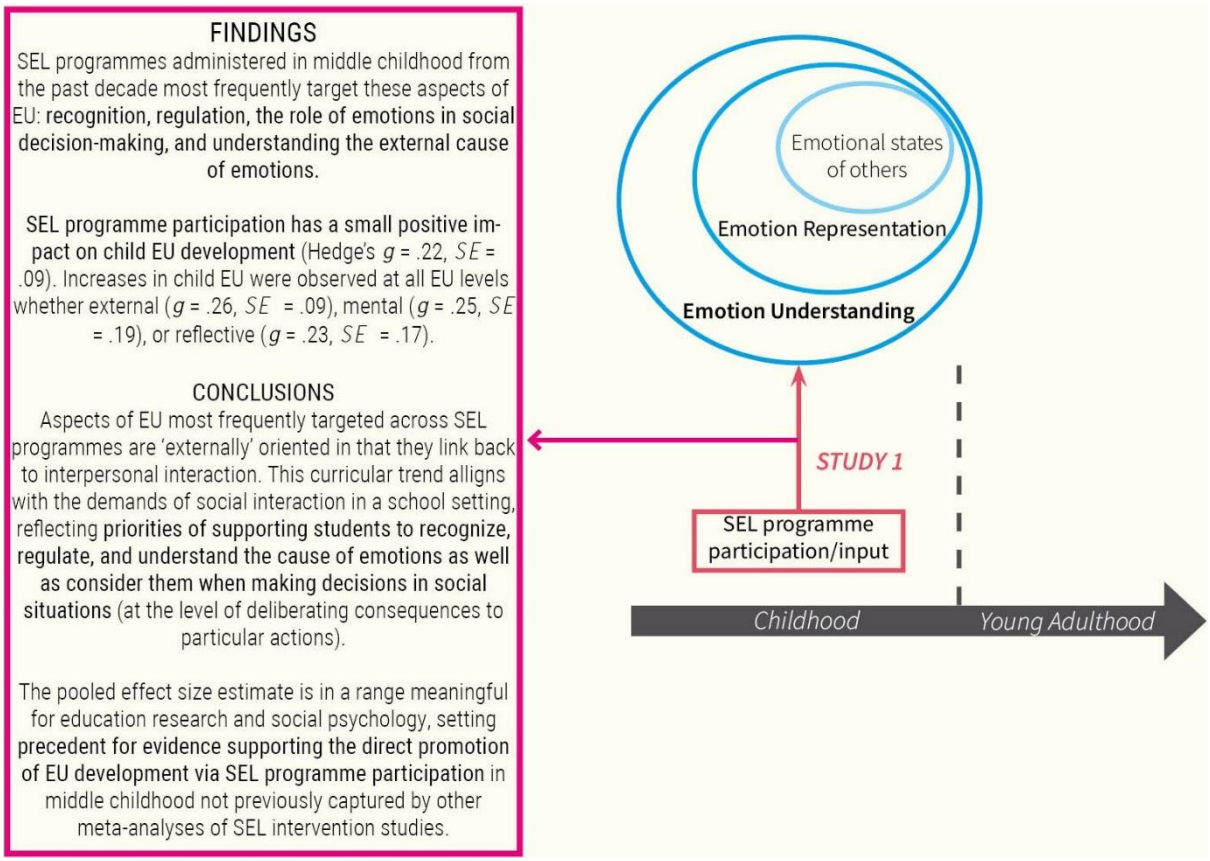
					95% Confidence Interval	
	Estimate	**Standard Error**	**z**	**p**	**Lower**	**Upper**
intercept	0.074	1.160	0.064	0.949	-2.200	2.348
Global Rating (2)	0.046	0.218	0.211	0.833	-0.381	0.473
SEL Programme Combination: External + Reflective	-0.301	1.156	-0.260	0.795	-2.566	1.965
SEL Programme Combination: External, Mental, Reflective	0.133	1.145	0.116	0.907	-2.111	2.378
Continent: North America	0.263	0.171	1.534	0.125	-0.073	0.599
Continent: South America	-0.513	0.329	-1.559	0.119	-1.158	0.132
Continent: Oceania	0.421	0.338	1.247	0.212	-0.241	1.083

Note. Wald test.

2.3 Summary of Findings and Interpretation

Figure 18

Study 1 Research Focus, Findings, and Main Conclusions



The systematic review undertaken in this study identified 38 different SEL programmes across 54 studies (conducted in 19 countries) to address its first question of: how has emotion been taught in primary schools in the past decade? Amongst the 38 SEL programmes whose components were mapped onto a 10-facet EU framework, components of 'Recognition' (n = 38 programmes), 'Regulation' (n = 33 programmes), 'Decision/Action' (n = 33 programmes), 'External Cause' (n = 30 programmes), 'Belief' (n = 26 programmes), and 'Desire' (n = 20 programmes) were targeted by at least half of SEL programmes (*see* Figure 10 for full description of EU framework components). Emotion recognition, understood more broadly as the ability to recognize and label emotional states, was targeted by all SEL programmes. A subsequent meta-analysis including 20 studies from the

systematic review was undertaken to address the second research question for Study 1: does SEL programme participation impact the development of child EU across middle childhood? The meta-analysis found a small positive impact of SEL programme participation on student EU as compared to a control group (Hedge's $g = 0.22$, $SE = .09$).

The combined systematic review and meta-analysis of Study 1 constitute an effort to disentangle how emotional learning relates to social learning, often difficult within the larger field of SEL as child outcomes are most often measured as a social-emotional skill composite. Discussion of causal mechanisms linked to participation in SEL programmes can be limited when: a) only composite measures are used to assess student outcomes, b) intervention components are not transparently reported (not necessarily by omission), c) theoretical models to explain the interaction of specific social skills with emotional skills are not stressed, and d) multiple terms are used interchangeably to describe constructs pertinent to social-emotional development across studies. Here, Study 1 contributes both a synthesis of common EU areas promoted in school-based SEL programmes and initial statistical evidence, previously unavailable, in support of the positive impact of SEL programme participation on child EU development across middle childhood.

An effort within the field to clarify what is meant by social-emotional skill and to note content overlap amongst SEL programmes has begun. Most notably is 'Explore SEL' (EASEL Lab, n.d.)—an online taxonomy project run out of the Harvard EASEL lab to visualize links across the plethora of theoretical frameworks found in SEL programmes. Explore SEL offers tools to help educators, researchers, and parents identify and compare how much each programme targets a particular SEL domain (six of which are included: 'Cognitive,' 'Emotion,' 'Social,' 'Values,' 'Perspectives,' and 'Identity'), and provides an overall system for classifying social-emotional skills. In 'Explore SEL,' the domain of 'Emotion' includes three main sub-domains: 'Emotion Knowledge and Expression,'

'Emotional and Behavioral Regulation,' and 'Empathy/Perspective-taking,' each with a list of specific skills extracted from the content of SEL programmes included in the taxonomy project. This research effort to synthesize all social-emotional skills across common SEL programmes is vital to the future of SEL research so that social-emotional learning does not become an empty umbrella term, covering too many domains and capacities with an overwhelming number of associated programmes that hinder motivations to promote social-emotional development. The discussion in empirical papers on EU development via SEL programme participation is either often subsumed into discussion of social-emotional skill in general or not discussed directly, favouring instead a broader reflection on social-emotional domains that links back to social problem-solving ability.

As described in the Pons et al. (2004) EU model, the external level of EU encompasses: the ability to recognize emotions from facial expressions, the understanding that emotions have an external cause, and the impact of external reminders of an event by giving rise to emotional states (e.g., seeing a photograph of a loved one who has passed). The mental level encompasses understanding the role of desires and beliefs in shaping one's emotions as well as understanding the distinction between expressed and felt emotion (i.e., that one's external facial/physical expression may not necessarily reflect inner states). The final level of reflective EU encompasses the understanding that emotions can be regulated via use of strategies, that an individual can hold emotions of mixed or opposing valence (e.g., one is both nervous and happy about a situation), and of how moral emotions arise—morally laudable actions are linked to the experience of positive emotions whereas morally reprehensible actions are linked to that of negative emotions.

This meta-analysis found small positive effect sizes across all EU levels (as understood within the Pons model) that were targeted by SEL programmes. The effect size of studies targeting external aspects of EU was the largest (Hedges' $g = 0.26$, $SE = 0.09$; based

on 15 studies studies), as compared to the promotion of mental aspects of EU (Hedges' g = 0.25, SE = 0.19; based on 3 studies), and reflective aspects of EU (Hedges' g = 0.23, SE = 0.17; based on 16 studies). The difference in number of studies available for each level of EU is due to the fact that studies included in the meta-analysis often only used assessments targeting either external or reflective aspects of EU (*see* Table 6). Hill et al. (2008) provide empirical benchmarks for interpreting effect sizes in education research that are contextualized, finding a typical effect size range of .20 to .30 when considering studies that have implemented a similar form of intervention; however, studies included in their discussion focused on improvements in educational attainment and on social-emotional development factors versus emotion understanding specifically.

Meta-analyses concerned with the impact of SEL programmes have largely focused on the promotion of social-emotional skills overall (as opposed to EU specifically), included studies encompassing a wide participant age range, and found effect sizes in the range of .12 to .57. Recently, Beelmann and Lösel (2021) reported an effect size of d = .25 in their review of social skills trainings implemented to reduce antisocial behaviour with participants aged 0 to 18—a follow-up to Lösel and Beelmann (2003) that reported effect sizes of d = .39 and .40 for the promotion of social skills and social-cognitive skills, respectively. Durlak et al. (2011) reported an effect size of g = .57 in their review of SEL programmes implemented in primary and secondary education, with social-emotional skill encompassing a range of cognitive, affective, and social skills including: emotion identification based on social cues, goal setting, interpersonal problem-solving, decision-making, conflict resolution, and perspective-taking. Taylor et al. (2017) reported an effect size of .23 (Hedge's g) with regards to SEL programme impact on social-emotional skills, understood as emotion identification, perspective-taking, self-control, interpersonal problem-solving, coping strategies, conflict resolution, and decision-making abilities, in their review of studies conducted with samples in

primary through secondary school. Siddiqui and Ventista (2018) assessed the impact of individual programmes on social-emotional skills with participants ages 6 to 12, reporting effect sizes (Cohen's *d*) ranging from .12 to .17 for the promotion of emotional literacy, and of .07 for emotional regulation. Lastly, Goldberg et al. (2019) reported an effect size of d = .22 for improvement in social-emotional adjustment post participation in interventions adopting a 'whole school' approach to support social-emotional development. Students were aged 4 to 18, and social-emotional adjustment included measurement of social or emotional skills as well as attitudes towards the self and others. Considering empirical benchmarks provided by previously described research, the effect size of the present meta-analysis is within an expected range found in the literature, and can even be considered high in comparison to some studies within the literature.

The finding from this meta-analysis that SEL programme participation promotes EU development specifically (at all levels—external, mental, and reflective) complements research from EU training studies. In their review of EU training studies, Sprung et al. (2015) found meaningful impacts of training studies on external (g = .62), mental (g = .31), and reflective (g = .64) levels of EU. Although SEL programmes encompass a broader set of developmental domains, Study 1's finding of the positive impact of SEL programmes on EU, taken together with evidence from EU training studies, highlights the benefit of direct EU skill development with students via SEL programme participation.

Regarding EU areas that have been emphasized in schools across middle childhood, 'Recognition' and 'External Cause' belonged to the external level of the EU framework used in this review, whereas 'Regulation' and 'Decision/Action' (both addressed by 87% of programmes) pertained to the reflective level of EU. 'Belief,' addressed by 68% of programmes included in this study, belonged to the mental level of EU. It is not surprising that the external level of EU was most frequently targeted by school-based SEL programmes,

followed by reflective and mental levels, nor that all SEL programmes included in the study placed particular emphasis on emotion recognition. EU aspects most frequently targeted by programmes as identified by the present systematic review can arguably be considered most crucial to classroom behaviour and social interactions at school.

The external level of EU in the Pons model is posited to begin to develop at around 3 to 4 years of age, whereas the 'Belief' component of the mental level is posited to develop at ages 4 to 6, and the reflective level, at ages 6 to 8. As such, findings from the systematic review indicate programmes implemented in Years 4 to 6 tended to target EU components that begin to develop early on, prior to entry to formal education, as well as components children may only have just begun to acquire prior to entry into Year 4. Children in middle childhood can be considered proficient in identifying emotions based off of facial expressions as compared to their younger peers (and models of EU development), but Garcia and Tully (2020) found children ages 7 to 10 made identification errors depending on the intensity of an emotional facial expression for the emotions of happiness, sadness, and anger. Specifically, child emotion identification accuracy was poor for low intensity expressions, but improved in a cubic fashion as emotion intensity increased. This links to Nook et al.'s (2017) finding suggesting that representing emotions along an axis of intensity is what continues to develop for a child, to later match an adult representational structure of emotion that includes both dimensions of valence and arousal/intensity.

Aspects of emotion recognition, emotion regulation, understanding emotions when making decisions or planning actions in social situations, and understanding the external cause of emotions can be said to have an external locus for EU. In these instances, either the identification of emotions is directed at others so as to navigate situations of social conflict or to build positive relationships with others by understanding emotions within the self so that

they can then be regulated. Strand et al. (2015) in a sample of 281 preschoolers found that EU was related to hyperactivity, emotion symptoms, and peer problems.

In a series of longitudinal studies, Dodge et al. (2003) found that peer rejection in early years predicted growth in aggression in later years in students ages 5 to 8 (followed from Reception to Year 4). Peer rejection experienced in Years 2 to 4 (students aged 6 to 8) predicted aggression levels in Years 6 to 8 (students aged 10 to 12). Social-information processing style also partially mediated the effect of early aggression levels on later peer rejection. Dodge et al. (2003) could not conclude whether acceptance into a peer group could diminish the aggressive behaviour of children, or whether the experience of peer rejection at an early age promotes the development of antisocial (i.e., aggressive) behaviour. The design of SEL programmes developed for middle childhood that were included in this review encouraged children to identify their own emotions and regulate them as a way to avoid negative social interactions with peers and adults. Self-regulation also has its importance for overall classroom management. Although self-regulation and emotion recognition can be a part of promoting student well-being when directed at the self, SEL programmes often couch development of such skills within the larger consideration of the environment surrounding the child and arguably, how to train students to not be disruptive in class in order to facilitate learning.

Emotion recognition, whether via facial expression or the ability to label emotions once identified, is considered fundamental to EU development (Bassett et al., 2012; Castro, Halberstadt, et al., 2016; Herba & Phillips, 2004). Emotion recognition/identification also plays an important role in the mental level of EU as it relates to emotion regulation (J. J. Gross, 2015). In order to apply a specific emotion regulation strategy, one must first be able to identify the emotion experienced. Regulating one's emotions can play an important role in social interaction at different developmental stages (Bozkurt Yükçü & Demircioğlu, 2021;

Lopes et al., 2011; Martins et al., 2016; Orobio de Castro et al., 2003; Rocha et al., 2015) and when navigating conflict (e.g., Halperin, 2014).

Buckholdt (2015) has developed a system of emotion regulation skill profiles across middle childhood, identifying five sub-groups via latent variable mixture modelling (LVMM): 'low-average coping,' 'average coping,' 'high intensity/expression,' 'high-efficacy,' and 'high support seeking.' Sub-groups were generated based on child self-report of the experience and expression of sadness and anger. Buckholdt (2015) found emotion regulation sub-group membership was related to levels of social competence and depression, but not with peer report of sociability and aggression.

Smith and Walden (1999) in their study with a sample of 45 preschoolers found that maltreated, high-risk, and low-risk groups of children presented no reliably significant differences with regards to their emotion knowledge, but did present statistically significant differences with regards to social problem-solving skills as well as parent- and teacher-rated reports of social and expressive behaviour. This would suggest that although emotion knowledge had been successfully acquired amongst young children with different risk profiles, it was insufficient to relate to equal levels of social problem-solving skill across groups. The link between emotion knowledge, specifically recognition of emotion cued from facial expressions, and social problem-solving can be seen in older populations. For example, van Doorn et al. (2015) across two studies with a sample of adults ages 18 to 62 found that participants relied on emotional expressions to interpret ambiguous social situations presented as vignettes, and tended to make attributions of agency and responsibility to others.

The ability to identify emotions within the self and others constitutes a core part of not just emotion understanding, but also greater social skill development as it relates to affective perspective-taking beginning in the preschool years (Denham, 1986; Wellman et al., 2000) and social interaction (e.g., Dilalla & John, 2019). Harwood and Farrar (2006) found

positive correlations between affective perspective-taking and theory of mind (ToM) in children ages 3 to 5, independent of age and language ability; the relationship was strongest when there was a conflict between the child's emotional response to a scenario and that of their friend. As such, Harwood and Farrar (2006) provided evidence linking a child's ability to understand conflicting emotions with their ability to understand false beliefs.

It should be noted that the ability to identify the emotional states of others is distinct from empathy, understood as the spontaneous sharing of another's emotional state in response to another person's emotion (Stietz et al., 2019). The SEL programmes included in this study comprised an intervention component dedicated to developing EU and did not necessarily purport to train empathy. Israelashvili et al. (2020) addressed the inconsistencies in research linking emotion recognition to empathy by emphasizing the importance of considering the two facets of empathy (i.e., empathic concern and personal distress), finding that empathic concern was positively related to the recognition of emotional facial expressions, whereas personal distress was negatively correlated with accurate emotion recognition. As such, in focusing on emotion recognition, SEL programmes can be said to lay the foundation for the development of empathy, but such language is not readily found in the description of such programmes unless their focus is on the promotion of prosocial behaviour or anti-bullying efforts.

The least frequently targeted EU components by SEL programmes from the past decade (i.e., by less than 10% of programmes) as identified by the present systematic review were: 'Mixed,' referring to the understanding that individuals can experience emotions of opposite valence at the same time; 'Reminder,' referring to the understanding of the role of memory in triggering emotional experiences not necessarily related to present situations; and 'Hiding,' that only had one programme target it, and refers to the understanding that individuals may not always display their internal states externally—in other words, that there

can be a mismatch between facial expressions (or other verbal and non-verbal cues) and how an individual is actually feeling. ‘Mixed’ belongs to the reflective level of EU, ‘Reminder’ to the external level, and ‘Hiding,’ to the mental level. It is possible these topics did arise in discussion when the SEL programmes were implemented, but such information was not detailed in descriptions of lesson plans as reported in included studies.

‘Morality’ was addressed only by 12 programmes (32%) used in intervention studies included in this review. Although the topic can easily arise in the context of how students relate to their peers and make decisions in social situations, it is interesting that this component was targeted less frequently as opposed to others in the EU framework, especially given a general trend of SEL programmes to emphasize social decision-making processes. It could be due in part to the age band of participants in studies, but also to the way in which ‘morality’ in relation to EU is defined in the Pons model: the understanding that morally laudable actions trigger positive emotions in the self, and morally reprehensible emotions trigger negative emotions. Such a definition does not necessarily encompass the dimension of understanding the emotional consequences on another individual depending on whether a moral decision is made or not.

Furthermore, deciding what is ‘morally reprehensible’ or ‘morally laudable’ may be difficult. How morality can be addressed in the classroom outside of religious education and whether or not it should be broached in primary school settings can be debated (Elias et al., 2007; Hand, 2017; J. Russell, 2007), especially depending on the cultural context (e.g., Hằng, 2019; Huo et al., 2021; Willems et al., 2013; Zhao & Sun, 2017). Based on the mapping exercise of this systematic review, it would seem the ‘morality’ component of EU was not as integral to SEL programme designs targeting EU development as compared with other SEL topics concerned with developing emotional skills and how we interact with others.

2.3.1 Limitations

With regards to the systematic review, the scope of identifying trends in the promotion of EU in SEL programmes was constrained to programmes that have been implemented in intervention studies published within the past decade. There are numerous SEL programmes available and as such, the 38 programmes mapped in this systematic review only represent a handful of conceptualizations of EU skill.

The search method for the review also did not include unpublished work as the research focus was concerned with SEL programmes prevalent within the literature or more likely to be read about as well as disseminated. Not searching unpublished literature also impacted access to all possible studies that were potentially available for meta-analysis. Furthermore, the number of studies included in the meta-analysis could have been higher, although the reduction in heterogeneity amongst studies would have been doubtful given the variety of samples and measures used to assess EU and overall social-emotional development with primary school children, even in a constrained age band of 8 to 11 years (as was selected in this study).

Another limitation to this study was that coding of SEL programmes was done at a surface level and entirely dependent upon information provided in the studies regarding SEL programme content. Unfortunately, no true discussion of which activities accompanied particular lesson plans could be had in connection with the topics broached in SEL lessons on aspects of EU. Although this study provides an initial answer to the question of ‘how’ emotion is taught in schools with regards to which topics are covered, a more mechanistic answer providing a summary of activities and a review of them from programmes was not possible and should be included in future research to provide a more holistic picture of how emotions are ‘taught’ in school settings.

2.4 Study-specific Conclusions

This study adds to the social-emotional literature in 1) its review of SEL programmes and 2) emphasis on how emotional learning has been addressed with regards to social learning. Reinforcing correct labelling and identification of emotional states as SEL programmes have done in primary schools over the past decade, as indicated by the present systematic review, can be considered an effective practice to supporting social-emotional skill development across middle childhood. Aspects of SEL programmes that promote EU do not have a strict singular focus on the acquisition of emotion vocabulary, but rather on discussion of context-based emotions in addition to understanding how to identify and regulate emotions within the self. Knowing how to name an emotion is fundamental to this process of self-regulation, but the link between emotion recognition and decision-making in social situations was found to be more central to SEL programmes, based on the mapping exercise undertaken in this study. Considering the information provided in SEL intervention studies, the question still remains as to which components of SEL programmes that teach such aspects of EU are most effective. Detailing how emotion representation and understanding can support positive social interaction as well as lead to correct attributions of the internal states of others needs to be further outlined.

Results of the systematic review and meta-analysis attempt to offer a glimpse of how emotions are taught in classrooms across the world, supporting a small but meaningful positive impact on child EU that can inform future educational practice. Although there may have been larger representation in this systematic review from studies in North America (35% with US/Canada/Mexico combined), continental Europe (30%), as well as the UK and Oceania (each reflecting 13% of studies), it should be noted that the remaining 9% of studies were also from countries in South America (Chile and Brazil), Asia (Japan and South Korea), and the Middle East (Turkey)—evidence of a global trend supporting SEL in education,

echoed by both institutional and governmental calls discussed at the start of this chapter. The diversity in study location could not be maintained with regards to studies in the meta-analysis; of 20 studies, 45% were conducted in continental Europe (across Finland, Poland, Sweden, the Netherlands, Portugal, and Spain), 40% in North America (Canada, the USA, and Mexico combined), and 10% in the UK (one study in England and one in Scotland). The US has dominated the SEL literature whether programme development or research, largely through the widespread adoption of the CASEL framework in its identification of 'core' SEL domains (CASEL, n.d.). A similar phenomenon is observed in the UK with the SEAL (Social and Emotional Aspects of Learning) initiative launched in 2005 (SEAL, n.d.). The importance of context and culture in social-emotional development cannot be ignored (Hareli et al., 2015; Koh et al., 2014; McCoy et al., 2019; Savina & Wan, 2017; Scollon et al., 2011; Tulviste et al., 2019) and as such, continued efforts need to be made to consider the impact of SEL programmes in different contexts.

It is still of interest to provide a link between which lesson plans target EU and the types of activities children engage in as part participating in a SEL programme in order to answer the question of how emotion is taught in schools more concretely. Knowing more about the activities that comprise SEL programmes can provide more nuance to understanding instances of positive gains post participation in a SEL programme. Furthermore, how EU (i.e., the 'emotional learning) in a given programme is stressed to relate to 'social learning' is not always clear depending on how much of the theoretical underpinnings are provided as part of the rationale for a SEL programme.

Although the Pons model and EU framework adopted in this review can serve as useful starting points for characterizing EU, the nature of child emotion concepts can be further explored. Such study, in particular in relation to the role of language, would be of benefit to SEL programmes conducted in the classroom to grasp the potential of explanatory

conversations about emotion to promote EU development (e.g., Tenenbaum et al., 2008), as is indicated by EU training studies. In Study 2 discussed next, the nature of child emotion concepts is addressed in more detail in relation to emotion language and how children describe emotional states, providing a contrast to definitions of emotional states provided by adults in the classroom via SEL programmes discussed here in Study 1.

It would also be of interest to understand how emphasis on emotion recognition ability in childhood may influence later social-emotional development in secondary school, and then at university. Rowsell et al. (2016) in their three-year longitudinal study with adolescents in Years 10 to 13 found a reciprocal developmental influence model between emotion identification skill (understood as the ability to identify and describe feelings) and perceived social support (operationalized via self-report of social support network size and quality of social support from others). Study 3 takes up the question of links between EU, emotion representation, and levels of social connectedness with an older age band of students, discussed later.

Chapter 3

Child Patterns of Emotion Language: An Analysis and Visualization of Blended Semantic Networks across Middle Childhood (Study 2)

This study focuses on emotion representation and language across middle childhood by exploring inter-relationships amongst emotion concepts both at the participant-level and word-level. Social skill is considered through a linguistic-specific lens. How individuals represent internal states requires consideration of the production of mental state terms (MSTs), a unit of language often adopted in social skill research as a proxy of child ability to represent other minds. Mental state and emotion word vocabulary constitute two important categories in the lexicon that comprise a child's overall language to represent others (Ornaghi et al., 2011; Taumoepeau & Ruffman, 2006). The relationship between MST usage and emotion word knowledge has been discussed previously in the literature review (*see Section 1.4.1.2*).

This study, in its focus on the relationship between emotion language and emotion representation, will first consider co-occurrences amongst emotion terms across emotion definitions to glean potential inter-relationships amongst child emotion concepts. The secondary focus on child production of non-emotional MSTs within emotion definitions captures the broader focus of the thesis concerned with examining factors that shape how we develop the ability to identify emotions in others. MSTs are not necessarily required to produce emotion definitions, but including an analytic focus on MST production in relation to that of emotion terms can provide important information regarding child communicative styles when asked to explain the meaning of a variety of emotions.

Previous research has also supported the impact of both the home environment and type of interactional partners on overall language development in their status as sources of language input for children. The number of languages spoken at home has been found to impact multilingual language acquisition, especially if these languages do not necessarily

match the main language the child is exposed to in formal education (e.g., Altman et al., 2014; Flores et al., 2017; Paradis et al., 2020). Vocabulary size has been found to be a predictor of expressive language, specifically in 'late-talkers' (*see* Fisher, 2017 for systematic review and meta-analysis). Bilingualism in the household has also been explored in relation to emotional experience in children (Chen et al., 2012). A child's exposure to languages in the home in addition to the language of their formal education would grant children access to a larger number of emotion words, but not necessarily a larger number of emotion concepts. Bilingualism has previously been linked to higher theory of mind (ToM) skill as opposed to monolinguals in young children (Goetz, 2003). Bilingualism has also been linked to greater perspective-taking skill in adults (Tarighat & Krott, 2021), but its impact on emotion understanding (EU) development requires further study as evidence of a bilingual advantage in ToM or EU development is not conclusive (Weimer & Gasquoine, 2016).

Emotion words in one language may not necessarily have cognates in another language (Pavlenko, 2006), with such translation difficulty extending to that of emotional metaphors across languages (Hanić et al., 2016). However, linguistic research does support the claim that there is a shared set of emotion concepts across languages (Devon, 2006; Wierzbicka, 1999), often in line with categories proposed by basic emotion theory (e.g., Ekman & Cordaro, 2011). Saucier et al. (2014) also found a shared set of concepts in language describing human attributes of morality and competence across twelve mutually exclusive languages. A multilingual child's knowledge of multiple words to describe one particular emotion across languages would still contribute to the child's overall representation of that emotion (even if the definition provided is only in one language). As such, in the larger discussion of factors that may impact child generation of emotion definitions, and more specifically, emotion term co-occurrence patterns, capturing whether participants live in a multilingual or monolingual household is of interest to this study's additional analysis.

Having siblings is another factor found to have both positive and negative impacts on child language development. For example, negative correlations have been found between a child's verbal skills and the number of older siblings they have (Peyre et al., 2016). Tompkins et al. (2013) in a sample of low-income 4- to 5-year-olds found that vocabulary skill mediated the negative relationship between number of siblings and child ToM, specifically their false belief understanding—that is to say the realization that beliefs about the world or situations can be incorrectly represented in the minds of others.

Research findings on the impact of older siblings on language development have been mixed. Havron et al. (2019) found that a negative effect of older siblings on the language development of younger siblings had no relationship with the age gap between siblings, and that the negative effect may be attributable to older brothers specifically, as opposed to older sisters. In contrast, older siblings in monolingual populations have been found to support the language development of their younger siblings whether promoting aspects of syntactic development such as pronoun production (Oshima-Takane et al., 1996), or during moments of pretend play that allow for the use of internal state language (Lillard et al., 2011). Older siblings can also offer scaffolding opportunities for the learning and literacy development of a younger sibling (Gregory, 2001). Within the bi- and multilingual research literature, older siblings often serve as models for a younger sibling's second language acquisition where parental input is limited. Sorenson Duncan and Paradis (2020) found via hierarchical linear modelling that input from siblings in the family's second language (L2) that the child was also exposed to in school was associated with more advanced child abilities in L2 narrative comprehension, inflectional morphology, and vocabulary (controlling for age, non-verbal reasoning, and phonological short-term memory). Having a sibling and an older sibling in particular presents a particular influence on child language development, whether positive or negative. As such, number of siblings, in addition to capturing the number of languages

spoken in the home, were additional variables of interest taken up in this study with regards to their potential contribution to child emotion representation and production of emotion definitions.

The present study analysed child emotion definitions to capture how typically developing children ages 8 to 11 represent different emotions within a larger conceptual system and how this may relate to language and social skill. This linguistic study was exploratory in nature to delineate potential factors that may influence the content and structure of child emotion term definitions (and by proxy, emotion concepts) across development. The following research questions were addressed:

1. Which emotion terms co-occur across emotion definitions?
2. Do emotion term co-occurrence patterns shift depending on:
    a. participant age or gender?
    b. emotion term valence or intensity?
3. Does mental state term (MST) production across emotion definitions shift depending on:
    a. emotion term co-occurrence patterns?
    b. participant age or gender?
    c. emotion term valence or intensity?
4. Are there specific scenarios or topics common across emotion definitions?

Two approaches were adopted to address Study 2's research questions. The first centred on quantifying child emotion definitions by noting emotion term co-occurrence and production of mental state terms. The second approach was a thematic analysis to provide a description of semantic content in child emotion definitions across middle childhood. Considering the semantic content of emotion definitions via thematic analysis was intended to enrichen and broaden reflection on quantitative findings as they relate to child emotion

representation. Analysed emotion definitions were part of a corpus compiled previously by the researcher comprising data collected from two different pilot studies, described further in the 'Method' section below.

3.1 Analysing Emotion Language

Linguistic analysis of emotion words has included the study of co-occurrence patterns and broader questions of semantic network structures for emotion words. In their study of mixed emotions specifically, Moeller et al. (2018) used co-occurrence network analysis to capture the structure of emotions within individuals. Across two studies, Moeller et al. (2018) looked at how positive emotions and negative emotions co-occur (that is to say emotions of opposite valence), and which specific emotions frequently arise as co-occurrence pairs. Participants were secondary school students ages 14 to 18. Due to its relevance to Study 2, we will focus here on the first study conducted by Moeller et al. (2018) that included an open-ended question to collect data (somewhat similar to the open-ended format of the emotion definition task used in Study 2): 'How do you typically feel when you are in school? List up to three feelings." Responses to the prompt were then coded for analysis. Participants also completed emotion rating scales to indicate how often they experienced each of 28 emotions listed on a scale, and measures of temperament, the experience of social emotions to capture how participants feel in social situations, and the experience of academic emotions (both positive and negative).

Emotions of mixed valence were listed by 34.1% of participants and within such instances, often two negative emotions were listed with one positive emotion (Moeller et al., 2018). In contrast, a larger proportion of participants reported a combination of negative emotions or a mixture of negative emotions and neutral terms (52.7%). Only 8.1% of individuals reported multiple positive emotions or a mixture of positive emotions and neutral terms. Moeller et al. (2018) observed a clustering of negative emotion words in the upper left

corner of their visualized network. Positive emotion words clustered together in the lower right corner of the network. Emotions with the highest number of unique connections to other emotion words were often negative and included: tired, stressed, bored, happy, anxious, annoyed, alone, sad, depressed, and frustrated. The most frequent co-occurrence pairs were: tired – stressed, tired – bored, and tired – happy. Emotions that frequently co-occurred with emotions of opposite valence were: happy, tired, stressed, bored, anxious, annoyed, excited, alone, okay, and nervous. Moeller et al. (2018) organized this information via data tables, and such descriptive information regarding frequencies of co-occurring pairs will also be captured when presenting the results of Study 2.

Co-occurrence network analysis was undertaken by Moeller et al. (2018) using opensource software called Gephi (Bastian et al., 2009) and network visualization was generated via a complementary layout algorithm ForceAtlas2 (Jacomy et al., 2014). However, such software is only appropriate for large datasets. In this study, given the smaller number of datapoints and an exploratory approach that required engaging with the data fully (as opposed to automating the process), co-occurrence patterns were extracted manually. The manual extraction of co-occurrence patterns also assisted the visualization protocol developed for Study 2 as it was concerned with which words were used to qualify the relationship between two emotions in a co-occurrence pair. For example, does the child equate the two terms on the same level when defining a particular emotion (e.g., 'happy is when you <u>are</u> excited'), or is there more of a hierarchical relationship (e.g., 'frustrated is when you are <u>a little bit</u> angry'). The difference in degree in similarity as indicated by the child's choice of language was central to plotting co-occurrence patterns in this present study (discussed later). Although a programme could be developed to capture which words were located in proximity to a given emotion co-occurrence term, it was decided to be more judicious to go through each definition manually so as to minimize risk of error or over-inferring relationships not

necessarily present in the original sentence. Definitions were transcripts of unscripted spoken language, and as such, there was no guarantee that instances of the word 'like' were being used in a comparative sense (to indicate that two emotions were similar), as opposed to as a filler word or hesitation marker produced by the child when they provided an emotion definition.

Typically, within a network visualization, the thickness of lines connecting two nodes (that represent two terms) indicates co-occurrence frequency patterns as seen in graphs produced by Moeller et al. (2018). Although this information was also pertinent to Study 2 analysis, once again the analytic interest in child emotion definition data pertained to the relationship between the two emotion words that the child described in a given definition. Study 2 was not concerned with characterizing the experience of mixed emotions of children or identifying the simultaneous experience of emotion per se. Rather, in its focus on which emotion terms co-occur to define a target emotion, the goal of the visualization process was to highlight how two emotions in a co-occurrence pair relate to each other based on the child's language. The present focus of Study 2 is on emotions in general and spontaneous co-occurrence patterns as the definition task is open-ended. The emotion definition task also poses no leading questions to imply that emotions are experienced simultaneously or should be referenced in order to provide an emotion definition. Still, Moeller et al. (2018) provided an important precedent for analysing emotion term co-occurrence patterns and initial data as to which emotions may have more frequent co-occurrence together as opposed to others.

Support for a network approach to analysing emotion language and the inter-dependent nature of emotion concepts that is advanced in this thesis is also based in research on causal networks of emotion components. Lange and Zickfeld (2021) proposed methodological approaches to test the conceptualization of overlapping causal emotion networks to understand components that can represent one or multiple emotions. It is

important to note that the researchers subscribed to the componential theory of emotion wherein an emotion is a network of causally interacting emotion components including: a cognition in the form of a subjective experience of the state (e.g., mental event, feeling), a bodily experience or physiological state, a limbic/pre-conscious experience, action tendencies, and nonverbal signals. In this framework, components associated with one emotion could be shared with a different emotion, and components interact in order to give rise to emotions, hence the possibility of overlap in causal networks.

Lange and Zickfeld (2021) advance that network analysis is a fruitful avenue to analyze relationships between multiple components of an emotion and of a larger complete network structure, as it allows for investigation between all components, assessing how certain components group together or which components may be more central to a network. In order to identify potential network overlaps as a type of sub-structure to a larger emotion network, Lange and Zickfeld (2021) support the use of algorithms to detect 'communities' understood as strongly connected substructures. Observed clustering in network graphs is an important feature for detecting trends and potential communities (Fortunato, 2010) that although cannot be fully used in this present study, should be included in future emotion language research. In line with the conceptualization of an emotion network wherein emotions share network components, Study 2 explores how such overlaps may evidence themselves in spontaneous linguistic associations between emotion terms produced in the emotion definitions task.

Support for the study of emotion language as a method to glean conceptual representations of emotion is found in developmental research on emotion concepts. Nook et al. (2020) assessed emotion vocabulary knowledge by adapting the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 2011) vocabulary test to ask participants to define 27 emotion terms by presenting a card with a target emotion term written on it. The word was

then read aloud by the researcher, and then the participant was asked "what does ____ mean?" with the blank referring to the emotion word to be defined. Responses were audio-recorded, transcribed, and then coded for levels of comprehension and abstractness to highlight potential shifts in definitional strategies across the study's sample of participants aged 4 to 25. Although Study 2 is focused on emotion term co-occurrence and not the level of abstractness in the content of emotion definitions, Nook et al. (2020) set a precedent for analysing emotion definitions as a method to uncover conceptual representations of the emotions being defined based on linguistic data. The list of 27 emotion terms selected to be defined were the same as those used in Nook et al. (2017), which informed the emotion definitions task used to create the child emotion definition corpus analysed in Study 2.

Analysing language to identify internal representations (whether thoughts or emotions) also has precedent in the research literature concerned with identifying potential pathology in an individual's perspective or emotion processing based on their written language. Vine et al. (2020) explored natural emotion vocabularies (i.e., words produced in natural speech), focusing on the use of positive versus negative emotion vocabulary and its links to mental health and well-being. Stream of consciousness essays of 1,567 undergraduates and blog posts by 35,000 adults were analysed. Having a larger negative emotion vocabulary was correlated with higher psychological distress and poorer physical health. Having a larger positive emotion word vocabulary was correlated with higher levels of well-being and physical health. The emotion definition task used in Study 2 may be more formalized than that of Vine et al. (2020) to generate linguistic descriptions of emotional states. However, the findings of Vine et al. (2020) support a link between produced emotion language and internal experience (both psychological and physical), and also raise important considerations regarding the valence of an individual's emotional vocabulary as it relates to their mental well-being. Such a consideration is pertinent to the types of emotions addressed

in SEL curricula, specifically whether there is a particular emphasis on negative emotions (as was found in some SEL programmes summarized in Study 1) as opposed to a more balanced curricular focus on both positive and negative emotions.

Emotion word usage has also been tracked to infer participant cognitive processing and representation of either the self and/or others as well as reactions to events. For example, Margola et al. (2010) used a computer-based text analysis programme, Linguistic Inquiry and Word Count (LIWC), to code writings of adolescents who experienced the sudden death of a classmate, capturing frequency counts of emotion and cognitive processing words (*see* Boyd et al., 2022 for most recent version of the software). Margola et al. (2010) assessed a) changes in the description of the traumatic event and b) elaborations regarding processing it emotionally and cognitively based on adolescent writing. Tov et al. (2013) also used LIWC to analyze diary entries produced by undergraduate students to examine potential relationships between self-reported well-being and LIWC emotion word codings. Junghaenel et al. (2008) were able to identify psychiatric outpatients and non-clinical controls based on differences in natural word use also captured by LIWC: psychiatric patients used fewer words to describe optimism, energy, cognitive mechanisms, exclusion, and bodily functions.

Rude et al. (2004) analysed essays produced by undergraduate students comparing pieces written by depressed participants, never-depressed participants, and formerly depressed participants. Depressed participants were found to use more negatively-valenced words and “I” more than never depressed participants. Patterns of language use have also been taken to potentially reflect change in psychiatric symptoms (Arntz et al., 2012). Although Study 2 is concerned with the representation of emotion in a sample of typically developing children as opposed to clinical populations, these studies lend support to the important link between language used to describe an internal state (whether spoken or written) and the conceptual understanding of said internal state.

The present study is the first within the research literature, to the researcher's knowledge, to analyse children's emotion definitions in order to identify emotion term co-occurrence patterns. There is however precedent in the literature for analysing child definitions of non-emotion words. Ponari et al. (2018) compared definitions produced by typically developing children with those presenting developmental language disorder (DLD). Children were audio recorded defining 48 words (both concrete and abstract), and then scored by both a team of researchers and crowd-sourced adult participants on measures of accuracy, quality, and conceptual features based on a set of conceptual categories developed by Barca et al. (2017). Ponari et al. (2018) presented words to children by having them watch an alien shown in the centre of a computer screen, accompanied by an acoustic presentation of a word. However, accuracy in word definitions is not assessed as part of Study 2's analysis as the research interest is rather how children spontaneously understand the meaning of an emotion word when presented.

3.2 Method

3.2.1. Compiling a Child Emotion Definition Corpus

3.2.1.1 Participants. Participants were 49 typically developing children enrolled in primary school, Years 4 to 6 (M_{age} = 9.24; *SD* = .75; 46.9% Female). Roughly 31% of the sample was monolingual (speaking English) (*n* = 15), and 69% were multilingual (*n* = 34), with the following languages being spoken at home (in addition to English): Arabic, Chinese, Dutch, French, German, Irish, Italian, Japanese, Kirsrdandra, Polish, Portuguese, Russian, Spanish, Ugandan, and Welsh. Nine participants were only children, with the remainder of the sample (*n* = 40) having at least one sibling. Participants were recruited from three different schools for two separate pilot studies. Schools were first contacted via email by the researcher, and for those that agreed to participate, parent/guardian consent forms and demographic questionnaires were sent to and shared by school staff with all families of

students enrolled in Years 4 to 6. School staff returned completed consent forms and questionnaires to the researcher; a list of student participants sorted by classroom was then generated.

The first pilot study, conducted in Summer 2018, had 19 participants (Group 1) ages 8 to 9 (M_{age} = 8.79; *SD* = .42) enrolled in Year 4 and recruited from two different schools in Oxfordshire, UK (*n* = 14 for School 3; *n* = 5 for School 2). School 3 was a Catholic school in St. Margaret's Ward, a residential neighbourhood north of Oxford City Centre; according to the Local Insight June 2018 St. Margaret's Ward Profile (Oxford City Council, 2018b), in this neighbourhood 5% of children lived in poverty, 4% of residents had no qualifications, 33% of residents ages 16 to 74 were in full-time employment, 19.3% of households had multiple ethnicities, and the racial/ethnic make-up was as follows: 61.3% White British and 38.7% BME (Black or Minority Ethnic Groups) with 23.1% White-non-British, 9% Asian, 3.7% Mixed, 1.7% Black, and 1.3% Other Ethnic Group. School 2 was a Church of England school in Cowley Ward, a residential and industrial neighbourhood located in the South East greater Oxford area; according to the Local Insight June 2018 Cowley Ward profile (Oxford City Council, 2018a), in this neighbourhood 18% of children lived in poverty, 22% of residents had no qualifications, 44% of people aged 16 to 74 were in full-time employment, 20.3% of households had multiple ethnicities, and the racial/ethnic make-up was as follows: 53.3% White British and 46.7% BME with 17.4% Asian, 15.5% White-non-British, 7.2% Black, 5.1% Mixed, and 1.5% Other Ethnic Group.

The second pilot study, conducted in June 2019, had 30 participants (Group 2) ages 8 to 11 (M_{age} = 9.53; *SD* = .78) enrolled in Years 4 to 6 from two different schools: a private bilingual French-English school in New York, USA (School 1, *n* = 21), and one in Oxfordshire, UK (School 2, *n* = 9) that also participated in the Summer 2018 pilot study. School 1 was located in the New York City neighbourhood of the Upper East Side in zip

code 10021, classified as a 'Middle Class' zip code in comparison to other NY zip codes with a 10% unemployment rate (ZipDataMaps, n.d.). According to the 2014 Census, the racial/ethnic make-up of 10021 was: 80.07% White, 9.65% Asian, 6.44% Hispanic, 1.82% Black or African American, 1.6% 'Two or More Races,' 0.28% Native Hawaiian and Other Pacific Islander, 0.08% 'Other Race,' and 0.06% American Indian or Alaskan Native (ZipDataMaps, n.d.). Information on socio-economic status of participants in either pilot study was not collected.

Table 11

Study 2 Participants by School, School Year, and Gender

	School 1		**School 2**		**School 3**	
	Male	Female	Male	Female	Male	Female
Year 4	5	3	3	2	7	7
Year 5	4	1	3	6	0	0
Year 6	4	4	0	0	0	0
Total	13	8	6	8	7	7

3.2.1.2 Materials. An audio recording device as well as a deck of 27 unruled A6 index cards (4" x 6") of varying colours were used to collect emotion definitions. Each target emotion word was written in capital letters in black permanent marker by the researcher in the centre of an index card; there was only one emotion term per index card, with no duplicate cards. The recording device used was a Tascam DR-05 Version 2 Dictaphone Linear PCM Recorder.

3.2.1.3 Procedure. The following describes the general procedure adopted as data was collected at three different schools with different physical layouts. Recording of emotion definitions took place in a quiet room designated for use by school staff for the duration of the study. The researcher collected participants from their respective classrooms to take them to the 'research' room. The researcher and participant sat across from each other with a table between them, upon which the emotion card deck was placed. After an initial introduction,

the researcher a) explained the purpose of the study and that the child's parent/guardian had given consent for them to participate, b) confirmed information provided in the demographic questionnaire (including age, date of birth, number of siblings, and number of languages spoken at home), and c) obtained verbal assent from the child to participate, noting the child could stop the task at any time without penalty if they wished.

The researcher began the definitions task by asking the child to shuffle the emotion index cards by mixing them along the surface of the table and gathering them back into a deck that was passed back to the researcher. The researcher then explained to the child participant that the researcher would present each index card one by one, after which the child would be expected to say what they thought the emotion term meant, and pointed to the recorder that would be used to record the child's answers. The researcher also explained that there were no wrong answers, that the child could say as little or as much as they wanted, that they could say 'Pass' if they did not know the meaning of an emotion term or did not want to provide a definition, and that only the researcher would listen to the recording (i.e., the recording would not be shared with parents, teachers, or classmates). Children were encouraged to 'say the first thing that popped into their heads.'

Once the participant confirmed they understood and agreed to start the task, the researcher turned on the audio recorder, encouraged the child to speak into the recorder to maximize sound quality, and presented the first emotion card by reading out loud the emotion word listed. The researcher held up the emotion card in the child's line of sight until the child had finished giving their definition and then placed the card face down on the table, presenting the next emotion card in the deck and reading out the emotion term listed. The procedure continued until all 27 emotion cards were presented. No further prompting occurred on the part of the researcher once they began presenting cards to participants. If

there were emotion words that the child did not know, the researcher explained their meaning at the end of the task.

3.2.2. Analytic Procedure

3.2.2.1 Data Preparation. Audio recording files of emotion definitions for each participant were transferred to the researcher's laptop from the audio recorder and then transcribed using the online software, 'transcribe by Wreally.' Once transcription was complete, files were deleted from the audio recorder. Transcription files for each participant were then downloaded as Microsoft Word documents, labelled with participant ID numbers, and then removed from the 'transcribe by Wreally' website. Transcripts for all participants for each emotion term were then entered into an Excel spreadsheet using participant ID numbers and organized by target emotion term. Separate Microsoft Excel files of emotion definition transcripts were created for each age band (8 to 9 years, 9 to 10, and 10 to 11), as well as for emotion term valence (comprising one sheet for positive words and one sheet for negative words), and emotion term intensity (comprising one sheet for activating emotions and one sheet for non-activating emotions). The number of definitions in the corpus by participant age was as follows (*see* Table 12):

Table 12

Number of Emotion Definitions per Participant Age Band

Age band	Definitions (n)	Omitted Definitions (n)*	Total Participants (n)	Participants who omitted definitions (n)
8 to 9	279	17	11	3
9 to 10	637	11	24	6
10 to 11	377	1	14	1
Total	1,239	29	49	10

* Refers to instances where participants did not provide a definition; emotion terms that were undefined by some participants included: disappointed, disgusted, jealous, pleased, proud, scared, surprised, and thankful.

3.2.2.2 Descriptive Analysis. To address the first research question concerned with identifying which emotion terms co-occur across child definitions, the researcher read through all definitions to code instances of when another emotion term was used. Initially, all terms describing internal states across emotion definitions were extracted to form a co-occurrence matrix in an Excel spreadsheet wherein the researcher manually recorded frequency counts for each co-occurrence (*see* Appendix E). All terms were listed alphabetically, with target emotion terms (i.e., emotion terms that were defined) listed in the first row and co-occurring terms listed in the first column. The co-occurrence matrix was then split to create a new Excel spreadsheet with only internal state terms that were emotion terms listed (excluding MSTs, slang terms, and references to emotional states that were utterances longer than a single term).

Emotion terms comprised any singular term that described an emotional state (including the target 27 emotions defined) that could appropriately complete the statement, 'I feel [x].' In instances wherein a child repeated the same emotion term in one definition, the frequency count for the co-occurrence was only recorded as one. A list of non-emotional mental state terms (*see* Appendix F) was created *a priori* as reference for the initial coding of emotion definitions. Emotion term valence and intensity were also pre-determined based on their placement on Russell's Circumplex Model of Affect (1980) (*see* Appendix G).

3.2.2.3 Statistical Analysis. Statistical analysis was run to address Study 2's second and third research questions. All statistical analysis was completed using *IBM SPSS Version 28*. Emotion term co-occurrence patterns were operationalized as a) 'participant blend score,' calculated as the average number of co-occurrences a participant produced across 27 emotion definitions, and b) 'emotion term blend score,' calculated as the average number of co-occurrence instances per target emotion term across participants (n = 49). Mental state term (MST) production was operationalized as a) 'participant MST production,' calculated as the

average number of MSTs produced by participants across 27 emotion definitions, and b) 'emotion term MST score,' calculated as the average number of MSTs produced per emotion term across participants. Non-parametric tests were run in instances where variable data were not normally distributed.

To address research question 2, a one-way ANOVA was run to test the relationship between participant blend score and age; independent samples *t*-tests were run to test relationships between participant blend score and gender, emotion term blend score and emotion term valence, as well as emotion term blend score and emotion term intensity. To address research question 3, a simple linear regression was run to test the relationship between participant MST production and participant blend score. Kruskal Wallis H Tests were run to test relationships between age and participant MST production, as well as between emotion term MST score and emotion term intensity. Lastly, independent samples *t*-tests were run to test relationships between participant MST production and gender, as well as emotion term MST score and emotion term valence.

3.2.2.4 Thematic Analysis. To address research question 4, inductive thematic analysis of all emotion definitions was undertaken in line with the six-phase guide put forth by Braun and Clarke (2006) for rigorous and systematic thematic analysis. The six phases include: 1. Familiarizing oneself with the data; 2. Generating initial codes; 3. Searching for themes; 4. Reviewing themes; 5. Defining and naming themes; 6. Producing a report as summary. Themes were identified at the semantic level, meaning the researcher was concerned with the surface-level meaning of definition content to allow for a descriptive organization of definition semantic content, followed by a level of interpretation to speak to potential implications of recurrent themes (Patton, 2002).

First, emotion definition transcripts for each participant were uploaded as separate Word Document files to NVivo 12. A given document listed transcripts of a participant's

definitions for all 27 emotion terms, including time stamps. The researcher then read all transcripts (Step 1) as part of an initial round of exploratory coding to note all mentions of specific scenarios, topics, and/or individuals involved that may give rise to a defined emotion (Step 2). These codes (called 'nodes' in NVivo software) were grouped into categories where possible (Step 3).

A codebook was then generated by and downloaded from NVivo 12 as a Word Document (*see* Appendix H) comprising: an alphabetical list of all codes organized into their respective categories, the 'spread' of a given code accounting for the number of files in which it appeared (reflecting how many participants made mention of a particular code in their definitions), and the number of overall references to a particular code. Code categories that appeared in at least 24 different files (i.e., nearly half of participant transcripts) were identified in order to address the research question concerned with determining which topics were common across participant emotion definitions as opposed to the variety in topics that arose. Codes within each of these common categories that appeared in the highest number of files comparatively were then identified to generate descriptive themes (Step 3).

These themes were then reviewed by the researcher and an independent reviewer by comparing them to the coded portions of definition text to assess fit (Step 4). After coding by the researcher, nine themes were initially identified across all child definitions. A portion (25%) of all child definitions coded to each of the nine themes were then randomly selected and shared with an independent reviewer along with the initial nine theme labels and descriptions. The independent reviewer assessed level of fit between the presented theme and the selection of coded portions of child definitions, as well as the clarity in emotion definition theme description. Sub-themes were also generated and discussed between the researcher and the independent reviewer via the same process. After discussion of relevancy, themes and sub-themes were finalized (complete with a theme name and description) and organized

hierarchically (Step 5; *see* Table 16), and then summarized with examples from child definitions (Step 6; *see* Table 17).

3.2.2.5 Data Visualizations. Two different types of visualizations were generated to complement the analysis of emotion term co-occurrence across child emotion definitions. The first comprised semantic network maps to represent common emotion term co-occurrences per age band (given the unequal number of participants in each). Semantic network maps were generated using the online mind-map creation platform 'Coggle' (via researcher-paid subscription, but freely available). The goal of these semantic maps was to give an overview of trends in emotion term co-occurrence patterns across age bands. The threshold for a co-occurrence to be considered 'common' was determined by first considering the range of emotion term co-occurrences when present (*see* Table 13):

Table 13

Range of Emotion Blend Frequency per Age Band

	n	x_{min}	x_{max}	$\bar{x}$
8- to 9-year-olds	11	1	6	1.65
9- to 10-year-olds	24	1	13	1.92
10- to 11-year-olds	14	1	8	1.67

The mid-point of each range per age band served as the threshold to deem an emotion term co-occurrence as common. This meant that only emotion term co-occurrences appearing in definitions of at least three participants for 8- to 9-year-olds, six participants for 9- to 10-year-olds, and four participants for 10- to 11-year-olds were included in the semantic map visualizations.

The second type of visualization completed in this study translated emotion term co-occurrence patterns to radar plots to reflect relationships between emotion terms at the individual child level. A researcher-developed protocol was adopted to visualize data. The steps were as follows:

1. Identify terms present in instances of emotion term co-occurrence—both the target emotion word defined and the additional emotion term (i.e., blend term).
2. Take note of any terms used to introduce the blend term (i.e., cues), namely declarative verbs (e.g., Excited is when you are happy.), conjunctions (e.g., Bored is when you're calm or sad.) or adverbs (e.g., Disgusted is when you're somewhat uncomfortable).
3. Translation to radar plot:
    a. Blend terms used as axes upon which defined emotion terms are plotted.
    b. Cues are translated into numerical values to act as coordinates for target emotion terms on axes of blend terms based on reference table (*see* Table 14; 'core' cues are bolded):

Table 14

Reference Table for Linguistic Blend Cue Translation

Cue	Transformation	Coordinate Value
is		1.00
like		.95
mostly		.80
not		-1.00
somewhat		.5
or	'is' / 2	.5
a little	'is' / 4	.25
sometimes	or	.5
sort of	somewhat	.5
very	2 x 'is'	2

In instances where a blend cue appearing in the child's definition was not directly listed in the above table, it would be translated into a cue that captured a similar meaning (e.g., for the definition 'Hate is when you *strongly* dislike something,' 'strongly' would be translated to 'very'); the coordinate was then calculated accordingly. The three participants whose data was visualized as radar plots were randomly selected from a sub-sample of participants that had above average blend scores (i.e., average number of emotion co-

occurrences per participant) for their respective age band. First, groups of participants who were 'above average' blenders were identified for each age band. Then, a random number generator was used to select participants within each group based on their participant ID numbers.

3.3 Results

3.3.1 Emotion Term Co-Occurrence across Emotion Definitions

Descriptive analysis undertaken to address the study's first research question identified 49 different emotion terms in addition to the 27 'target' emotions defined in the task (bolded below) across child emotion definitions (*see* Appendix K for co-occurrence matrix of all emotion terms across all participants). Emotion terms that were synonyms were grouped as opposed to being counted as additional co-occurrence terms. The oldest participants (ages 10 to 11) produced the highest number of unique emotion term co-occurrences (n = 53), followed by 9- to 10-year-olds (n = 48), and lastly 8- to 9-year-olds (n = 38). Which emotion terms co-occurred most frequently across age bands were as follows (*see* Table 15):

Table 15

Frequent Emotion Blends per Age Band

Emotion term pair	8- to 9-year-olds (*n* = 11)	9- to 10-year-olds (*n* = 24)	10- to 11-year-olds (*n* = 14)
Angry – Grumpy	6	6	1
Angry – Annoyed	4	5	6
Angry – Mad	4	5	4
Calm - Relaxed	4	11	9
Calm – Quiet	3	-	-
Happy – Excited	7	11	11
Happy – Joy/Joyful	-	9	4
Happy – Pleased	4	13	6
Happy – Proud	4	11	9
Happy – Thankful	-	7	6
Nervous - Worried	-	10	7
Nervous – Scared	4	1	2
Sad – Lonely	4	5	1
Sad – Upset	7	6	9
Surprised - Amazed	7	5	3

Note. Bolded emotion terms indicate 'target' emotion terms that were defined as part of the task.

Emotion terms in a frequent co-occurrence pair were consistently of the same valence. Out of the 15 pairs presented in the table above, eight pairs were of a positive valence and seven pairs were of a negative valence. 'Happy' had the highest number of co-occurrence pairs (n = 5) and as such, can be considered the most 'blended' emotion term across all child emotion definitions. 'Angry' had the next highest number of unique co-occurrence pairs (n = 3). The emotion terms 'calm,' 'nervous,' and 'sad' all had two pairs. The following side-by-side bar graphs (created using *Tableau Public*) reflect all co-occurrence instances in definitions for positive emotion terms (Figures 19 to 21) produced by participants in each age band, followed by those for negative emotion terms (Figures 22 to 24). Data in graphs are organized based on the target emotion term that had the highest number of unique co-occurrence pairs (i.e., blends), with target emotion terms alphabetically listed in the first row and their co-occurrence term in the first column. For example, the target emotion term 'surprised' in Figure 19 had the highest number of co-occurrence pairs compared to other target emotion terms and as such, data in the graph were organized first based on 'surprised'

data points. Colours for each target emotion term were automatically generated by *Tableau Public*.

Figure 19

Emotion Blends for Positive Emotions: Children Ages 8 to 9

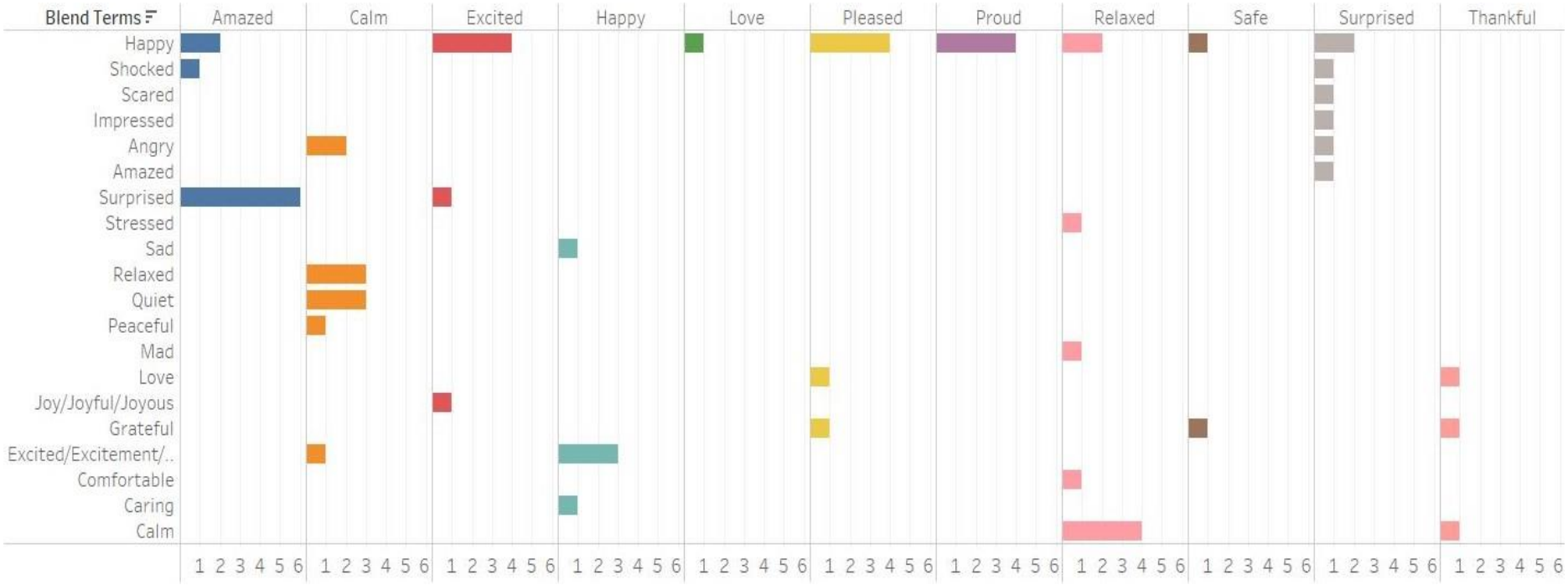


Figure 20

Emotion Blends for Positive Emotions: Children Ages 9 to 10

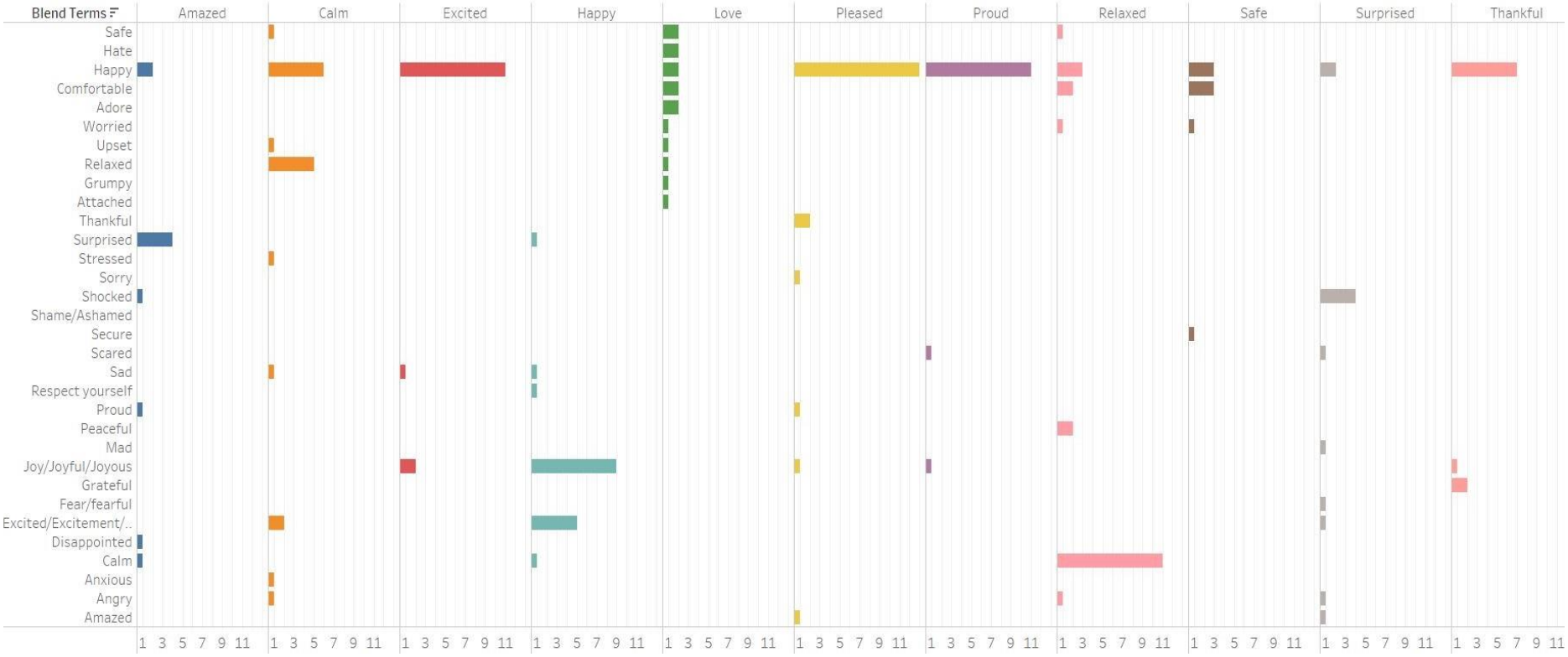


Figure 21

Emotion Blends for Positive Emotions: Children Ages 10 to 11

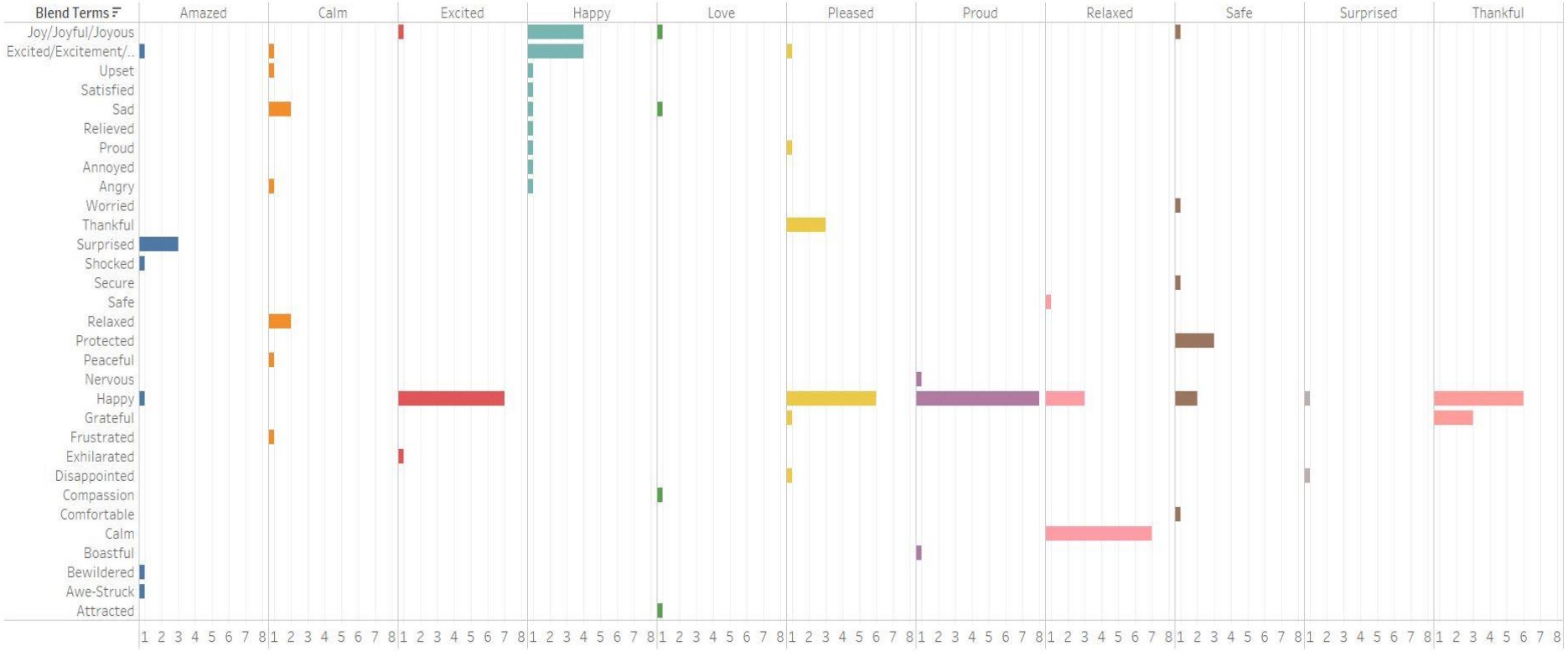


Figure 22

Emotion Blends for Negative Emotions: Children Ages 8 to 9

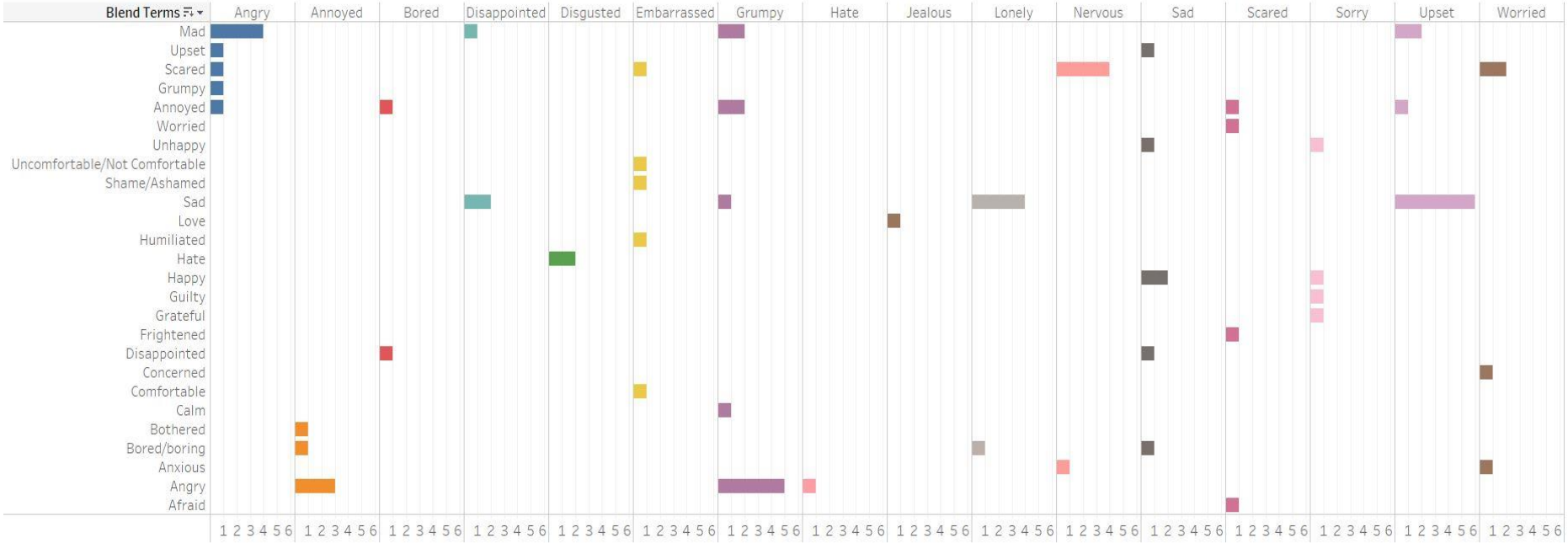


Figure 23

Emotion Blends for Negative Emotions: Children Ages 9 to 10

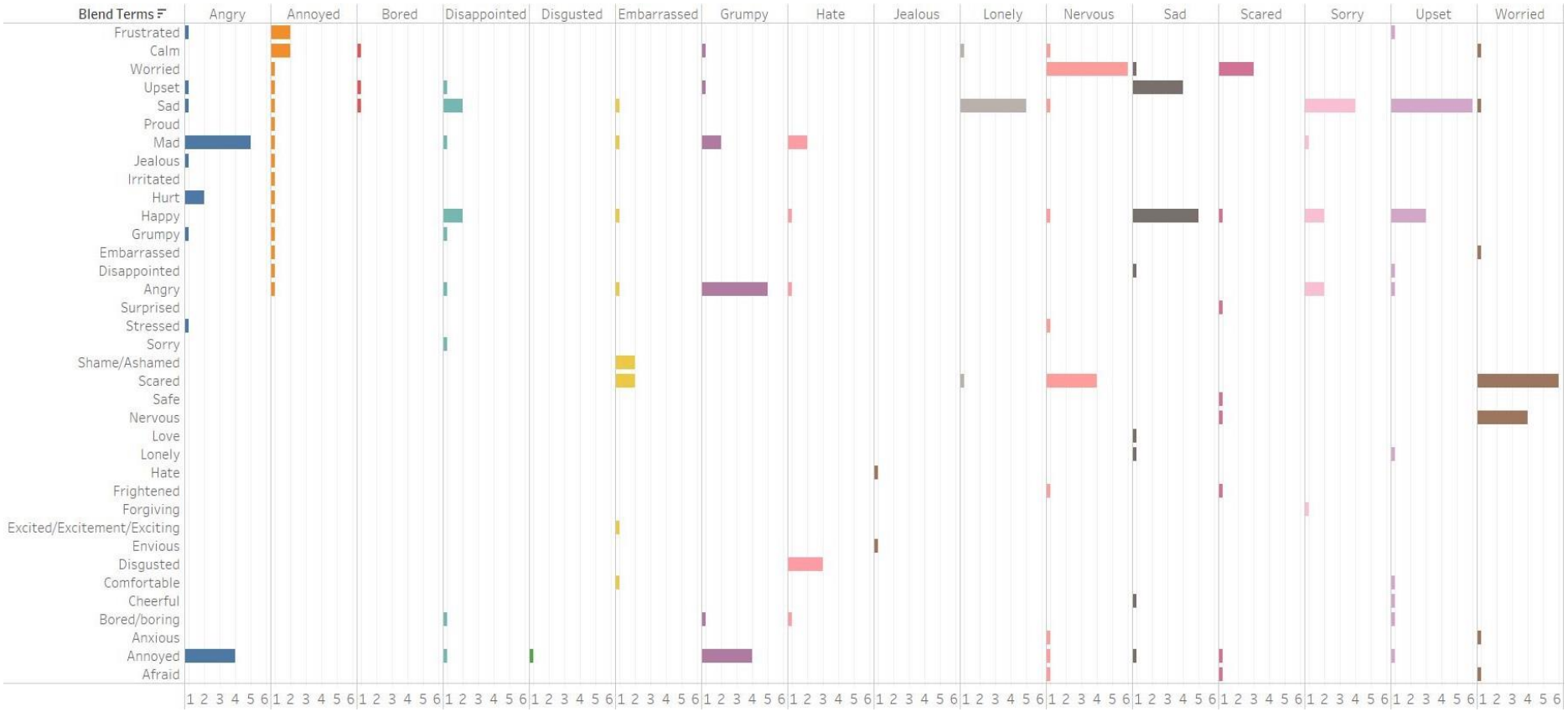
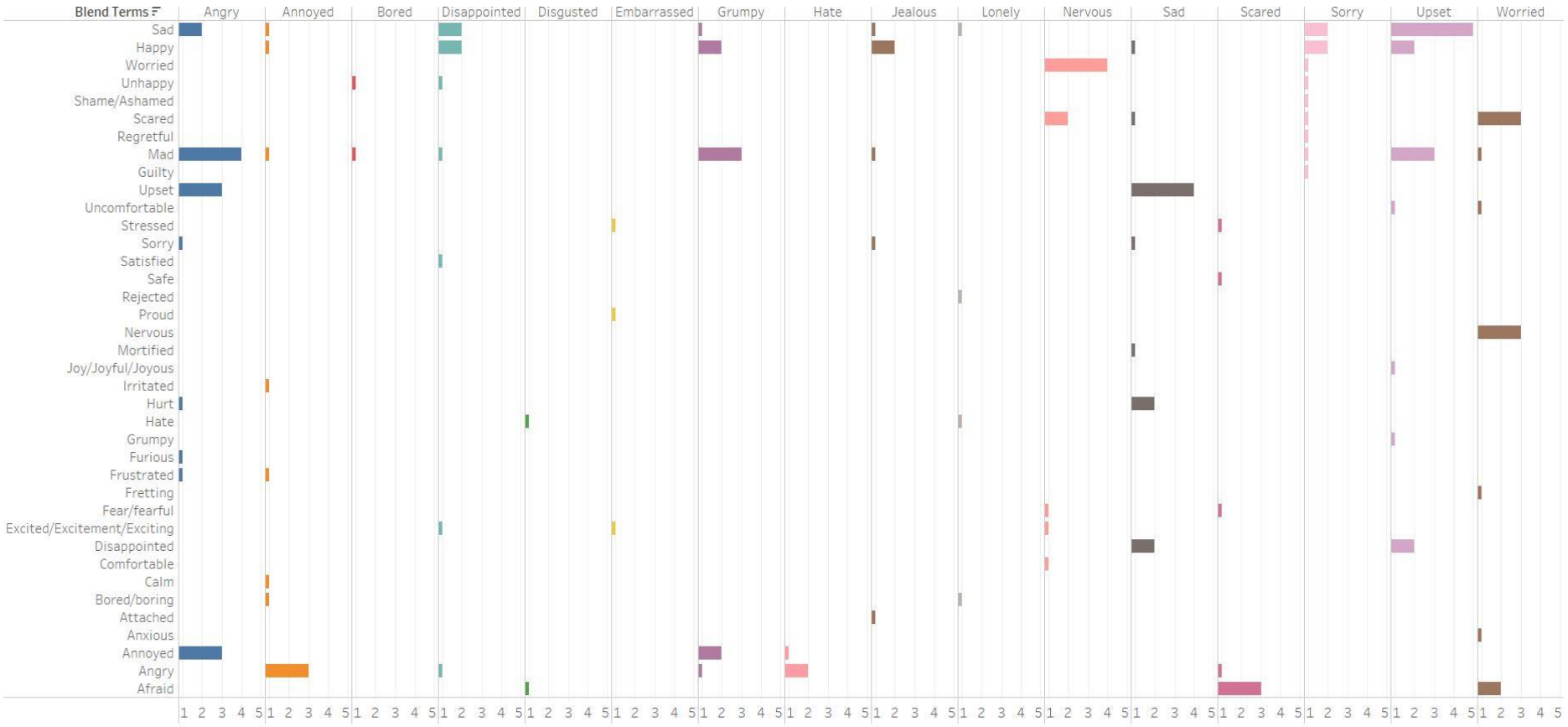


Figure 24

Emotion Blends for Negative Emotions: Children Ages 10 to 11



Study 2's second research question concerned whether emotion term co-occurrence patterns shifted depending on participant age or gender, or an emotion term's valence or intensity. There was no statistically significant difference between age groups for participant blend score as determined by one-way ANOVA ($F(2,46) = 1.673$, $p = 0.199$). An independent samples *t*-test was conducted to compare blend scores in male children and female children. Female children ($M = .78$; $SD = .41$) produced more emotion blends across definitions on average as compared to male children ($M = .54$; $SD = .28$), however the difference was not statistically significant: $t(47) = -2.43$, $p = .073$ (equal variances assumed).

An independent samples *t*-test was conducted to compare emotion term blend score for positive emotion terms and negative emotions terms. There was no statistically significant difference in blend scores by emotion term valence between positive terms ($M = 33.55$; $SD = 13.69$) and negative terms ($M = 31.31$; $SD = 15.30$); $t(25) = .389$, $p = .701$. An independent samples *t*-test was conducted to compare emotion term blend score for high intensity emotions terms and low intensity emotion terms. There was no statistically significant difference in blend scores by emotion term intensity between high activating emotion terms ($M = 31.38$; $SD = 12.32$) and low activating emotion terms ($M = 35.17$; $SD = 21.51$); $t(25) = -.412$, $p = .695$ (equal variances not assumed).

Semantic maps were the first type of visualization generated to capture emotion term co-occurrence across child definitions, organized by age band. In the following representations (Figures 25 to 27), thin lines between two emotion terms represent the minimum number of co-occurrences, increasing in thickness, and the thickest lines represent the maximum number of co-occurrences. Positive target emotion terms are represented in rectangles in the right half of figures; negative target emotion terms are represented in ovals in the left half of figures. Additional non-target emotion terms are represented without any outer shape.

Figure 25

Emotion Blend Network Map for 8- to 9-Year-Olds

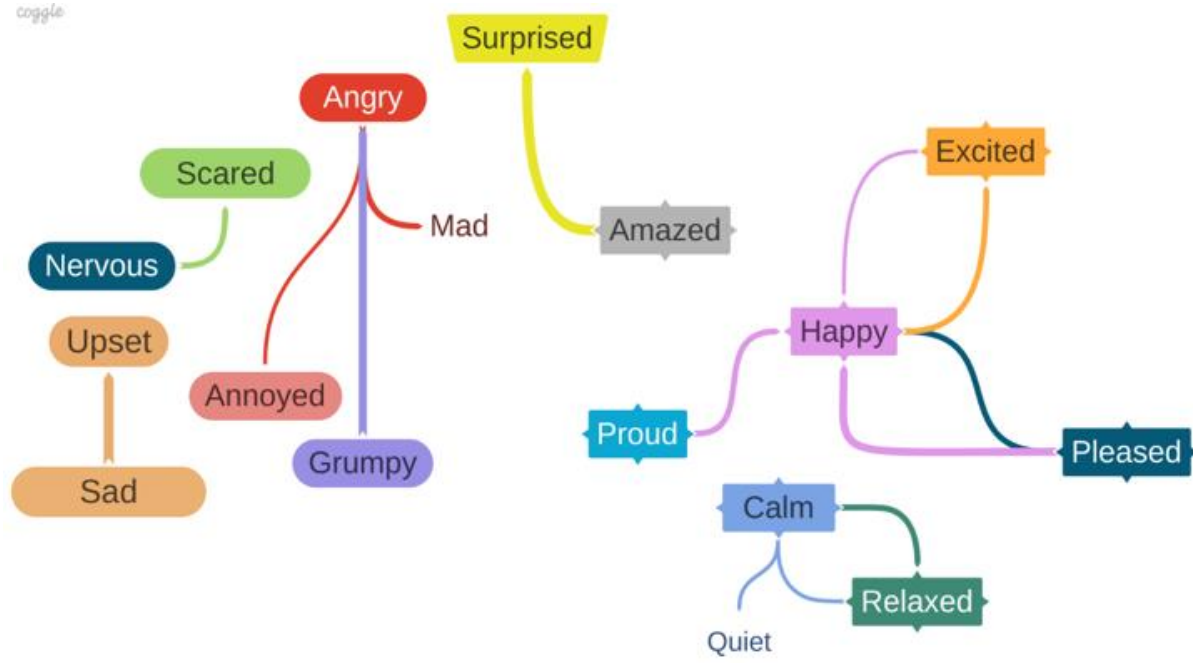


Figure 26

Emotion Blend Network Map for 9- to 10-Year-Olds

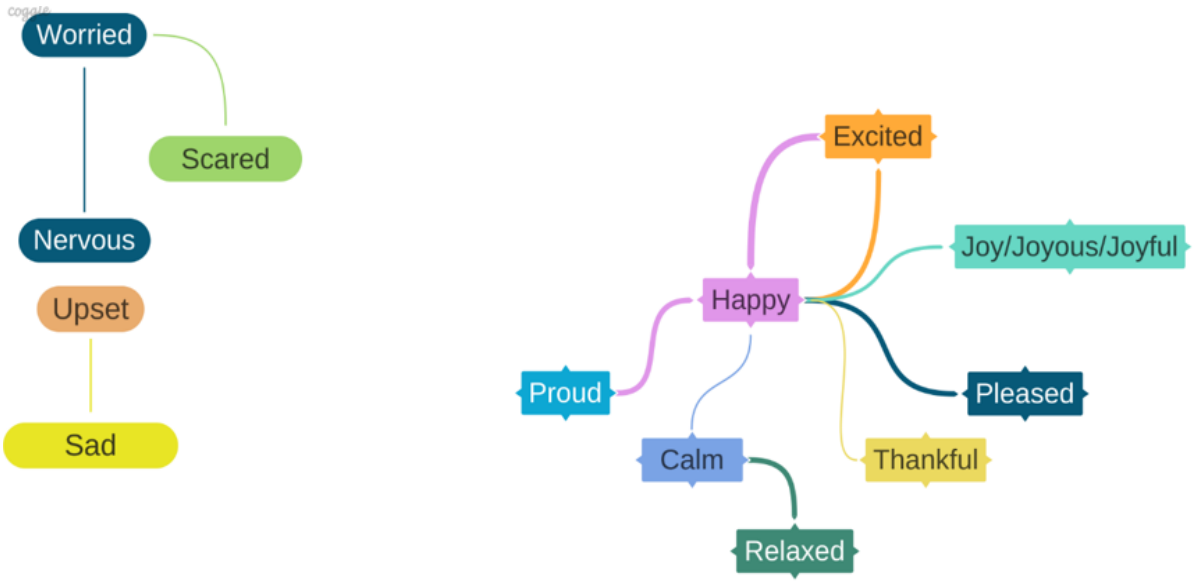
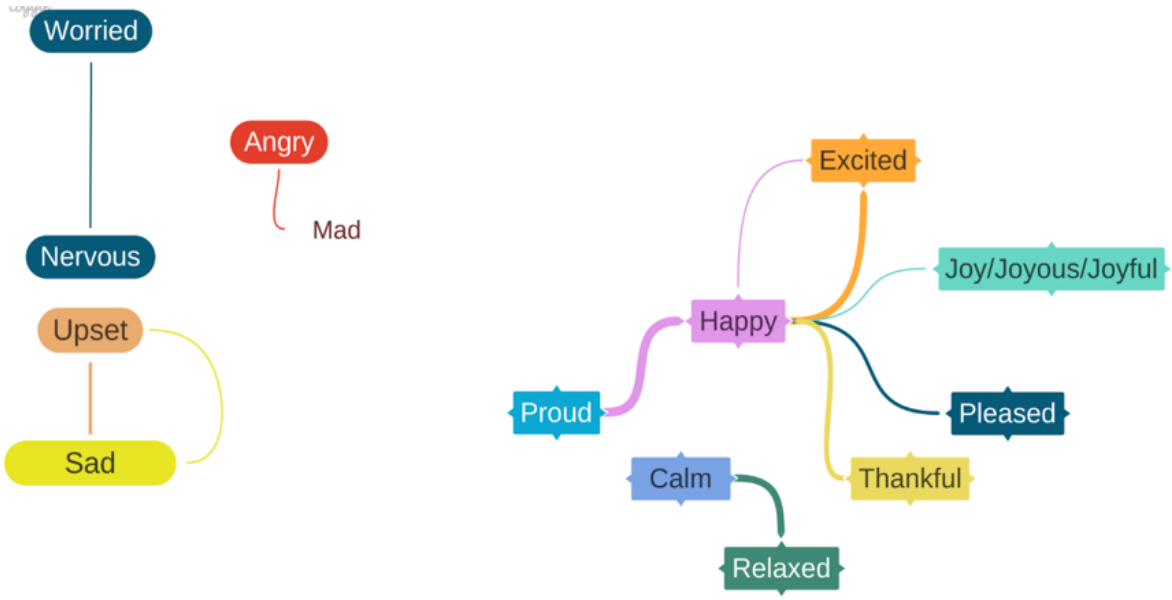


Figure 27

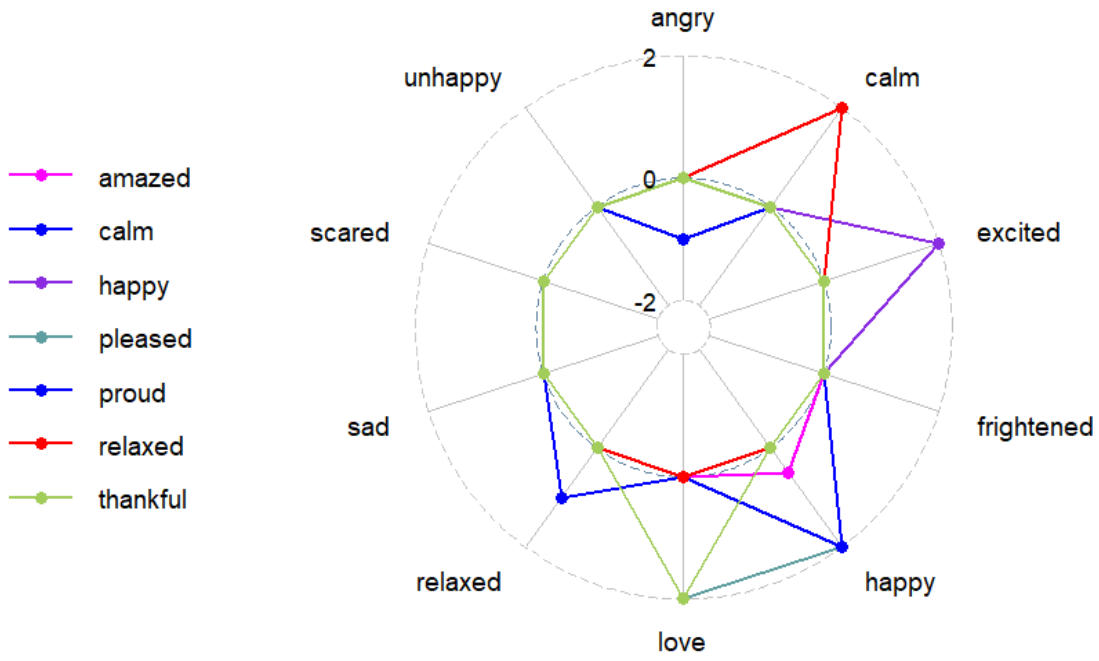
Emotion Blend Network Map for 10- to 11-Year-Olds



The second form of data visualization for child emotion co-occurrence patterns included spider plots generated based on the visualization protocol described earlier (*see Section 3.2.2.5)*. The following figures (28 to 33) reflect spider plots depicting co-occurrence patterns of different children of varying ages in order to capture emotion representation at the individual level, based on child language production.

Figure 28

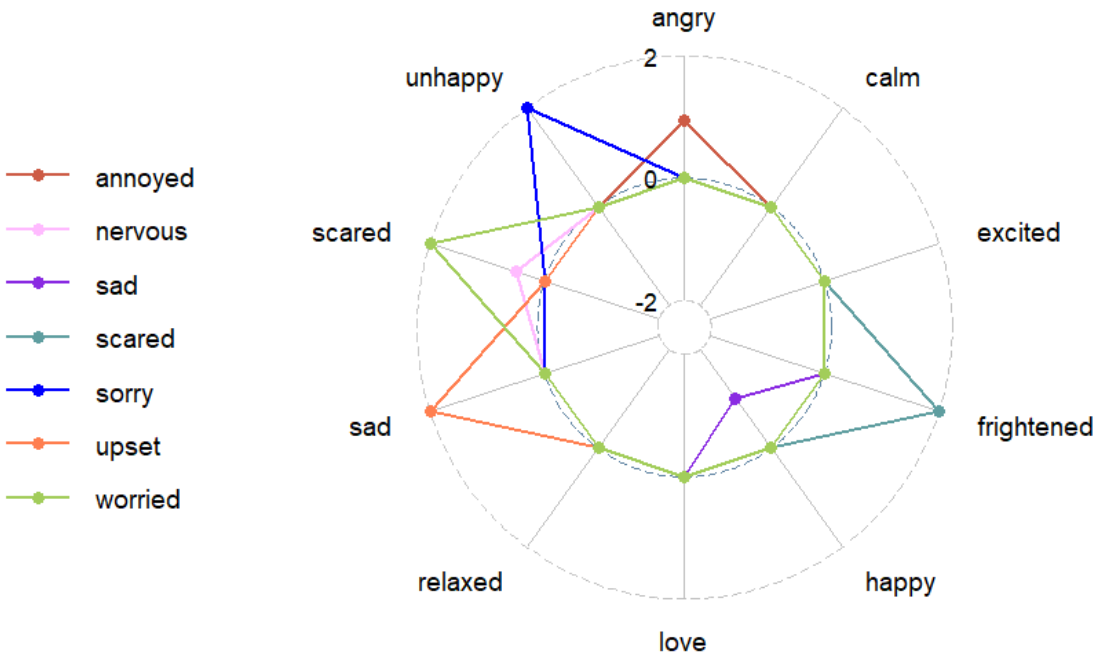
Emotion Blend Radar Plot for Participant 31 (Age 9, Female): Positive Emotions



	amazed	calm	happy	pleased	proud	relaxed	thankful
angry	-	-1	-	-	-	-	-
calm	-	-	-	-	-	2	-
excited	-	-	2	-	-	-	-
frightened	-	-	-	-	-	-	-
happy	0.5	-	-	2	2	-	-
love	-	-	-	2	-	-	2
relaxed	-	1	-	-	-	-	-
sad	-	-	-	-	-	-	-
scared	-	-	-	-	-	-	-
unhappy	-	-	-	-	-	-	-

Figure 29

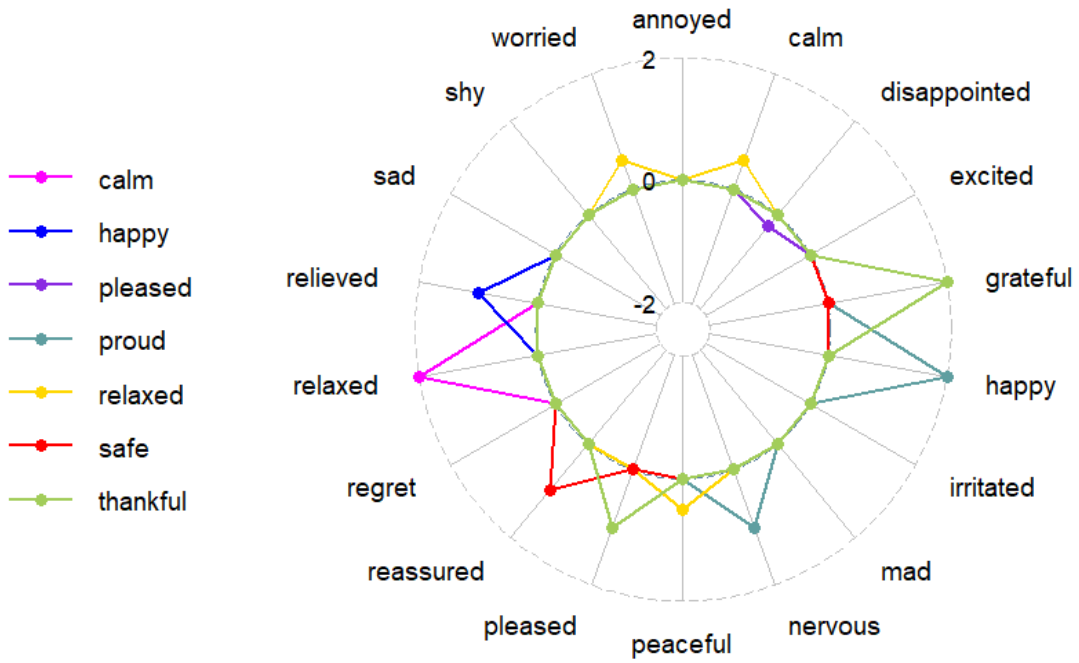
Emotion Blend Radar Plot for Participant 31 (Age 9, Female): Negative Emotions



	annoyed	nervous	sad	scared	sorry	upset	worried
angry	0.95	-	-	-	-	-	-
calm	-	-	-	-	-	-	-
excited	-	-	-	-	-	-	-
frightened	-	-	-	2	-	-	-
happy	-	-	-1	-	-	-	-
love	-	-	-	-	-	-	-
relaxed	-	-	-	-	-	-	-
sad	-	-	-	-	-	2	-
scared	-	0.5	-	-	-	-	2
unhappy	-	-	-	-	2	-	-

Figure 30

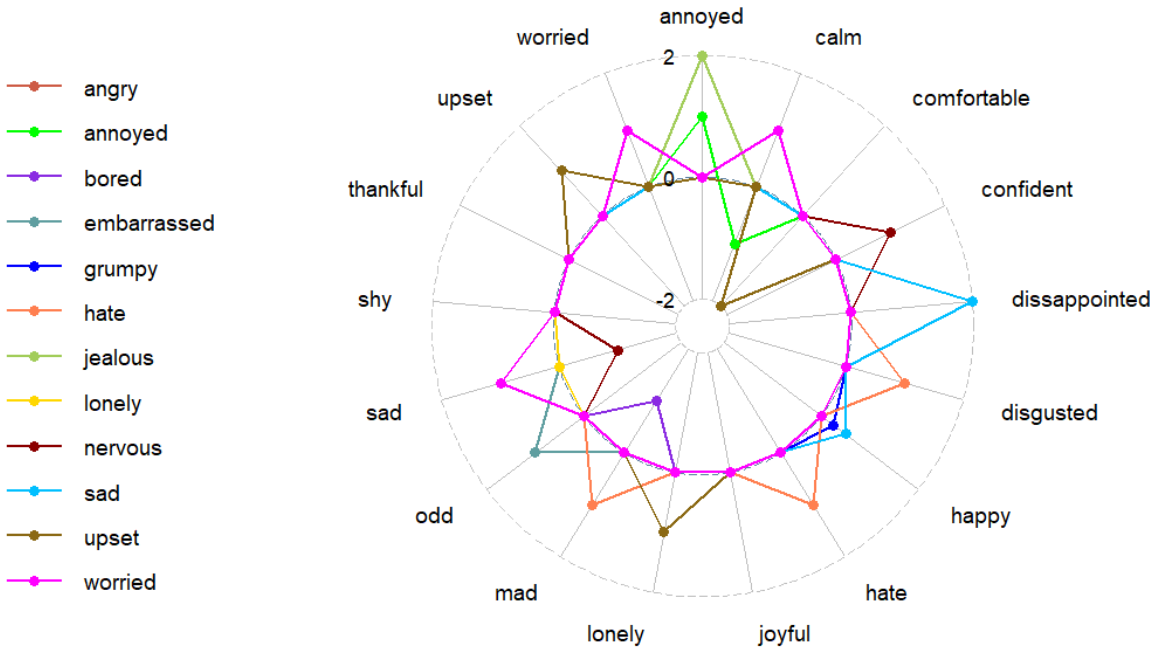
Emotion Blend Radar Plot for Participant 15 (Age 9, Female): Positive Emotions



	calm	excited	happy	love	pleased	proud	safe	thankful
annoyed	-	-	-	-	-	-	-	-
calm	1	-	-	-	-	-	-	-
comfortable	-	-	-	1	-	-	-	-
confident	-	-	-	-	-	-	-	-
disappointed	-	-	-	-	-	-	-	-
disgusted	-	-	-	-	-	-	-	-
happy	0.5	2	1	-	1	2	1	2
hate	-	-	-	1	-	-	-	-
joyful	-	1	1	-	1	2	-	2
lonely	-	-	-	-	-	-	-	-
mad	-	-	-	-	-	-	-	-
odd	-	-	-	-	-	-	-	-
sad	1	-	-	-	-	-	-	-
shy	-	-	-	-	1	-	-	-
thankful	-	1	-	-	-	-	-	1
upset	-	-	-	-	-	-	-	-
worried	-	-	-	1	-	-	-	-

Figure 31

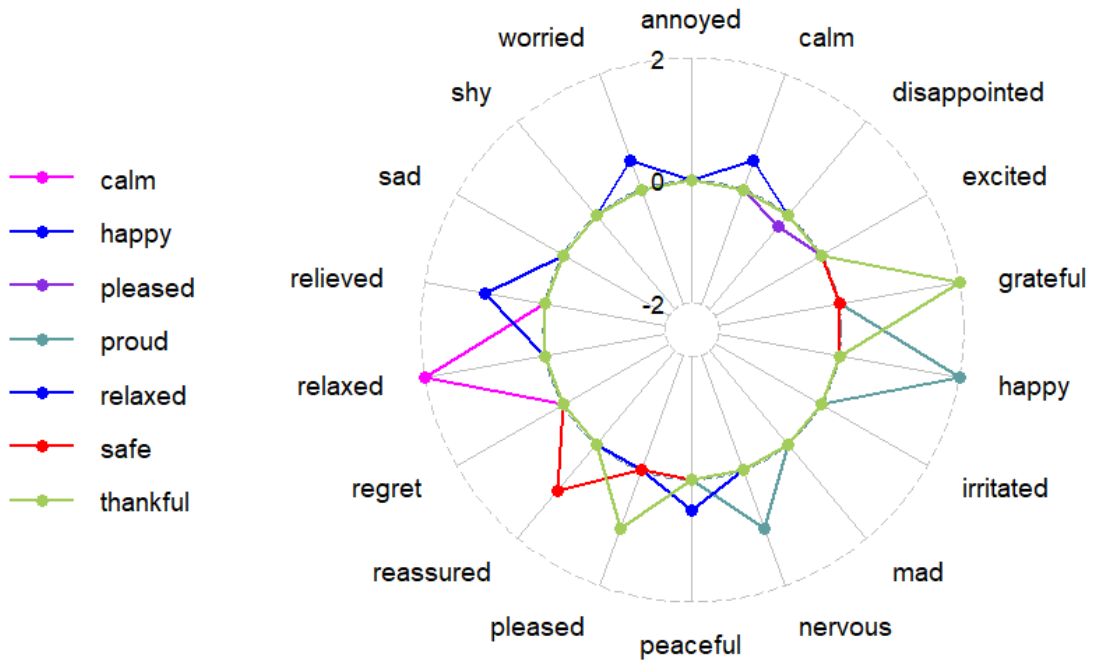
Emotion Blend Radar Plot for Participant 15 (Age 9, Female): Negative Emotions



	angry	annoyed	bored	hate	jealous	lonely	nervous	sad	upset	worried
annoyed	-	1	-	-	2	-	-	-	-	-
calm	-	-1	1	-	-	1	1	-	-	1
comfortable	-	-	-	-	-	-	-	-	-2	-
confident	-	-	-	-	-	-	1	-	-	-
disappointed	-	2	-	-	-	-	-	2	-	-
disgusted	-	-	-	1	-	-	-	-	-	-
happy	-	-	-	-	-	-	-	0.5	-	-
hate	-	-	-	1	-	-	-	-	-	-
joyful	-	-	-	-	-	-	-	-	-	-
lonely	-	-	-	-	-	1	-	1	1	-
mad	1	1	-1	1	-	-	-	-	-	-
odd	-	-	-	-	-	-	-	-	-	-
sad	-	-	-	-	-	-	-1	1	1	1
shy	-	-	-	-	-	-	-	-	-	-
thankful	-	-	-	-	-	-	-	-	-	-
upset	-	1	1	-	-	-	-	-	1	-
worried	-	-	-	-	-	-	1	-	-	1

Figure 32

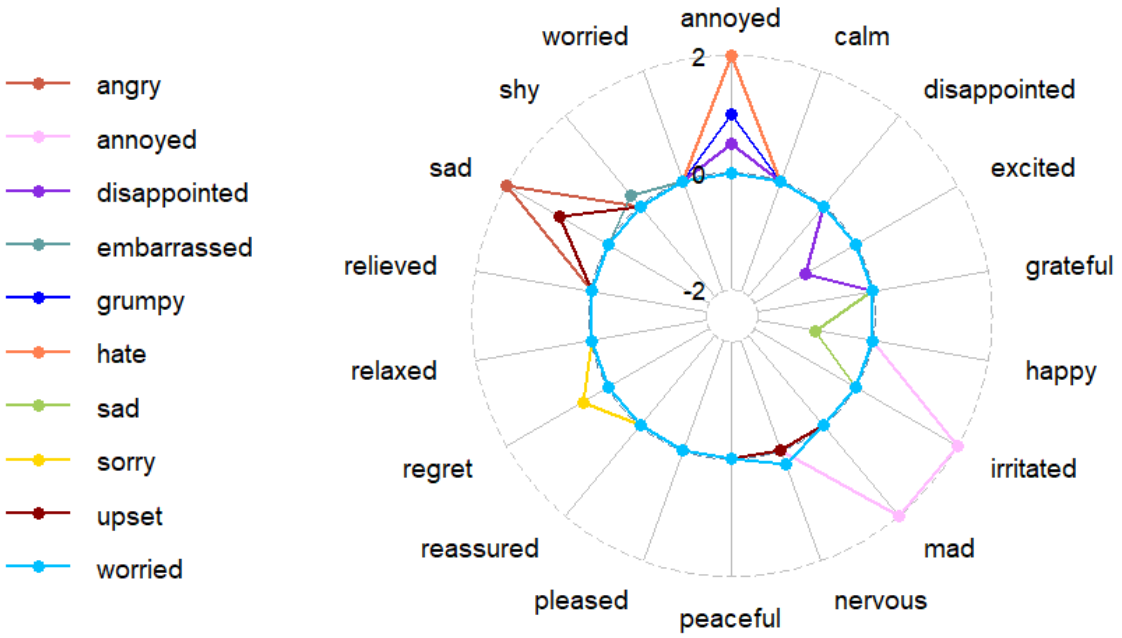
Emotion Blend Radar Plot for Participant 22 (Age 10, Female): Positive Emotions



	calm	happy	pleased	proud	relaxed	sad	safe	thankful
annoyed	-	-	-	-	-	-	-	-
calm	-	-	-	-	0.5	-	-	-
disappointed	-	-	-0.25	-	-	-	-	-
excited	-	-	-	-	-	-	-	-
grateful	-	-	-	-	-	-	-	2
happy	-	-	-	2	-	-1	-	-
irritated	-	-	-	-	-	-	-	-
mad	-	-	-	-	-	-	-	-
nervous	-	-	-	1	-	-	-	-
peaceful	-	-	-	-	0.5	-	-	-
pleased	-	-	-	-	-	-	-	1
reassured	-	-	-	-	-	-	1	-
regret	-	-	-	-	-	-	-	-
relaxed	2	-	-	-	-	-	-	-
relieved	-	1	-	-	-	-	-	-
sad	-	-	-	-	-	-	-	-
shy	-	-	-	-	-	-	-	-
worried	-	-	-	-	0.5	-	-	-

Figure 33

Emotion Blend Radar Plot for Participant 22 (Age 10, Female): Negative Emotions



	angry	annoyed	disappointed	embarrassed	grumpy	hate	sorry	upset	worried
annoyed	1	-	0.5	-	1	2	-	-	-
calm	-	-	-	-	-	-	-	-	-
disappointed	-	-	-	-	-	-	-	-	-
excited	-	-	-1	-	-	-	-	-	-
grateful	-	-	-	-	-	-	-	-	-
happy	-	-	-	-	-	-	-	-	-
irritated	-	2	-	-	-	-	-	-	-
mad	-	2	-	-	-	-	-	-	-
nervous	-	-	-	-	-	-	-	-	0.24
peaceful	-	-	-	-	-	-	-	-	-
pleased	-	-	-	-	-	-	-	-	-
reassured	-	-	-	-	-	-	-	-	-
regret	-	-	-	-	-	-	0.5	-	-
relaxed	-	-	-	-	-	-	-	-	-
relieved	-	-	-	-	-	-	-	-	-
sad	2	-	-	-	-	-	-	0.95	-
shy	-	-	-	0.25	-	-	-	-	-
worried	-	-	-	-	-	-	-	-	-

3.3.2 Mental State Term Production across Emotion Definitions

A simple linear regression was calculated to predict average participant mental state term (MST) production across child emotion definitions based on participant blend score. A significant regression equation was found ($F(1, 47) = 20.879$, $p < .001$), with an R^2 of .308. Participant MST production score was found to be equal to .427 + 1.233 (Blend Score) when blend score is measured as average number of emotion term co-occurrences across definitions. Average participant MST production increased by 1.233 for each average participant blend score.

A Kruskal Wallis H Test indicated no statistically significant difference in participant MST production across age bands (χ^2 (2) = 4.124, p = .127). An independent samples *t*-test conducted to compare average MST production between male and female participants indicated a statistically significant difference: $t(47) = -2.811$, p = .007. Female children (M = 1.56; SD = .99) produced more MSTs on average in emotion definitions as compared to male children (M = .95; SD = .46). An independent samples *t*-test was conducted to compare emotion term MST score for positive emotion terms and negative emotions terms. There was no statistically significant difference in MST score between positive terms (M = 1.15; SD = .38) and negative terms (M = 1.30; SD = .38); $t(25) = -1.036$, p = .310. A Kruskal Wallis H Test also indicated no statistically significant difference between emotion MST score depending on emotion intensity: χ^2 (1) = .167, p = .683.

3.3.3 Common Themes across Emotion Definitions

Inductive thematic analysis revealed the following eight topic categories appeared in transcripts of at least 25 participants (in ascending order): ‘Interpersonal Dynamics,’ ‘Experiencing a Non-social Situation,’ ‘Non-emotional Human Behaviour,’ ‘Performing an Activity,’ ‘Describing a Location,’ ‘Experience of Being a Student,’ ‘Partaking in an Organized Event/Holiday Celebration,’ and ‘Experience of Non-emotional Internal States.’

Tables 16 and 17 present these eight main theme categories, respective frequent sub-categories, as well as sample topics for each category to give a sense of spread across child definitions.

Table 16

Common Theme Categories and Topics across Child Emotion Definitions

Theme	Transcripts (n)	Frequent Sub-Themes (n)	Sample Topics
Interpersonal Dynamics	49	Mention of Specific Social Situation (48)	Positive behaviour from others (35) Being alone (23) Negative behaviour from others (20) With family (15)
		Isolation/Rejection (28)	No one to play with/being left out (19)
		Conflict (24)	Hurting someone's feelings (12)
Experiencing a Non-Social Situation	41	Disappointment/Negative Event (25)	Doing something wrong/bad (14)
		Danger/Safety (22)	Being in danger (13)
Non-emotional Human Behaviour	40	Physical/Sensory (38)	Sleep (22) Injury (20)
		Effort (18)	Doing nothing (14)
Performing an Activity	34	Leisure (32)	Playing (19); Physical/Sport activities (15); Engaging with media entertainment (e.g., watching TV/film, reading a book) (14)
Describing a Location	33	Outdoor environment (16)	The dark (5)
		Being at home (10)	Being in bed (5)
Experience of Being a Student	29	Going to school (14)	Being at school (11)
		Having an assessment (9)	Getting a mark (good/bad, failing) (9)
		Teacher (9)	Description of teacher behaviour (e.g., assigning homework, interacting with parents) (9)
Partaking in an Organized Event/Holiday Celebration	26	Birthday (16)	Having a birthday (party, surprise) (16)
		Performance (12)	Participating in a stage performance (12)
Experience of Non-emotional Internal States	26	Desire (18)	Wanting something (object)/to do something (12)
		Nerves (15)	Having stage-fright (9) Having 'butterflies in your stomach' (5)

Table 17

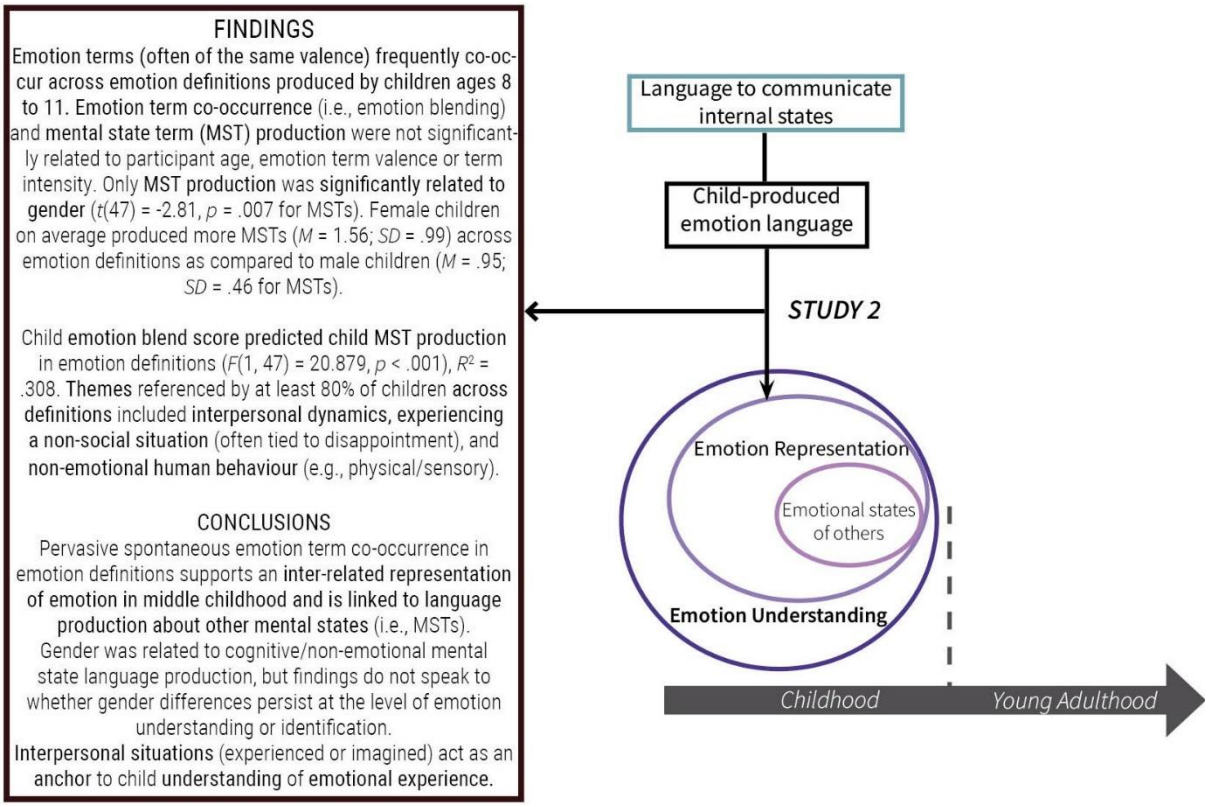
Common Themes in Child Emotion Definitions (with Examples)

Theme	**Description**	**Example** (Verbatim)
Interpersonal Dynamics	Definition references some aspect of interpersonal dynamics, whether communication, behaviour, relationships, relating to others, or a social situation.	"[Embarrassed is when] you feel like... like that everybody is on like someone's side and like they are like against you. And there's humiliating things. I once remember someone someone's was trying um to do it to me, but it didn't work. So so um they were trying um to humiliate me, but I guess um um I'm um humiliating him. So it didn't work."
Experiencing a Non-social Situation	Definition describes a specific scenario or context that can give rise to the emotion being defined; has a narrative quality; does not mention a situation that is social in nature.	"[…] There's nervous like when you get like... maybe hit and run, and then you're waiting for the police to like come 'cuz like maybe they broke your tire or something, I don't know, and you're just scared, and so you have all the butterflies in your stomach... and you don't know what's gonna happen next, but it's like more of a serious matter than a test uh test and... that's nervous, I guess."
Describing a Location	Definition references a specific location without further elaboration where one might experience the emotion being defined.	"[Relaxed is] when you... like if you're at the beach and... and... and... lll like in the sun relaxing."
Performing an Activity	Definition references a specific activity that may or may not result in the emotion being defined.	"[Disappointed is] when… you were sure something was going to happen… but well… basically when you thought something was going to happen, like something interesting, for example if you watch a soccer game, you want a team to win, but maybe it will lose, so you would say, 'Oh la la I was sure they were going to win."
Non-emotional Human Behaviour	Definition references an observable human behaviour (either physical/sensory or cognitive) that is not necessarily the result of the emotion being described; may be the cause.	"[Grumpy] it's for example sometimes when you wake up when your mom needs to wake you up in the morning, you're very grumpy because you sometimes you talk with your a little bit with your mouth closed. So... you know. You moan... and so you don't you don't feel very happy."
Experience of Being a Student	Definition references the experience of being a student or a topic that is tied to schools or an academic context.	"Nervous is when... it's sort of like when you have a test, and you're like really nervous 'cuz you studied all night, but you're like, 'Oh yeah, I know everything.' but you're just nervous because you get butterflies in your stomach, and you're just like... it's sort of like you're nervous because you don't know what's gonna happen like... next like you never know like, 'Oh yeah, what if I forget everything? Oh...' like you make up all these crazy scenarios in your head just to put yourself like down 'cuz that's what like... the brain does. […]"
Partaking in an Organized Event/Holiday Celebration	Definition references a specific event or holiday that is associated with the emotion being described.	"[Proud is] When you've done something good or you've won something. I was proud when I won a medal on Sports Day which was last which was on a Monday. And I was first."
Experiencing Non-emotional Internal States	Definition references an internal state, not a single-term emotion.	"[Angry is when] you can't control your emotions about something."

3.4 Summary of Findings and Interpretation

Figure 34

Study 2 Research Focus, Findings, and Main Conclusions



3.4.1 Emotion Term Co-Occurrence/Blends

The first line of inquiry taken up in this study concerned emotion term co-occurrence patterns at the emotion word level. There were numerous instances of emotion term co-occurrence across all definitions produced by the 49 children ages 8 to 11 included in this study. Matrices were developed as part of descriptive analysis to reflect patterns of emotion term co-occurrence across definitions between the 27 target emotion terms defined and the additional 49 emotional terms children spontaneously produced to form emotion term co-occurrence pairs. Additional terms were included in emotion co-occurrence analysis if they: 1) were preceded by the verbs 'feel [x]' or 'are [x],' and 2) were single terms (as opposed to sentence fragments). As such, there was a mixture of co-occurrence between target emotion terms that were defined as well as with additional emotional state terms that children

spontaneously produced in their emotion definitions. Target emotion words were randomly presented throughout the definitions task. Consequently, co-occurrence between target emotion terms is not necessarily due to previous exposure.

The oldest age band of participants in this study (i.e., 10- to 11-year-olds) produced the highest number of unique emotion term co-occurrence pairs or blends (53 pairs), followed by the 9- to 10-year-olds (48 pairs), and then the 8- to 9-year-olds (38 pairs). The slightly larger number of emotion blends produced by the oldest age group could be linked to an increase in language skill development and potentially, an increase in links between emotion concepts within a child's larger representational system. However, when considering how many emotion blends an individual child produced (as opposed to the total number of blends per target emotion term discussed here), there was no statistically significant difference across age bands with regards to blend score (operationalized as the average number of blends produced across 27 emotion definitions). Regarding the relationship between emotion blend score and gender, no statistically significant difference was found between male and female children. Descriptively, female children did produce more emotion blends on average across their definitions as compared to male children (*see* Appendix L Table 21 for correlation matrix of Study 2 variables included in participant level analysis).

There was no relationship between emotion term co-occurrence (i.e., blend score) patterns for negative emotion words as compared to positive emotion words. The number of emotion blends produced in definitions of 'high intensity' emotion terms was also not statistically significantly different from that produced in definitions of 'low intensity' emotion terms. Emotion term characteristics of valence and intensity also had no relationship with child non-emotional mental state term (MST) production across definitions (*see* Appendix L Table 22 for correlation matrix of Study 2 variables included in emotion word-level analysis). It should be noted that there was an unequal number of emotion terms across

the four categories of intensity and valence (i.e., 'positive high-intensity,' 'negative high-intensity,' 'positive low-intensity,' 'negative low-intensity) as described in the Circumplex Model of Affect (Russell, 1980). Ideally, children would have defined an equal number of emotion terms per valence/intensity category. However, the list of emotion terms used in this study was adopted from previous research concerned with developmental shifts in emotion representation and language skill, specifically Nook et al. (2017) and Nook et al. (2020).

As to the question of which emotion terms co-occurred together, this study captured the most frequent emotion blend pairs per age band (*see* Table 13), amounting to 15 unique emotion blends. The valence of a given emotion term in a blend was often the same as the valence of the other emotion term in the pair. In other words, positive terms frequently co-occurred with positive terms, and negative terms co-occurred with other negative terms. There was roughly an equal number of both positive emotion blends and negative emotion blends. The emotion term 'happy' had the highest number of blends, with the pair 'happy-excited' appearing in definitions produced by all age bands (a total of 29 instances across the entire dataset). 'Angry' had the next highest number of blend pair terms (a total of three: 'annoyed,' 'mad,' 'grumpy) frequently produced across all age bands, but the 'calm-relaxed' blend pair appeared more frequently across the dataset along with the 'happy-proud' blend (24 instances each). 'Calm,' 'nervous,' and 'sad' each had two blend pair terms frequently produced across definitions from all age bands. 'Surprised-amazed' was the final blend pair produced most frequently with 15 instances across the dataset; interestingly, its frequency decreased as age band increased.

Participants were unaware that we were interested in emotion term occurrence when asked to produce definitions. Participants were also not encouraged to reference other emotion terms in order to define a target one when completing the emotion definitions task. The use of synonyms by children in their emotion definitions can be considered a definitional

strategy, however the task required participants to express their understanding of a single emotion. The spontaneous use of additional emotional terms to define a target one can still be taken as evidence for inter-relationships amongst emotion concepts at a representational level.

Amongst the 27 target emotion terms defined, 14 terms had above average blend frequency across the dataset. Of these terms, ‘angry,’ ‘upset,’ and ‘relaxed’ had the highest average blend frequency (each with a total of 41 instances), followed by ‘calm,’ ‘happy,’ and ‘pleased’ (with 38 instances each). Anecdotally, children often noted throughout the emotion definition task that ‘happy’ is quite a ’general’ feeling, easily applied to multiple positive emotions and emotional experiences. In contrast, the conceptual boundaries between negative terms appeared to be more specific, with children emphasizing a clearer difference between various negative emotion terms. For example, children would note a specific difference between being angry, frustrated, or annoyed so that they were attached to distinct emotional experiences, but positive emotional experiences appeared to be treated at the same level and ultimately linked back to the experience of feeling happy. Defining negative emotions prompted children to reflect more often on the differences between the experiences of various negative emotions, including more comparative and equivocal language to be more precise in how one negative emotion is different from another negative emotion. In contrast, when defining positive emotions, children noted little to no variation between different positive emotions; rather, they spoke of positive emotions in relation to a ‘threshold’ of when one is happy. In other words, positive emotions were considered to be highly similar (and as such, interrelated). Children seemed to understand happiness and other positive emotions as a ‘general feeling,’ lacking in the nuance they provided when defining, and subsequently comparing, negative emotions to each other.

This study can only speculate as to the source of the observed differences in children defining and reflecting on emotions depending on their valence, positive or negative. However, one related line of inquiry to explain such differences concerns the process of emotion concept differentiation for positive versus negative emotions as well as their respective emotion socialization processes. Previous research has focused on the parental emotion socialization of children (Castro et al., 2015; Havighurst et al., 2013; McKee et al., 2018; Meyer et al., 2014), its impact on child understanding of emotion regulation strategy (e.g., Cole et al., 2009), parental reactions to child negative affect/emotions (Blandon, 2015; D. Li et al., 2019; J. A. Nelson et al., 2009; Ravindran et al., 2021), and how parents express negative emotions to children (Moed et al., 2017). Johnson et al. (2017) in their review and meta-analysis of studies on emotion socialization and child conduct problems (with samples ranging from 0 to 18 years) found that parental emotion socialization behaviours (ESBs) were more strongly associated with conduct problems at younger ages, moderated by ESBs of negative emotions as opposed to positive emotions.

Research with adolescents has focused more on emotion socialization with peers (Klimes-Dougan et al., 2014; Reindl et al., 2016), yet maternal emotion socialization has been found to mediate the relationship between maternal and adolescent negative emotionality (Briscoe et al., 2019). Starr et al. (2020) adopted a developmental lens to explore negative emotion differentiation in adolescents, but focused on parental factors of depression, parenting style, and attachment security as opposed to parental ESBs. The social implications of how one regulates and ultimately expresses negative emotion can be considered more ‘costly’ interpersonally as opposed to the expression of positive emotions. The expression of negative emotion may be more likely to strain interpersonal relationships as opposed to the expression of positive emotions. Children, and individuals in general, may also have more opportunities to discuss and explain negative emotional states as opposed to

positive emotional states, prompting a need for further labelling precision to meet communicative demands. The experience of positive emotion is rarely questioned by others, but enquiries regarding one's experience of internal states often occurs for negative emotions or in antisocial situations. For example, a child may be asked as to why they are feeling upset or angry more often than when they are expressing a positive emotion.

How negative emotions are expressed at an early age appears to have an important impact not just on social-emotional development, but also academic performance. Hernández et al. (2018) found negative expressivity in Kindergarten/Reception inversely predicted school engagement and teacher-reported academic skills in 1st Grade. There were also significant individual differences in trajectories of negative emotion expression during the transition to 1st Grade. As such, the question of how negative emotions can be socialized in the classroom through SEL programme input could be of interest for further study, with a specific focus on negative academic emotions in particular (such as failure) in order to address links with negative expressivity, academic engagement, individual well-being, and peer relationship formation.

3.4.2 Mental State Term Production

This study found no statistically significant relationship between mental state term (MST) production and age band. The most frequently produced terms to refer to internal states across emotion definitions were: 'know/knew,' 'want,' and 'think/thinking/thought.' The lack of relationship between age and MST production was unexpected in light of previous research (both longitudinal and cross-sectional) indicating an increase in MST usage and mental state talk as children age (e.g., Bartsch & Wellman, 1995; Carr et al., 2018; De Mulder, 2015; Pascual et al., 2008; Tardif & Wellman, 2000). There was not an equal number of participants per age band in this study and the overall sample size was arguably small—both factors that could have contributed to why no effect of age on MST production trends

was observed. Potentially the age range was also not wide enough for MST production to shift greatly across three years (i.e., from the ages of 8 to 11) as the research previously cited has primarily focused on child mental state vocabulary acquisition from ages 3 to 7.

At the same time, the spontaneous use of MSTs in emotion definitions as analysed in this present study has not been addressed by previous research. The focus within the field has typically concerned emotion vocabulary development in children (especially young children) as opposed to child emotion conceptualization. Nook et al. (2020), in its focus on the development of abstract emotion concepts, is one of the few studies that has used child emotion definitions to address how concepts underlying emotion words may shift in mid- and late adolescence. Adult emotion definition content has been analysed to potentially uncover developmental shifts in emotion conceptualization (Ready et al., 2021). Grosse et al. (2021) compared emotion word usage in adults with that of children ages 4 to 11, finding an increase in emotion word production the older the children were (as well as a convergence of older children displaying adult-like usage of emotion words). However, MST production was not captured in these three research studies, and as such, no conclusion on the relationship between the production of emotion definitions and MST usage can be drawn.

Grosse et al. (2021) is also of particular interest to this study's focus on emotion term co-occurrence patterns, and on emotion word usage more broadly, across childhood. Specifically, they found an increase in similarity in emotion word usage between 4- to 5-year-olds and 6- to 7-year-olds, as well as between 8- to 9-year-olds and 10- to 11-year-olds. However, there was no significant increase in the similarity of emotion word usage from 6 to 7 years and 8 to 9 years of age. Emotion word production matrices from children 10 to 11 years had the highest correlation with adult emotion word production matrices across all age bands (r_s (1320) = .55, $p < .001$). Although these findings are of interest from a developmental perspective regarding emotion word usage and implications for emotion term

co-occurrence patterns across the lifespan, it must be noted that emotion word production in Grosse et al. (2021) was analysed within the context of naming the emotion a protagonist feels (represented in a vignette), as opposed to producing a description of the emotional state as done for this study's emotion definition task.

This study also found that gender had a statistically significant relationship with MST production across emotion definitions, with female children producing more MSTs on average as compared to male children. Female children also produced more emotion blends than male children on average in their emotion definitions, but this difference was not statistically significant. As such, this study does not provide overwhelming evidence in support of the claim that gender influences the conceptual representation of emotion in middle childhood from a causal standpoint. Findings do support that there may be a non-causal relationship between the production of non-emotional mental state language and gender, but the sample size is too limited to make claims generalizable to the greater population.

Still, the role of gender in social-emotional development must be noted in light of existent literature. Previous research has focused on differences between adult males and females in the processing of emotional stimuli (e.g., Whittle et al., 2011), wherein females have sometimes been found to be more accurate than males in identifying emotions (e.g., Hall & Matsumoto, 2004). The role of gender has been explored in children with regards to emotion expression. For example, Chaplin and Aldao (2013) in their meta-analytic review of emotion expression from infancy through adolescence found small effect sizes indicating: 1) girls expressed more positive emotions than boys in middle childhood (g = -.20) and adolescence (g = -.28); and 2) boys expressed more externalizing emotions than girls at preschool age (g = .17) and middle childhood, but not in adolescence where the reverse occurred (g = -.27). Emotion has also been found to be socialized differently in boys versus

girls whether by parents or culturally, prompting the development of a scale to measure potentially gendered beliefs or expectations parents may have about emotion (i.e., Parents' Gendered Emotion Beliefs (PGEB) scale; Thomassin et al., 2020). However, evidence of gender differences is not unilaterally supported (*see* Hyde, 2005 for *Gender Similarities Hypothesis*). Still, the role of emotion socialization and its potential impact on emotion language, representation, and expression cannot be ignored.

One dimension of emotion socialization that could have influenced the linguistic content of child emotion definitions captured in the present study is participant experience (and relatedly, ease) with discussing internal states. The emotion definition corpus compiled based on responses to the study's emotion definition task is not taken to reflect everyday speech produced when discussing internal states. The direct explanation of emotional states without tie to an external event (as was required by this study's emotion definition task) would not necessarily arise in regular conversation. However, the way that individuals define emotions can still reflect shared qualities of emotional experience tied to specific contexts. There is evidence supporting the existence of cultural norms tied to the expression of emotional states (e.g., Hareli et al., 2015), and of cross-cultural differences in the interpretation of emotional display and cognitive styles (*see* Engelmann & Pogosyan, 2013). It could be of interest for future research on emotion definitions to see if there are certain patterns in definitional strategy and emotion term co-occurrence that shift depending on the language spoken and an individual's emotion socialization experience (whether at the parental or peer level, or linked to larger societal and cultural norms around emotion expression). It is plausible that even within one culture there could be much variation in emotion socialization experience. The possibility then of gleaning pre-identified cultural norms based on patterns of emotion term co-occurrence in emotion definitions could be a fruitful avenue for research. For individuals who do not necessarily match the norms of their

cultures with regards to how they provide emotion definitions, one could then consider the impact of emotion socialization processes unique to the individual, thereby addressing a potential source of individual difference in both emotion representation and understanding.

3.4.3 Themes in Child Emotion Definitions

Thematic analysis of child emotion definitions indicated that the most common themes (i.e., present in definitions of at least 82% of participants) referred to interpersonal dynamics, experiencing a non-social situation, and a non-emotional human behaviour. Within the theme of interpersonal dynamics, nearly all participants mentioned a specific social situation that involved positive behaviour from others (e.g., receiving a gift, help, or a compliment). The next common topic within 'interpersonal dynamics' was the experience of being alone. The fact that 'interpersonal dynamics' was a theme found in transcripts produced by all child participants aligns with the stance that emotions constitute a form of social information (van Kleef, 2016). In this perspective, the focus is on how emotions are experienced in the presence of others, and how the emotions of others can impact one's individual feelings, thoughts, and actions in turn. Such an interpersonal perspective on emotion is summarized in the 'Emotions as Social Information (EASI)' Model (Van Kleef, 2009) discussed previously.

Regarding the theme of 'experiencing a non-social situation' to capture child reference to specific events or scenarios, children most often referred to disappointing or negative events as well as alluded to some aspect of danger or safety in their emotion definitions. These sub-themes link to situations that are negative and can be considered emotionally stimulating or particularly salient due to their valence (García-García et al., 2016). Negative events are understood to be highly emotionally stimulating or linked with high arousal/activation of sensory processes (to borrow terms from the neuroscience literature), whereas positive events have been found to recruit more conceptual processes, and

thus can be encoded in memory more effectively to assist the retrieval process (Kensinger, 2009). Hoscheidt et al. (2014) found that the experience of stress and high arousal during exposure to a negative event right before the encoding process of said event into memory acted together in enhancing the emotional memory of the event. In their comparison of methods to elicit emotional responses in undergraduate participants, Salas et al. (2012) found recalling personal events (the internal procedure) generated more negative emotions and mixed blends (i.e., emotions of opposing valence) as well as a higher intensity of emotional reaction in participants as compared to an external stimulus (i.e., watching film clips of four emotions: fear, anger, joy sadness).

The importance of linking emotion to a specific situation or the experience of high activation during an event for building an understanding of a particular emotion pertains to a broader discussion on the formation of emotion concepts. Nook et al. (2020) found that across emotion definitions, younger children (starting at age 4) opted for strategies of 'concreteness' by referencing specific situations to explain emotions. In contrast, the level of abstractness in emotion definitions (capturing a dimension of generalizability not specific to one particular context or individual) increased with participant age. Nook et al. (2020) also found a plateau in example situation use (i.e., concreteness) in emotion definitions specifically at 18 years. It would be of interest if the same themes found here in Study 2's child emotion definitions in middle childhood were to be maintained in definitions produced by a sample of older children and adults, even if the definitional strategy for emotions may differ.

Within the theme of 'non-emotional human behaviour,' the majority of children further mentioned a physical or sensory experience across emotion definitions—most commonly sleep or injury. Sleep can be considered a state wherein no emotional experience can be recorded and as such, was an interesting find as a frequent topic across child emotion

definitions. The recurrent mention of sleep potentially points to a child's distinction between situations wherein emotions can arise (e.g., in the presence of others) and those that are not emotionally charged (e.g., where the child no longer has to engage with others or tasks). Being injured, similar to the frequent mention of a disappointing or negative event discussed earlier, can once again be considered an emotionally heightened scenario, making it unsurprising for it to have been a common theme across emotion definitions.

3.4.4 Limitations

One important limitation of this study of emotion term co-occurrence and mental state term production across child definitions is that definitions were only analysed in English. Although some children did provide definitions in different languages depending on the target emotion term and languages known to the researcher (i.e., French, Spanish, and German), these non-English definitions were translated prior to analysis. Although the aim of the study was to address emotion blends in child emotion definitions in order to speak to the conceptual representation of emotion across middle childhood, conclusions can only be made regarding patterns observed in English.

Analysing emotion term co-occurrence in emotion definitions produced in other languages would not be for the sake of identifying cognates with English (e.g., to answer a question of whether the same emotion terms, translated, co-occur). Rather, a first step would be to ascertain whether the phenomenon of emotion blends as evidenced through language production to describe emotional states is upheld in different languages. Although we believe it would be likely in light of the study's argument that emotion concept representation is in the form of an inter-related system with the understanding of one emotion necessarily linked to that of another (out of similarity or difference), evidence of spontaneous emotion term co-occurrence across different languages when defining emotions would lend more support to the argument.

Furthermore, definitions were produced by a small sample of children that, although diverse, cannot be said to reflect the general population of children ages 8 to 11. Still, despite definitions being from a small number of participants, statistically significant relationships were found between child emotion blending, mental state term production, and gender. Still, confirmation with a larger sample of definitions from children in the same age band is needed to better contextualize and interpret this study's preliminary findings.

3.5 Study-Specific Conclusions

This study sets a precedent for analysing emotion term co-occurrence and mental state term production in child emotion definitions from different age bands to better understand the relationship between language and the conceptual representation of emotion. Common themes extracted from child emotion definitions reinforce the importance of context for emotion understanding and representation, drawing a link between specific situations and emotions arising, which echoes the design of emotion understanding training studies that comprise causal conversations about emotions to nurture understanding. The preponderance of emotion term co-occurrence across all child emotion definitions supports the practice of capturing inter-relationships amongst emotion concepts based on language patterns as both a viable method and line of inquiry.

Child production of emotion blends was found to be predicted by average mental state term (MST) production across emotion definitions. The way emotion term co-occurrence was operationalized in this study can potentially be used to characterize a child's overall use of mental state language (at least in an instance of describing emotions). Age band did not have a relationship with either the production of emotion blends or MSTs across definitions, but it did with child gender. Female children significantly produced more MSTs on average than male children across emotion definitions. As such, the role of gender should still be considered in future research concerned with mental state language use across childhood.

This study also adds to the literature on emotion definition analysis and contributes to methodological literature on the study of emotion representation and language. A corpus of emotion definition data for middle childhood was developed for this study which, to the researcher's knowledge, is not readily available for common use within the research field. The emotion definition corpus compiled for Study 2 complements 'EMOTE,' an English word database of EMOtional Terms developed by Grühn (2016), as well as JESEME, an interactive website to visualize emotion word meaning changes over time (Hellrich et al., 2018), but should be expanded to include a wider range of age bands and languages. A novel protocol for visualizing inter-relationships amongst emotion concepts based off of linguistic data is a further contribution of Study 2. The protocol can be used by future researchers interested in visualizing emotion term co-occurrence patterns by quantifying aspects of natural language describing internal states.

Several questions remain based on this study's findings concerning emotion vocabulary development and implications for emotion representation as well as potential links to social skill. For example, Chiarella et al. (2013) found that toddlers with higher internal state vocabulary performed better on perspective-taking tasks. Can the same be observed in adolescents and young adults? Furthermore, are the emotion blends observed here in middle childhood maintained in older students and if so, does this inter-related conceptual representation of emotion impact the way identifying emotions in others occurs?

Watson and Stanton (2017) describe emotion superclusters based on valence in their study of the experience of emotion blends and mixed emotions. However, no research has yet addressed how such 'superclusters' form across development or relate to potential emotion language patterns and semantic understanding. Baron-Cohen et al. (2010) conducted a developmental survey to chart emotion comprehension from ages 4 to 16 (organized into six different age bands), finding the emotional lexicon in English doubled every two years

between the ages of 4 and 11, but lexicon growth levelled off between the ages of 12 to 16. Similarly, Nook et al. (2020) found a plateau in emotion vocabulary growth at age 11 in their study with participants ages 4 to 25, in contrast to consistent emotion word knowledge increase across childhood. Although additional emotion words may not be added to the vocabulary lexicon in a meaningful way in secondary school or university, the underlying conceptual structure that exists between emotion words can still adapt.

The ability of and ease with describing internal states is a final important factor impacting how individuals provide definitions of emotional states. Links between the ability to describe and identify one's own emotional states, emotion language, and how emotion representation interacts with social skill with an older sample of students are explored and discussed next in Study 3.

Chapter 4

Does Emotion Representation Enhance Interpersonal Accuracy? A Cross-Sectional Study with Undergraduates (Study 3)

Accurately representing the emotional states or emotion processing of others can have important implications for an individual's ability to empathize and form meaningful relationships with others. Some researchers advance that emotions are social information in and of themselves, part of a larger inquiry into how emotions regulate social life (c.f., the Emotions As Information—EASI Model from van Kleef, 2009) and the interplay with an individual's emotion recognition ability. Butler (2011) presents the TIES (Temporal Interpersonal Emotion System) framework to stress how many emotions are experienced in the context of social interaction whether with strangers or established relationships. Exploring what may influence the appraisal process of an individual's personality and emotional processing is of interest to answer questions of individual differences observed in interpersonal perception accuracy and larger social ability.

Emotion representation has been addressed in Study 1 and Study 2 in their focus on how emotion understanding (EU) arises across development. Study 1 focused on interventions targeting social-emotional learning (SEL) wherein EU is often intertwined with the process of social problem-solving. Representing the emotional states of others is construed as part of navigating through situations of conflict or social difficulty. Representing other's emotional states also arises in SEL classroom intervention via topics of perspective-taking, empathy, and compassion. Study 2 emphasized the role of emotion language in shaping the conceptual understanding of emotion and representation of a larger system of interconnected emotion concepts. Here Study 3 extends the research focus of the role of emotion representation into one particular domain of social cognition: interpersonal accuracy (IA) with regards to personality trait and profile attribution as well as trait-based behaviour prediction. Study 3 also explores the relationship between emotion language and emotion

representation through a language manipulation in one condition of a researcher-developed IA task wherein participants are presented with more information about a character's emotional reactions as part of an initial description.

Study 3 focuses on whether having access to emotional social information about another person (e.g., their emotional processing or emotional reactions to situations) impacts the way young adults represent personality traits and make predictions about the likely behaviour of others. Representing how others process emotions can be useful to inform predictions of their likely behaviour in a situation. However, it is possible that the representation of other people's emotional reactions may not always be necessary to inform predictions about their behaviour, or be as automatic as is advanced by the social information processing (SIP) model where emotion representation is embedded in every step of the social decision-making process (e.g., Lemerise & Arsenio, 2016).

Implicit personality theory refers to an individual's assumption of inferential relationships between personality traits or the attributes of others, initially coined by Bruner and Tagiuri (1954) to describe how people assume the relationship between various traits. Trait accuracy is understood as the ability to discriminate one trait amongst different individuals or targets, whereas profile accuracy refers to the ability to discriminate levels of different traits within one target (J. A. Hall et al., 2018). Jones and Davis (1965) first put forward the related concept of correspondence that describes how once a particular trait is ascribed to an individual, said individual would then be expected to exhibit behaviour considered correspondent with the attributed trait. In other words, individuals can be said to have behavioural expectations of trait stereotypes, so much so that the observation of a particular behaviour serves as the preliminary basis used to determine whether someone ascribes a trait to the individual or not—an idea discussed in Rothbart and Park (1986) and further explored in Sanbonmatsu et al. (2015). Korman and Malle (2016) researched how

people explain the behaviour of others, finding participants referenced the mental states of an individual more often as opposed to their personality traits when providing a cause for an individual's behaviour. Interpersonal accuracy (IA) or interpersonal perception accuracy (M. H. Davis & Kraus, 1997; J. A. Hall et al., 2016) has been used as an umbrella term to describe accurate perception of all states and traits.

Personality also plays an important role in social interaction. Individuals who possess socially 'desirable' traits (e.g., extraversion) and fewer socially undesirable traits (e.g., neuroticism) present higher IA (J. A. Hall et al., 2016). Emotionality or emotional reactivity has also been found to influence the interpretation of social cues or stimuli (e.g., Silvers et al., 2012). Specifically, emotionality has been longitudinally linked to the development of social perspective-taking in middle childhood (Bengtsson & Arvidsson, 2011). Emotional reactivity has been associated with social anxiety disorder in clinical population of both children (Carthy et al., 2010) and adults (Goldin et al., 2009, 2014).

Level of exposure to social situations and comfort with engaging with others (e.g., sense of belonging, integration) can influence the development of social skill in terms of the number of opportunities to a) meet different people and b) make use of social problem-solving skills. Social experiences inform an individual's implicit personality theory by either confirming or violating assumptions about trait clustering and subsequent attributions of 'stereotyped' or trait-aligned behaviour. The present study focuses on whether having access to emotional information about another person (e.g., their emotional processing or reactions to situations) impacts the way young adults subsequently represent the personality traits and predict the likely behaviour of an 'other.' A potential pathway for how emotional information is used in interpersonal perception accuracy and representation in neutral or spontaneous social situations is needed as previous models have focused primarily on situations of conflict. As raised previously, personality can influence one's emotional reactivity to a

situation. The question of whether personality also influences one's ability to represent the emotional states of others still remains.

Level of engagement with a social situation also differs depending on whether one is an observer or directly involved. Schilbach et al. (2006) found whether one was an observer or an active participant to a social situation activated different brain regions associated with social cognition. The likelihood and ability to represent emotional information can also vary across individuals (Brooks et al., 2019; Desatnik et al., 2021; Engen et al., 2018), especially when considering research on individuals with alexithymia—the inability to identify and describe one's emotions and feelings (*see* Preece et al., 2020b for factor analysis to establish alexithymia's latent structure). When completing a social skills task as part of a controlled experiment, a participant can be considered a passive observer to a social situation (unless questions ask what participants would personally do in a particular scenario). The IA task used in this study can arguably be treated as a simulation of observing social interaction, although this study does not capture brain activation.

The research questions addressed in Study 3 are:

1. Does the availability of emotional information regarding others and/or length of time enrolled at university impact personality trait attribution and predicting the likely behaviour of others?
2. Are personality trait attribution and social predictive ability influenced by other individual-level factors including:
    a. personality?
    b. level of social connectedness?
    c. the ability to identify and describe one's own emotional states?
3. Is personality trait covariance representation impacted by:
    a. the availability of emotional information?

b. the ability to identify and describe one's own emotional states?

4. Is the ability to represent one's own emotional states related to personality?

Study 3 included a language manipulation within the IA task resulting in two task conditions as well as random assignment of participants to either condition (counter-balanced by age group and condition). Including a manipulation in the task condition was part of an initial effort to potentially find evidence in support of a causal relationship between the independent variable (level of emotion representation) and dependent variable (performance on the IA task). Randomization was executed through an algorithm in Gorilla, the online psychology experiment builder in which the task was created.

4.2 Method

4.2.1 Participants

Participants were 197 undergraduate students (67.5% female), with 103 participants enrolled in their first year at university and 94 participants enrolled in their final year at university. The age range was from 17 to 32 years (M_{age} = 20.03, SD = 2.13). Participants reported studying a variety of subjects reflecting all four divisions of subjects recognized by the University of Oxford including the humanities (n = 43), mathematics/plant and life sciences (MPLS; n = 43), social sciences (n = 58), and medical sciences (n = 53). The majority of participants (85.8%) reported English as their first language (EFL) with 88 participants (44.8%) reporting fluency in at least one additional language, most commonly belonging to the Indo-European language family (23 different languages), followed by the Niger-Congo language family (4 languages), Sino-Tibetan (3 languages), as well as the Afro-Asiatic, Austroasiatic, Dravidian, Karvelian, and Koreanic language families with six participants speaking one language belonging to each. A majority of participants (83.8%) also reported having at least one sibling.

Table 18

Study 3 Participant Language Profile and Subject of Study

	EFL	Humanities	MPLS	Social Sciences	Medical Sciences
First-year (n = 103)	89	22	26	34	21
Final-year (n = 94)	81	17	16	28	32
Total	170	39	42	62	53

Determining Sample Size. *A priori* calculations to determine sample size for intended statistical calculations for each of the study's research questions were run using the software *G*Power 3.2.1* (Faul et al., 2007). For RQ1, a total sample size of n = 151 was indicated as needed in order to run a two-way 2 (Condition) x 2 (Year Group) MANOVA (main effects and interactions) with significance level set at .05 and an effect size of f^2 = 0.0625. For RQs 2 and 4, a needed sample size of n = 107 was indicated to run linear multiple regression (fixed model, R^2 deviation from zero) with two predictors at the 0.05 significance level and medium effect size f^2 of 0.15. For RQ3.a., a sample size of n = 210 was indicated to run a two-tailed independent samples t test with two groups (n = 105 in each), a medium effect size (d = 0.5), and a significance level of 0.05. For RQ3.b, a sample size of n = 89 was indicated to run simple linear regression (with a significance level of 0.05 and medium effect size of f^2 = 0.15). The highest sample size indicated by the above *G*Power a priori* calculations was selected to be the study's target final sample size: in this instance a total of 210 participants, with 105 first-year undergraduates and 105 final-year undergraduates.

Inclusion Criteria. Target participants for this study were typically developing undergraduates in the start of either their first- or final-year of university with fluency in English. Recruitment efforts were targeted towards universities based in the United Kingdom and the Republic of Ireland as a way to ensure potential participants possessed a level of English proficiency adequate for university.

Recruitment. Recruitment of participants occurred from September to December 2021 through a) postings on a social media website (i.e., Facebook) and b) email communication to student representatives of student groups and common rooms across universities in the United Kingdom and the Republic of Ireland.

4.2.2 Measures

Participants in this study completed a demographic questionnaire as part of study enrolment in addition to different measures that captured variables of interest including participant: personality, level of social connectedness, ability to identify and describe their own emotional states, and interpersonal accuracy (IA). The ability to attribute traits and predict the likely behaviour of others based on representations of their personality traits and internal states will be referred to as IA henceforth.

Participant personality was operationalized as scores on the Ten Item Personality Inventory (TIPI), level of social connectedness as score on the Social Connectedness Scale-Revised (SCS-R), and the ability to identify and describe one's own emotional states as scores on the General Difficulties Appraising Feelings (G-DAF) composite subscale of the Perth Alexithymia Questionnaire (PAQ). Interpersonal accuracy was operationalized as both trait attribution and trait-based behaviour prediction scores derived from performance on the researcher-developed interpersonal accuracy task (i.e., Mind Maze). A digital version of the TIPI was created using Qualtrics. Digital versions of the SCS-R, PAQ and Mind Maze were created using Gorilla (www.gorilla.sc; Anwyl-Irvine et al., 2020). All standardized measures included one attention check item at the end of the task.

Demographic Questionnaire. As part of study enrolment, participants completed an online demographic questionnaire created using Qualtrics software, version XM (Provo, UT, Copyright © 2021 Qualtrics). The questionnaire comprised eight items that asked for

participant age, school year at university, subject of study, whether English was their first language, other languages spoken, biological sex, and number of siblings.

Ten Item Personality Inventory (TIPI). The TIPI (Gosling et al., 2003) is a 10-item self-report personality measure based on the 'Big-Five' or 'Five-Factor' Model of Personality: extraversion, agreeableness, openness (to experience), conscientiousness, and emotional stability/neuroticism. Each personality dimension has its own scale, amounting to participants having scores across five scales total. Participants are presented with the prompt 'I see myself as' at the start of the measure and then a list of personality traits organized into 10 pairs (e.g., '1. Extraverted, enthusiastic'; '4. Anxious, easily upset'). Participants respond to how much they agree or disagree with an item statement by providing a Likert-type scale rating ranging from 1 = 'Disagree strongly' to 7 = 'Agree strongly,' with 4 = 'Neither agree nor disagree.' Each personality dimension has two items, one of which is reverse scored and then subsequently recoded. Participants receive a score for each personality dimension scale by averaging scores on the two items per dimension.

The TIPI presents adequate internal reliability and test-retest reliability (r = .68) (Gosling et al., 2003). Reliability coefficients range from moderate to high depending on the personality dimension: Cronbach's α = .30 for 'Agreeableness,' .43 for 'Conscientiousness,' .48 for 'Openness to Experience,' .70 for 'Extraversion,' and .71 for 'Emotional Stability' (Burns et al., 2017). Moderate to strong convergent correlations between the TIPI and the more elaborate Big-Five Inventory have also been reported with positive correlation coefficients of .48 for 'Openness,' .58 for 'Agreeableness,' .65 for 'Conscientiousness,' .69 for 'Emotional Stability' and .80 for 'Extraversion' (Gosling et al., 2003). Internal reliability reported for the sample used in this study was as follows: Cronbach's α = .22 for 'Agreeableness,' .74 for 'Conscientiousness,' .45 for 'Openness to Experience,' .65 for 'Extraversion,' and .76 for 'Emotional Stability,' indicating that the TIPI had a moderate to

high level of internal consistency to capture all personality dimensions assessed in participants except for 'Agreeableness' and 'Openness to Experiences' that presented a low Cronbach's α.

The Social Connectedness Scale-Revised (SCS-R). The SCS-R (Lee et al., 2001) is a 20-item self-report measure developed for use with undergraduate students to capture the extent to which young adults feel connected with their surrounding social environment. Participants respond to statements describing either positive (10 items) or negative (10 items) aspects of social connectedness (e.g., 'I am able to connect with other people,' 'I feel like an outsider.') using a 6-point Likert-style scale ranging from 'Strongly Disagree' = 1 to 'Strongly Agree' = 6. Negative items are reversed-scored so that they can be summed with positive item scores, generating a total possible participant score that ranges from 20 to 120. Higher scores on the SCS-R indicate a higher sense of social connectedness. The SCS-R demonstrates good internal reliability (Cronbach's $\alpha > 0.92$), as well as convergent and discriminant validity, with no significant differences reported by gender or race/ethnicity (Lee et al., 2001). The Cronbach's α for the sample used in this study was .91, indicating high internal reliability.

Perth Alexithymia Questionnaire (PAQ). The PAQ (Preece et al., 2018) is a 24-item self-report measure that assesses three components of alexithymia in both adolescents and adults: difficulty identifying one's own feelings (DIF), difficulty describing feelings (DDF), and externally-oriented thinking style (EOT). Both positive and negative feelings are included, and there is an equal number of items dedicated to each alexithymia component (i.e., eight). Participants respond to items via a 7-point Likert scale ranging from 1 (strongly agree) to 7 (strongly disagree), with 4 representing a response of 'Neither Agree Nor Disagree.' Five different subscale scores can be generated to capture difficulty related to negative feelings versus positive feelings: 'Negative-Difficulty Identifying Feelings' (N-DIF,

4 items), 'Positive-Difficulty Identifying Feelings' (P-DIF, 4 items), 'Negative-Difficulty Describing Feelings' (N-DDF, 4 items), 'Positive-Difficulty Describing Feelings' (P-DDF, 4 items), and 'General-Externally Orientated Thinking' (G- EOT, 8 items). All five subscale scores can be combined into an overall marker of alexithymia as a composite (24 items total).

Additional composite scores can be derived, including a 'General-Difficulty Identifying Feelings' (G-DIF) composite by combining N-DIF and P-DIF subscales (8 items); a 'General-Difficulty Describing Feelings' (G-DDF) composite by combining N-DDF and P-DDF subscales (8 items); a 'Negative-Difficulty Appraising Feelings' (N-DAF) composite by combining the N-DIF and N-DDF subscales (8 items); a 'Positive-Difficulty Appraising Feelings' (P-DAF) composite by combining P-DIF and P-DDF subscales (8 items); and a 'General-Difficulty Appraising Feelings' (G-DAF) composite with 16 items by combining N-DIF, N-DDF, P-DIF, and P-DDF subscales. Preece et al. (2020a) report good reliability for all PAQ subscales with a Cronbach's α range of .85 to .87; composite scores also had very high reliability (Cronbach's α = .90 – .95). In this study, only scores on the G-DAF composite were calculated, with Cronbach's α = .90 indicating high internal reliability.

The total PAQ score has also been found to correlate highly with the total score of the 20-item Toronto Alexithymia Scale (TAS-20) (Bagby et al., 1994) ($r = .76$, $p < .001$), another self-report measure of alexithymia widely used in the literature. Moderate to high correlation was reported between subscales across the PAQ and TAS-20 designed to capture the same facet of alexithymia, with correlation coefficients *r* ranging from .47 to .74. The PAQ only has two publications assessing its psychometric properties and use in research as it is a recent measure. However, the reasons for adopting the PAQ in this study as opposed to the TAS-20 are two-fold. First, the TAS-20 minimally captures the valence of emotional states in its items, a construct paramount to emotion research. Statistical exploration via CFA also found the TAS-20 only assessed negative valence emotions (despite the intent that the scale

measure both positive and negative feelings) (Preece et al., 2020). In contrast, the PAQ organizes its subscales in accordance with the valence of emotional states described in task items. This distinction between the processing of negative versus positive emotional states is important to understanding the role of emotion in social interaction and the nature of emotion concepts, especially when considering the developmental literature. For example, children and adults are consistently found to process emotion words differently depending on their valence (e.g., Bahn et al., 2017).

Interpersonal Accuracy Task: Mind Maze. Mind Maze is a novel researcher-developed task that aims to assess the abilities to a) attribute personality traits and profiles, b) represent personality traits (specifically how they might co-vary within individuals), and c) make trait-based behaviour predictions. Two versions exist, one for children ages 8 to 11, and one for adults 18 and older. The task first presents a description of a named character and then participants complete four different kinds of items. The four types of items include: 1) a multiple-choice 'Trait Attribution' item where participants select a personality trait from three possible responses to describe the character based on what they have just read; 2) a multiple-choice 'Trait-Based Behaviour Prediction' item where participants select one out of three possible behaviours they think the character will most likely exhibit in reaction to a provided scenario; 3) a multiple choice 'Personality Profile' fill-in-the-blank item where participants select one of six possible responses to characterize the character 'core defining feature' (i.e., 'Conscientiousness,' 'Openness to Experience,' 'Emotionality,' 'Agreeableness,' 'Extraversion,' 'Honesty/Humility'); and 4) a 'Trait Association' rating between the character's dominant personality dimension, a highly correlated personality trait (based on findings of Lee and Ashton, 2018), and an additional personality trait, provided on a scale ranging from -100 to 100 (with 0 as a possible response). These items are completed for six characters in total.

Each character in the task represents one dimension of the HEXACO (Honesty-Humility; Emotionality; Extraversion; Agreeableness; Conscientiousness; Openness to experience) model of personality (Ashton et al., 2014). The associated HEXACO dimension serves as the correct 'personality profile' item for a character and structures the content of the task. The personality dimension label is unknown to participants. The inclusion of personality traits highly correlated with a particular personality dimension were based on factor loadings provided by Lee and Ashton (2018).

There are two conditions of the task to which participants can be assigned: 1) 'Emotion Language Neutral' that presents character descriptions with minimal use of emotion language to describe characters, and 2) 'Emotion Language Rich' that presents participants with the same text presented in the 'Emotion Language Neutral' condition and then added sentences with three-times as many emotion terms to describe character emotional reactions and processing. Sample items for one character description as well as task prompts across conditions can be found in Appendix I. Which emotion terms were included in the text for the 'Emotion Language Rich' condition are based on findings from Study 2, specifically the emotion terms identified as consistently 'highly blended' (*see* Appendix J for list). For an emotion term to be considered 'highly blended,' it had to have a high number of co-occurrences with other emotion terms across emotion definitions of all age bands provided by children ages 8 to 11.

The emotion language manipulation is included in this study to assess potential impacts of exposure to emotion language in character descriptions on task performance. Including emotion terms considered 'highly blended' was based on the thinking that such terms are more likely to elicit participant representation of other emotion terms not necessarily presented in the text, which in turn would lead to a richer representation of emotional information associated with the character and of their personality as whole that

could then impact participant responses on task items concerned with trait attribution and trait-based behaviour prediction.

Scoring. Three possible scores can be calculated based on Mind Maze task performance: 1) a 'Trait Attribution' score reflecting percentage of correct responses on all 'Target Trait Attribution' and 'Personality Profile Attribution' items; 2) a 'Trait-Based Behaviour Prediction' score reflecting percentage of correct responses on all 'Behaviour Prediction' items; and 3) a 'Trait Covariance' rating.

The 'Trait Attribution' score is recorded as a decimal number ranging from .00 to 1.00, with each 'correct' response awarded a value of 1 and 'incorrect' responses a value of 0. Which responses are valid are pre-determined as each character described is intended to represent one dimension of the HEXACO personality model and as such, to have specific dominant traits (e.g., for the character representing the 'Honesty-Humility' dimension, their dominant traits would be 'honest' or 'humble').

For the 'Trait-Based Behaviour Prediction' score (recorded as a decimal number ranging from 0.00 to 1.00), correct responses are those that reflect the most likely behaviour of the character given descriptions of its personality. Possible responses were developed based on simple extrapolations of how an individual with particular traits is likely to behave based on the subscales for each personality dimension found in the HEXACO-100 (Lee & Ashton, 2018). For example, the character representing the 'Extraversion' dimension is linked to a scenario wherein there is a new colleague in the office. Participants are asked whether the character will: *'1) Leave the new colleague alone and wait for an introduction; 2) Go up to the new colleague and introduce themselves; 3) Tell their co-workers they should make the new colleague feel welcome.*' The 'correct' response here would be 2, reflecting the personality traits with the highest factor loadings onto the 'Extraversion' dimension: those of including social self-esteem, social boldness, sociability, and liveliness.

The ‘Trait Covariance’ rating is calculated based on participant ratings on the trait covariance scale that ranging from – 100 to 100. The value of ‘0’ is a possible response. Participant scale ratings are divided by 100 to generate a trait covariance rating in decimal form for each dimension of the HEXACO personality model. Consequently, one participant has six different ratings related to trait covariance that are as follows: ‘honesty-humility trait covariance,’ ‘emotionality trait covariance,’ ‘extraversion trait covariance,’ ‘agreeableness trait covariance,’ ‘conscientiousness trait covariance,’ and ‘openness trait covariance.’

4.2.3 Procedure

Participants accessed the study consent form and demographic questionnaire via a weblink to the Qualtrics questionnaire (provided in an announcement detailing the study) before completing tasks on Gorilla. Participants were given two weeks to complete all four study tasks and were sent intermittent reminders. Participants were recommended to allow for 45 minutes to complete all four tasks in one sitting but were advised they could take as much time as they needed. Participants received £10 for completion of all tasks. All participants completed tasks in the following order: PAQ, TIPI, SCS-R, and were then pseudo-randomly assigned to one of the conditions of the Mind Maze (‘Emotion Neutral’ or ‘Emotion Rich’) such that there were equal numbers in each condition in each university year group.

4.2.3.1 Analytic Procedure. Statistical analysis was conducted using *IBM SPSS Statistics 28*. Analysis was run only on data belonging to participants who had completed all four study tasks and did not fail any of the attention checks included in study measures (n = 150). Analysed study data was from 68 final-year undergraduates and 82 first-year undergraduates (M = 19.93; SD = 2.05; 67.3% female).

Table 19

Study 3 Participants (n) per Interpersonal Accuracy Task Condition who Passed Attention Checks

	Task Condition	
	Emotion Language Neutral	**Emotion Language Rich**
First-Year Undergraduates	43	39
Final-Year Undergraduates	36	32
Total	79	71

It was noted that the number of participants whose data was included in final analysis did not meet the target sample size needed to run a two-tailed independent samples *t* – test to address research question 3.a (as outlined by *a priori* calculations in *G*Power*). Furthermore, data distributions for multiple study variables were not normally distributed upon initial inspection of histograms and Q-Q plots as well as tests of normality (Kolmogorov-Smirnov and Shapiro-Wilk). Outliers were also detected upon inspection of boxplots. Specifically, all TIPI scores (except for the 'Extraversion' personality dimension), 'trait attribution' scores, 'trait-based behaviour prediction' scores, and 'personality trait covariance' ratings (except for 'emotionality') were found to be not normally distributed, rendering the use of parametric statistical tests to address research questions no longer viable. Consequently, non-parametric tests were used instead where appropriate to address research questions.

For the first research question concerned with whether performance on the IA task differed significantly across task conditions or by year group (i.e., first-year undergraduates versus final-year undergraduates), separate Mann Whitney U tests were conducted. Spearman rank correlation was selected to address research questions 2 and 4 concerned with the relationship between scores in trait attribution and trait-based behaviour prediction, the ability to identify and describe one's emotional states, and levels of social connectedness. Given that levels of 'Extraversion' were normally distributed, a Pearson correlation was run to test the

relationship with G-DAF and SCS-R scores whereas Spearman rank correlation was used to test the relationship between all other scores across personality dimensions, G-DAF scores, and SCS-R scores. Although scores on the SCS-R to indicate levels of social connectedness and on the G-DAF of the PAQ to indicate general difficulty in describing and identifying one's own emotional states were normally distributed, the study did not have a sufficient sample size needed to conduct multiple linear regression (as originally intended) that could correct for the violation of normality in the dependent variables of trait attribution and trait-based behaviour prediction scores (Lumley et al., 2002).

For the third research question concerned with whether task condition or the ability to identify and describe emotional states impacted trait covariance ratings, an independent samples *t* – test was run to test the impact of task condition on trait covariance ratings for the emotionality personality dimension. A Mann-Whitney U test was conducted to assess impact of task condition on trait covariance ratings for remaining personality dimensions. A Spearman rank correlation was run to test the relationship between G-DAF scores and all trait covariance ratings, except for 'Emotionality' (which was normally distributed) wherein a Pearson correlation was run instead.

4.3 Results

4.3.1 Trait Attribution and Trait-Based Behaviour Prediction

The first research question addressed whether a) the availability of emotional information regarding others or b) time spent at university impacts trait attribution and trait-based behaviour prediction scores. A Mann-Whitney U test indicated that personality trait attribution score was slightly greater for participants in the 'Emotion Language Neutral' task condition (*Mr* = 75.75) than in the 'Emotion Language Rich' condition (*Mr* = 75.22). Trait-based behaviour prediction scores were also greater for participants in the 'Emotion Language Neutral' condition (*Mr* = 80.76) than those in the 'Emotion Language Rich'

condition *(Mr* = 69.65). However, neither difference in mean rank in either trait attribution (*U* = 2784.50, *p* = .94) or trait-based behaviour prediction scores (*U* = 2389.00, *p* = .11) across task conditions was statistically significant. As such, manipulating the level of emotion language in character descriptions did not appear to impact personality trait attribution or trait-based behaviour prediction. Regarding the difference in accuracy by task condition, Spearman rank correlation indicated a small positive relationship between having below average behaviour prediction scores and having been assigned to the emotion language rich condition, $r_s(148) = .18$, $p = .03$.

An additional Mann-Whitney U test indicated that trait attribution score was slightly greater for final-year undergraduate participants (*Mr* = 76.80) than for first-year undergraduate participants (*Mr* = 74.42). Trait-based behaviour prediction score was also slightly greater for final-year undergraduates (*Mr* = 76.28) than for first-year undergraduates (*Mr* = 74.85). However, the mean rank differences in trait attribution (*U* = 2699.50, *p* = .73) and trait-based behaviour prediction scores (*U* = 2735.00, *p* = .84) across university year groups were not statistically significant. As such, there was no evidence to suggest that university experience impacted attribution of personality traits or trait-based behaviour predictions.

The second research question addressed whether trait attribution and trait-based behaviour prediction scores were influenced by individual-level factors including personality (i.e., TIPI scores), level of social connectedness (i.e., SCS-R scores), or the ability to identify and describe one's own emotional states (i.e., G-DAF PAQ scores).[12] Spearman rank correlation indicated no statistically significant correlations neither between TIPI scores and trait attribution scores, nor trait-based behaviour prediction scores. Spearman rank correlation

[12] *See* Table 23 in Appendix M for correlation matrix of variables analysed in Study 3 including participant levels of social connectedness (SCS-R scores), personality (TIPI scores), ability to describe and identify their emotions (G-DAF Scores), year at university, and performance on the interpersonal accuracy task (behaviour prediction scores, trait attribution scores, and trait covariance ratings).

also indicated no significant relationship between: SCS-R scores and behaviour prediction scores ($r_s(148) = .06$, $p = .47$), SCS-R scores and trait attribution scores ($r_s(148) = .13$, $p = .10$), G-DAF scores and behaviour prediction scores ($r_s(148) = -.02$, $p = .80$), G-DAF scores and trait attribution scores ($r_s(148) = .07$, $p = .39$). As such, there was no evidence of statistically significant correlations between participant performance on the interpersonal accuracy task (as captured by trait attribution and behaviour prediction scores), personality, levels of social connectedness, and the ability to identify and describe one's own emotional states.

Levels of social connectedness was inversely correlated with general difficulty in appraising one's feelings $r(148)= -.383$, $p < .01$. Simple linear regression was then used to test if general difficulty in appraising one's feelings significantly predicted levels of social connectedness. The fitted regression model was: SCS-R score = 98.254 - 0.426(G-DAF score). The overall regression was statistically significant ($R^2 = 0.147$, $F(1, 148) = 25.431$, $p < .001$), although the model explained a small amount of total variation in the dependent variable (14.7%). Levels of social connectedness also had small positive correlations with agreeableness ($r_s(148) = .258$, $p < .01$) and extraversion ($r(148) = .288$, $p < .01$).

4.3.2 Personality Trait Representation

The third research question concerned whether participant ratings of personality trait covariance were influenced either by task condition or the ability to identify and describe one's own emotional states. An independent samples *t* – test indicated no statistically significant difference between emotionality trait covariance ratings provided by participants in the 'Emotion Language Rich' condition ($M = -.29$, $SD = .36$) compared to participants in the 'Emotion Language Neutral' condition ($M = -.29$, $SD = .40$). A Mann-Whitney U test indicated the mean rank of trait covariance ratings on 'Honesty-Humility,' 'Conscientiousness,' and 'Openness' personality dimensions were greater for participants in

the ‘Emotion Language Neutral’ condition than for participants in the ‘Emotion Language Rich’ condition. In contrast, mean rank trait covariance ratings for ‘Extraversion’ and ‘Agreeableness’ were greater for participants in the ‘Emotion Language Rich’ condition than for those in the ‘Emotion Language Neutral’ condition. However, none of the observed mean rank differences were statistically significant. As such, task condition did not appear to influence participant ratings of trait covariance across HEXACO personality dimensions.

A Pearson correlation indicated no relationship between trait covariance ratings for the ‘Emotionality’ personality dimension and G-DAF PAQ scores. Spearman’s rank correlation was computed to assess the relationship between G-DAF PAQ scores and trait covariance ratings on the ‘Honesty-Humility’ personality dimension. A small negative correlation was found ($r_s(148) = -.16$, $p = .047$), indicating that the greater a participant’s general difficulty in appraising their feelings, the lower the trait covariance ratings they provided on the ‘Honesty – Humility’ dimension. In the ‘Honesty-Humility’ item series of the task, participants were given the following prompt for the trait covariance rating scale: ‘*If Tiony is humble and* ***sincere****, how likely is it that Tiony is ALSO* ***fair?***’ The finding of an inverse relationship between G-DAF scores and ‘Honesty-Humility’ trait covariance indicated that the more participants had difficulty appraising feelings, the less participants found it likely that a character who is both humble and sincere would also be fair. As such, trait covariance ratings were found to be related to a general difficulty appraising one’s own feelings, but only for one dimension of personality—that of ‘Honesty-Humility.’

Spearman rank correlation also indicated small to strong positive correlations between trait covariance ratings for different personality dimensions (*see* Table 20). However, no correlation was found between trait covariance ratings for either ‘Emotionality’ and ‘Agreeableness,’ nor between ‘Emotionality’ and ‘Openness to experience.’

Table 20

Spearman Rank Correlations amongst Trait Covariance Ratings

	1	2	3	4	5	6
1. Honesty-Humility	1.00	-.18*	.358**	.271**	.311**	.307**
2. Emotionality	-.18*	1.00	-.17*	-.11	-.224**	-.05
3. Extraversion	.358**	-.17*	1.00	.423**	.511**	.342**
4. Agreeableness	.271**	-.11	.42**	1.00	.330**	.260**
5. Conscientiousness	.311**	-.224**	.511**	.330**	1.00	.248**
6. Openness to Experience	.307**	-.05	.342**	.260**	.248**	1.00

* $p < .05$. ** $p < .01$.

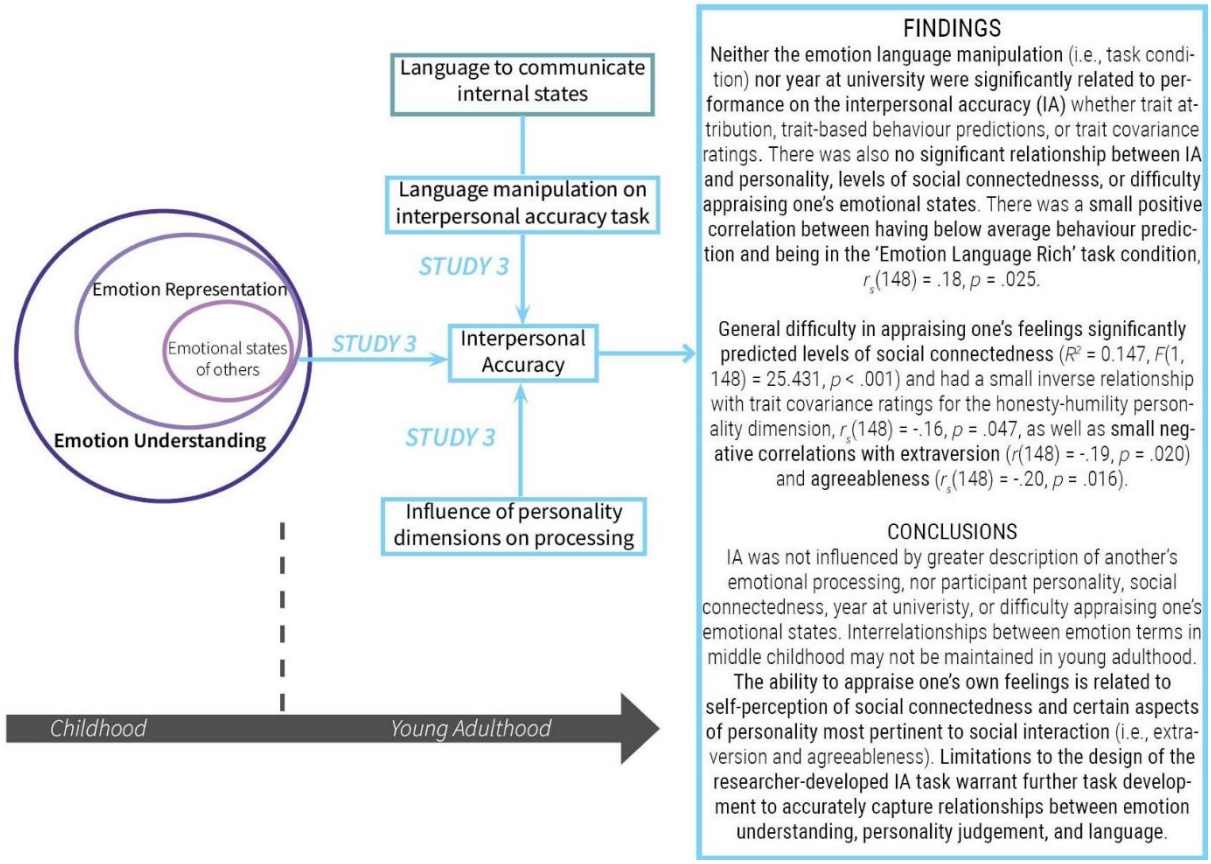
4.3.3 Personality and Appraising Emotional States

The fourth and final research question addressed in this study concerned whether participant personality (operationalized as TIPI scores) was related to the ability to identify and describe one's own emotional states, operationalized as scores on the G-DAF of the PAQ. A small negative correlation between participant 'Extraversion' and G-DAF scores was observed ($r(148) = -.19$, $p = .02$), meaning that the more a participant was extraverted, the lower their general difficulty in appraising their own feelings. There was also a small negative correlation between 'Agreeableness' and G-DAF scores ($r_s(148) = -.20$, $p = .016$), meaning the more agreeable a participant was, the lower their general difficulty in appraising their own feelings.

4.4 Summary of Findings and Interpretation

Figure 35

Study 3 Research Focus, Findings, and Main Conclusions



This study found that neither the availability of emotional information regarding others nor length of time enrolled at university (i.e., year group) impacted performance on the interpersonal accuracy (IA) task. Participants in the 'Emotion Language Neutral' condition did have higher mean rank scores for both trait attribution and behaviour prediction as compared to participants in the 'Emotion Language Rich' condition. Although not a statistically significant difference, it does raise the question of whether the additional emotion language interfered with participant performance on the IA task. There was in fact a higher number of incorrect responses amongst participants in the 'Emotion Language Rich' condition. In the task's current form, those in the 'Emotion Language Rich' condition read two additional sentences that provided further description of the character's internal states.

The language manipulation included in the task did not have a positive effect on IA. It is possible that the contrast of the number of emotion adjectives or quantity of content describing emotion processing of the characters across conditions was not drastic enough to provoke a meaningful difference in how participants represented these characters in a brief amount of time. It could also be that the representation of how another person represents emotional states is not as central to the process of trait attribution as opposed to other processes (e.g., observing nonverbal behaviour, accessing mental heuristics of trait co-variance). The scenarios in the IA task asked participants to select a likely behaviour the character would exhibit instead of making an attribution of an internal state or emotional reaction. Should the task's focus have been on asking participants to select the likely emotional reaction of described characters in a particular context, it is not unreasonable to posit that increased exposure to information about the character's emotion processing via linguistic cues could influence participant selection of likely emotional reactions.

Final-year undergraduates, of which there was a smaller sample in this study as compared to first-year undergraduates, also had slightly higher mean rank scores on the IA task. The difference was not statistically significant, but it is possible that older students may possess a slightly higher ability to accurately represent and predict personality traits. Final-year undergraduates by virtue of being older may have more exposure to social interactions as compared to first-year undergraduates—experience that would then impact how older undergraduates represent personality traits and make trait-based behaviour predictions. With a larger sample size, it is possible that there could be an observable statistically significant difference across year groups on the IA task.

Castro and Isaacowitz (2019) assessed 151 adults from three age groups ('young,' with an age range of 18 to 39 years; 'middle-age,' with an age range of 40 to 64; and 'older,' with an age range of 65 to 75) on eight different emotion perception skills and six different

social perception skills. Castro and Isaacowitz (2018) found that younger adults were more accurate than middle- and older adults when asked to recognize posed emotional facial expressions. There was no effect of age neither on recognition of spontaneous emotional expressions, nor on perception of the trait of agreeableness and openness. Middle-aged adults were less accurate in the perception of agreeableness as compared to younger adults. The two year groups in this study encompassed the same age group of 'young adults' defined in Castro and Isaacowitz (2018). As such, the lack of statistically significant difference of year group on IA in this study (especially for personality dimension profiling) could be due to too small an age gap between groups.

Furthermore, it cannot be ignored that undergraduate students included in this study would have had limited in-person social interaction due to the global COVID-19 pandemic, regardless of individual levels of sociability. Arguably, despite the age difference, both year groups could have potentially been considered to be 'at the same level' with regards to recent exposure or experience with in-person social interaction. Virtual or digital interaction may not constitute the type of experience that can inform implicit personality theory in the same way in-person interaction can (especially with regards to observing nonverbal cues). The format of a video call does arguably mimic some common formats of IA tasks wherein individuals attribute emotions to static images or interpret videos of human interaction. However, there was no statistically significant relationship between participant levels of social connectedness and year group. As such, this study did not find evidence to support a general claim that individuals in their final year of university have higher levels of social connectedness than individuals just beginning their undergraduate degree.

This study also found no evidence to support the influence of personality, level of social connectedness, or the ability to identify and describe one's own emotional states on IA. Once again it is important to note that IA was solely measured via performance on a single

novel non-standardized IA task. Schlegel et al. (2017) in their review and meta-analysis of measures commonly used to assess IA found that many available tests fail to report reliability coefficients and for those that do, they often fall below conventional standards accepted to indicate good psychometric properties (Schmitt, 1996). Given the broader concerns for IA measurement within the field and the limitations of Mind Maze, Study 3's results require replication. Previous research has indicated a positive relationship between social connectedness (specifically the need to belong) and sensitivity to social cues—a necessary component of interpersonal accuracy (Pickett et al., 2004). Researchers advance that personality plays a role in interpersonal perception in that the personality traits of an observer will shape the identification and attribution of traits in an 'other' (Back et al., 2011; Funder, 1999; Kenny, 1994). Evidence of the effect of personality on interpersonal prediction ability is mixed, however. For example, Sechrest and Jackson's (1961) found that there was no relationship between personality and 'social intelligence.'

One recent study that has aimed to integrate the study of personality judgment accuracy with that of other social-emotional skills and traits is by Jaksic and Schlegel (2020). Personality judgement accuracy was indexed as trait accuracy and descriptive profile accuracy. Judgement was made by participants on the 'Big Five' personality dimensions, intelligence, cooperativeness, and empathy. In a sample of 121 adults, Jaksic and Schlegel (2020) found that personality judgment accuracy was positively correlated with emotion recognition ability, but not with either emotion understanding or trait emotional intelligence. EU was operationalized as the ability to infer emotional states from written scenarios captured by the Situational Test of EU—STEU (MacCann & Roberts, 2008). Trait emotional intelligence was operationalized as scores on the Trait Emotional Intelligence Questionnaire short-form (Petrides et al., 2004) that asks participants to provide Likert-scale ratings of the extent to which emotion- and mood-related statements apply to them.

The lack of significant relationship found in Jaksic and Schlegel (2018) between EU, trait emotional intelligence, interpersonal accuracy (IA) is interesting for the larger question of how emotion representation impacts IA. The ability to identify and describe one's own emotional states can be understood as related to both emotion recognition ability and EU directed at the self. The lack of significant relationship between the ability to identify and describe one's own emotional states and IA in this study leads to partial alignment with Jaksic and Schlegel (2018) findings. The PAQ is a self-report measure where participants provide ratings to statements describing their personal experience of emotional states. Arguably, the aspect of emotion recognition assessed by the PAQ is oriented towards the self, and the measure prompts instances of self-reflection regarding how an individual processes emotional information about themselves. In contrast, Jaksic and Schlegel assessed emotion recognition via an externally-oriented measure: the Geneva Emotion Recognition Test (GERT) (Schlegel et al., 2014) that presents participants with brief videos of actors displaying different emotions and pronouncing meaningless sentences in order to convey emotional prosody, after which participants select one out of 14 possible emotion terms to label the video. No conceptual reflection on the experience of emotions is required to complete the task.

This study also looked at whether the personality of participants had any relationship to their ability to identify and describe their own emotional states. Small inverse relationships between a general difficulty in appraising one's feelings and participant extraversion as well as agreeableness were found. Thus, the present study's evidence supports the larger claim that personality and the ability to identify and describe one's own emotional states are correlated. Furthermore, additional analysis conducted for this study indicated small positive correlations between personality and levels of social connectedness, specifically agreeableness and extraversion. A moderate inverse relationship between difficulty in

appraising one's feelings and levels of social connectedness was also found, as well as a statistically significant regression model with difficulty in appraising one's feelings serving as a predictor of levels of social connectedness. Taken together, these findings lend further support to links between personality, the ability to describe and identify one's own emotional states, and levels of social connectedness—an indicator of greater social interaction habits.

Arguably, personality dimensions of extraversion and agreeableness are most pertinent to social interactions and situations. Researchers have found that low levels of agreeableness and conversely high levels of antagonism have been associated with deficits in a general capacity to represent the internal states of others (i.e., ToM), emotional states included (Allen et al., 2017; Ewing et al., 2016; Nettle & Liddle, 2008; Vonk et al., 2015). Da Costa et al. (2018) found in a non-clinical sample that pathological personality traits were associated with the ability to recognize the emotional states of an 'other,' specifically antagonism which is a trait that can be construed as especially pertinent to the realm of social interaction and relationships. Lösch and Rentzsch (2018) in their study on personality and interpersonal perception in the classroom also found the importance of agreeableness and extraversion in interpersonal perception. Specifically, neuroticism was linked to favourable ratings of classmates in social and academic domains; conscientiousness was rated favourably in academic domains.

With regards to personality trait covariance, this study found that the ability to identify and describe one's feelings was related to trait covariance ratings only on one dimension of personality in the 'Big 5' model: that of 'Honesty-Humility.' There was also a small positive correlation between levels of social connectedness and trait covariance ratings only for the honest-humility dimension. The honesty-humility trait covariance item asked participants how likely it was that someone who is humble and sincere is also fair. The factor loadings for honesty-humility and fairness and then fairness and sincerity as reported by Lee

and Ashton (2018) were .68 and .50 respectively. Which personality dimension task items were presented to participants was randomized and as such, it is not likely that the statistically significant relationship can be attributed to order effects. The availability of emotional information (i.e., task condition) also did not have a statistically significant impact on trait covariance ratings. Overall, there was variability regarding trait covariance ratings provided by participants in a given condition in that which group provided higher ratings was not consistent across each personality dimension. Previous research has also indicated that females have greater accuracy than males both in personality profiling (Hall et al., 2016; Vogt and Colvin, 2003) and judging emotions (e.g., Thompson and Voyer, 2014). However, this study found no gender differences in IA task performance, measures of levels of social connectedness, or general difficulty in appraising one's feelings.

4.4.1 Limitations

The main limitations to this study pertained to measurement. First, the EU measure only captured emotion recognition within the self. It would have been of interest to also include a direct measure of emotion recognition in others. Although the relationship between the ability to identify emotions within the self has been linked to the ability to recognize emotions in others, empirical confirmation of the relationship between the two would have been useful for the larger discussion of how EU that is self-directed relates to that which is other-directed in addition to links with personality trait representation.

Another measurement limitation concerned the way in which IA (i.e., trait attribution and covariance ratings, trait-based prediction) was assessed via performance on a novel task without the complement of a standardized measure of IA. The only data available in this study for participant IA was not normally distributed which is not necessarily surprising, even more so as the data for 40 participants was excluded due to failed attention checks. It is important to highlight that Schlegel (2017) in their review and meta-analysis of available IA

measures found no standardized test measuring accuracy in judging personality specifically; the only standardized measures were for emotion recognition skills. As such, although there were limitations to the way IA was measured in relation to emotion representation in this study, available tools within the literature to test aspects of IA of interest to this study using linguistic written stimuli emphasizing emotion language are limited. There were also limitations with regards to what was feasible in developing the IA task and as such, the adult version used in this present study is in no way considered its final form.

In future iterations, it would be of interest to increase the number of personality trait attributions and trait association ratings participants complete per personality dimension and trait to further capture participant representation of traits in line with the design of the personality pairs task (PPT) (Conway, Coll, et al., 2019). An additional emotion attribution item could be added to this study's IA task to further tease out whether the language manipulation in character descriptions has any impact. It could also be interesting to design the task so that participants rate how much each character (that represents one personality dimension of the HEXACO model) is likely to have a particular trait, as opposed to the traits consistently changing with each new character. These additional trait ratings could then be compared more directly with factor loadings provided by Lee and Ashton (2018) so as to calculate a trait covariance knowledge score that captures how aware participants are about actual trait covariance within the population (provided by Lee and Ashton, 2018 data). Scoring of the behaviour prediction item can also move away from the format wherein a participant selects which behaviour in a given a scenario would be most likely for a character. Instead, participants can be given a rating scale for each possible behavioural response (ranging from -100 'Highly Unlikely' to 100 'Highly Likely,' with '0' as a possible response) to get a more nuanced sense of how participants are representing these characters. In the task's current iteration, there was no way to control for participants answering the 'likely

behaviour' item with the response of what they as individuals would likely do as opposed to taking the perspective of the character and its traits (as asked in the prompt).

Furthermore, in light of the observation that 'incorrect' responses on attribution items (whether of likely behaviour or of personality traits) were often provided by participants in the 'Emotion Language Rich' condition, it must be seriously considered whether the additional emotion language input is in fact a hindrance to task performance in terms of cognitive load or that the additional language chosen emphasizes certain aspects of the character's personality that are not as salient. In other words, the additional language may have led participants to respond more often in a particular way, supported in part by participants consistently with the same incorrect response depending on the personality dimension being described. However, we cannot confidently explain how the language manipulation truly impacted participant performance in this instance since with the current task's construction and the study sample, there was no evidence of a statistically significant relationship between task condition and task performance.

4.5 Study-Specific Conclusions

This is the first study to the researcher's knowledge to specifically combine measures of personality, levels of social connectedness, the ability to identify and describe one's emotional states, and interpersonal accuracy (IA) in an effort to glean implications for understanding dynamics between emotion representation, social skill, and personality. The potential role of emotion representation and associated linguistic cues (as opposed to emotion recognition) in trait attribution, personality profiling, and trait-based behaviour prediction is still up for debate. Based on the study's findings, the rationale that providing emotion adjectives more likely to be associated to other emotion terms (i.e., those that are highly blended) would lead to a spontaneous representation of an emotion term cluster that could then influence IA was not supported.

Furthermore, the study did not find any evidence to suggest first-year undergraduates perform differently than final-year undergraduates on an IA task or with regards to levels of social connectedness or the ability to identify and describe one's emotional states, despite the age difference. The brief vignette style character representation in the IA task can hardly be said to approximate a real social situation, but the task presents a first attempt in understanding how participants may perform in their trait attributions and trait-based predictions when presented a constellation of personality traits and mental states via brief narrative.

This study sets a precedent for the use of a novel interpersonal accuracy task that can now be developed further with a larger pool of participants, additional trait and emotion attribution items per personality dimension to get a fuller sense of participant trait covariance knowledge as found in the wider population, and to continue to explore how the availability of emotional information about others shapes personality representation. How IA is measured requires further consideration to develop studies concerned with testing the relationship between IA (specifically personality judgement) and participant emotion understanding. Study implications for education settings whether at primary school, secondary school, or at university level will be discussed next in Chapter 5 that also addresses a larger discussion of implications from all three studies for the conceptualization and operationalization of previously explored constructs related to social-emotional development.

Chapter 5

Learning to Understand the Emotions of Others—A Discussion

5.1 Summary of Findings

The current research project addressed a central question of how emotional learning relates to social learning by focusing on the development of emotion identification in others and its links to interpersonal accuracy (IA). The first study detailed how emotion is 'taught' in upper primary school via social-emotional learning (SEL) programmes and whether such instruction can develop child emotion understanding (EU) directly. The second study explored the interconnected nature of emotion concepts and their relationship to emotion language. The final study extended the discussion of emotion representation and language with additional investigation into potential relationships between IA, personality, and social connectedness. IA was understood as the attribution and representation of personality traits as well as the ability to make trait-based behaviour predictions of others.

The systematic review of school-based SEL programme intervention studies indicated that the following EU components were targeted most frequently in the past decade: a) the ability to recognize and identify emotional states via facial expressions and emotion term labels; b) the understanding that emotions can be regulated via the use of different strategies; and c) the role of emotion in social problem-solving and decision-making, whether by representing others' emotional states or considering the emotional consequences of a decision. The meta-analysis indicated a slight positive impact of SEL programme participation on the development of child EU across middle childhood with similar gains in levels of external, mental, and reflective EU.

The linguistic analysis of child emotion definitions provided evidence of the spontaneous use of other emotion terms to define a target emotion term (i.e., emotion blends). Emotion term co-occurrence across definitions supported the claim that children possess an

inter-related understanding of emotion concepts. In instances of emotion blends, the valence of either emotion term in the pair was consistently matched—positive terms co-occurred with positive terms, and negative terms with negative. Emotion blending did not increase with age in a statistically significant manner. However descriptively, the oldest age band did produce the highest frequency of unique emotion blends. Emotion blend pairs produced by younger age bands were not consistently maintained in definitions produced by older age bands. However, the blend 'happy – excited' was amongst the most frequent co-occurrence pairs for all children. The production of non-emotional mental state terms (MSTs) across emotion definitions was also predicted by how often children produced emotion blends. Gender was significantly associated with MST production in emotion definitions, with female children producing more MSTs than male children on average.

The content of child emotion definitions analysed in Study 2 did not consistently match the topics Study 1 found to be commonly addressed in SEL programmes in order to enhance child EU. Study 2's thematic analysis indicated children most often referred to interpersonal dynamics in their emotion definitions and alluded to specific situations that might elicit the emotion being defined. Children displayed as such an understanding of the external cause of emotions—an area targeted by SEL programmes included in Study 1's systematic review. The importance of context, experience, and social situations (whether their presence or their lack in the sense of being alone) were core to child understanding of emotional experience. Although allusions to physical states were included in emotion definitions, children rarely referred to facial expressions. The link between emotion term and facial expression is often emphasized in SEL programmes to promote emotion recognition, but here facial expressions were not found to be as central to child semantic understanding. Physical manifestations of emotion were still important as children often referred to experiences of crying, sleeping, or experiencing ailment or injury in their definitions.

The final study did not find evidence supporting the claim that greater access to emotional information about others leads to greater IA. The inclusion of emotion terms considered highly blended in childhood (based on Study 2 findings) in IA task character descriptions did not increase precision in either trait or trait-based behaviour attributions. In fact, evidence in support of the reverse was found as there was a slightly significant relationship between participants being in the 'Emotion Language Rich' task condition and having lower accuracy in trait-based behaviour predictions. Personality trait co-variance ratings were only associated with the ability to describe and identify one's own emotional states for the 'Honesty-Humility' personality dimension. The ability to describe and identify one's own emotional states was also related to self-reported levels of social connectedness. Certain dimensions of personality (i.e., extraversion and agreeableness) were found to be related to both levels of social connectedness and the ability to identify and describe one's own emotional states. It is of interest for future research whether such findings would be maintained using a measure of the ability to identify emotions in others or could be replicated within a child sample.

The question of how emotional learning relates to social learning frames emotion, in its representation and experience, within a social context. Study 2 was arguably concerned with the subjective experience of emotion given its analysis of emotion definitions from individual children. The visualization protocol developed for Study 2 also offered a way to illustrate children's emotion concept systems at the individual level. The thematic analysis brought the consideration of emotion back to the social sphere given the most common theme across definitions was interpersonal dynamics. The meaning of emotions across child definitions was expressed thus through reference to an experience with an 'other'—either their presence or their absence. Considering a student's subjective emotional experience is important to wider conversations of individual well-being, but education settings and

classrooms may be better suited to focus on the emotional experience of students being part of a collective. All three studies acknowledge an interactive or externally-oriented dimension to emotion representation as well as experience, echoed in the EASI (Emotion As Social Information) model.

Taking all findings from the three studies into account, several contributions to the literature are to be noted as they set precedent for future emotion research from middle childhood to early adulthood that also considers the roles of language, temperament/personality, and the ability to represent others' internal states and predict their behaviour (i.e., interpersonal accuracy). The present study is the first to provide statistically significant evidence in support of the positive impact of SEL programme participation on developing emotion understanding in primary school children ages 8 to 11. The present study is also the first to advance the interconnected and interpersonal nature of emotion concepts in children through its analysis of child emotion definitions, stressing the importance of context and experience in the overall development of emotion understanding. This study also provides preliminary evidence of the relationship between an individual's personality, their ability to identify and describe their own emotions, and how socially connected they feel—findings that can potentially provide further insight for research on individual differences in social skill and frame a larger discussion on the distal impacts of SEL programme participation in childhood.

Several theoretical considerations also remain pertaining to emotion representation and social interaction based on this study's findings. The first concerns whether identifying the emotions of others can support navigating social situations successfully and in turn, the formation of positive relationships. An increase in social interactions enriches an individual's conceptual inventory (i.e., Mind-space) regarding the emotional states and personality of others. Emotion identification within the self can occur as part of self-regulation that then

helps to maintain positive social interaction. Identifying one's own emotions can also relate to the need to communicate internal states to others throughout social interaction, with the availability of emotion terms potentially enhancing emotional clarity if relationships amongst emotions can be construed. Lastly, emotion socialization processes (whether SEL programmes or more broadly) exert an important influence on EU development and subsequent representation as they relate to the expression and display of emotion. We will now discuss study findings as they pertain to implications for SEL field and the classroom setting.

5.2 Implications for SEL in the Classroom

Findings from this study speak to both the merit of SEL programmes in directly promoting EU across middle childhood and the need to reexamine SEL programme content dedicated to emotions. The gains in EU development via SEL programme participation as indicated by Study 1's meta-analysis may appear modest, but any evidence of improvement within the realm of education research and furthermore social-emotional skill goes beyond concern for meeting a statistical threshold. That the meta-analytic results represent actual impact of SEL programmes on a phenomenon as complex and multifaceted as social-emotional development is promising.

Study 1 also highlighted trends in SEL programme EU promotion including a slight bias towards emotion recognition and regulation, grasping the external cause of emotional states, and considering emotions in the social decision-making process. This uneven emphasis of EU components in schools is not necessarily problematic when considering past research linking EU to social skill. For example, emotion knowledge has been linked to social competence via emotion regulation (Di Maggio et al., 2016; Giménez-Dasí et al., 2015; A. L. Miller et al., 2006; Trentacosta & Fine, 2010). The particular emphasis of SEL programmes only on certain EU facets potentially reflects what can be trained or improved upon by SEL

programmes. Although not all EU components need to be incorporated into a SEL programme to see gains at various levels of EU (whether external, mental, or reflective), a variety of EU facets should be incorporated into SEL programmes directed at older age bands so as to be developmentally appropriate from both theoretical and empirical standpoints.

Aspects of EU can also shape how individuals respond and manage stress in various age groups (Armstrong et al., 2011; Kranzler et al., 2016). For example, Eckland and Berenbaum (2021) found that low emotional clarity was linked with increased worrying in a sample of 172 undergraduates. Emotional clarity is understood as an individual's ability to identify and describe how they feel (Salovey et al., 1995). Study 3 found that the ability to describe and identify one's own emotional states was related to specific aspects of personality including extraversion and agreeableness, but not the abilities to attribute personality traits or make trait-based attributions of others. As such, emotion recognition within the self can be said to have important links to other internal factors including personality and the experience of emotions, but its link to emotion identification in others in relation to factors of personality and interpersonal accuracy requires further study.

Emotional clarity also includes distinguishing between different types of emotions and their causes (i.e., emotion differentiation). This study found SEL programmes implemented across middle childhood have a strong emphasis on developing emotion recognition (which in turn can support emotion differentiation), emotion regulation, and identifying the external cause of emotional states. Bassett et al. (2012) advocate that early childhood programmes focus on teaching negative emotions as their data supported the teachability of expression recognition and situation understanding in Preschool when assessing negative emotions. Teaching about regulating negative emotions is thought to lead to a reduction in class disruption and antisocial behaviour and as such, to foster a better learning environment.

Nook et al. (2021) found that high emotion differentiation (i.e., a high ability in distinguishing between emotions) moderated the relationship between the perceived experience of stress and internalizing problems (i.e., self-reported levels of depression and anxiety) in adolescence. Although the sample used in Nook et al. (2021) was small (n = 30) and only included female participants aged 15 to 17, their findings indicate a potential benefit of participating in SEL programmes in primary school (especially if administered across middle childhood) in that they could support emotion differentiation during a developmental period right before adolescence. Starr et al. (2020) focused on negative emotion differentiation (NED) in adolescence and potential sources of individual differences, including parental factors and age. Participants were teenagers aged 14 to 17 (n = 233) and their parents. A negative linear relationship was found between NED and age. Lower NED was associated with greater parental depression and authoritarian parenting style as well as lower parental attachment security. Considering the classroom setting, a student's relationship with their teacher is another important relationship with an adult imbibed with a power dynamic. It would be of interest for the SEL field to actively explore how student interactions with teachers may impact adolescent emotion differentiation.

Findings from Starr et al. (2020) highlight how developmental trajectories of emotion differentiation differ in adolescence, aligned with evidence from Nook et al. (2018). However, Starr et al. (2020) conclude that further research is needed to provide an explanation for lower NED in later adolescence, noting that difficulty in differentiating intense negative emotions may be linked to adolescent brain development—specifically of areas relevant to cognitive control functions. SEL programmes administered in primary school can potentially provide specific instruction on managing difficult or negative emotions that would then have a positive impact on how students process their experiences as well as relate to others. Still, how negative emotions could be appropriately addressed in classrooms

with adolescents requires further empirical evidence that describes and explains developmental trajectories of emotion differentiation.

Findings from Study 2 stress the importance of context and the influence of the wider environment in contributing to a child's understanding of emotion. How EU naturally develops within the classroom also requires further study. Veraksa et al. (2020) found that children ages 5 to 6 from classrooms considered 'low quality' had higher EU overall as compared to students in 'high quality classrooms'—a finding against their original hypothesis that children from high-quality classrooms would exhibit higher EU. Children from lower quality classrooms also specifically had better understanding of the mental causes of emotion. Classroom quality was assessed via the Russian version of the Early Childhood Environment Rating Scale – Revised (ECERS – R), and EU via the TEC.

The findings from Veraksa et al. (2020) are interesting in that they are potentially unexpected. The researchers provide some explanations to shed light on how low-quality classrooms may provide specific opportunities for children to develop their EU that high-quality classrooms do not. One main characteristic of 'low-quality' classrooms identified by Veraksa et al. (2020) was that peer conflict is not resolved through teacher intervention, but rather peer-to-peer interaction. Opportunities for children to resolve conflict without adult intervention may allow children to better understand group and individual boundaries (Kyratzis & Guo, 2001). Veraska et al. (2020) suggest there may also be less resources in 'low-quality' classrooms (e.g., toys). A main consequence would then be an increase in situations where children need to learn to share, or conversely, ones of conflict and subsequent negotiation (Singer et al., 2012) that would not take place in a harmonious 'high-quality' classroom wherein the use of social problem-solving to resolve conflict may be infrequent as a result. Liao et al. (2014) found that EU was related to reconciliation tendencies across conflict scenarios in a sample of 47 children ages 4 to 6. Emotion

recognition ability was related to reconciliation tendencies in both overt and relational conflict scenarios. Additionally, affective perspective-taking was associated with reconciliation tendencies in overt aggression scenarios (i.e., situations involving physical harm), but not with relational aggression scenarios that involve manipulation or damaging an individual's relationships with others. There was also evidence supporting a relationship between affective perspective-taking and daily prosocial behaviour.

The importance of context for child EU is further supported by observed cross-cultural differences in caregiver emotion socialization practices. Friedlmeier et al. (2011) review evidence on parental emotional socialization behaviours towards children's expression of negative emotion, flagging that most research has been conducted in the US and as such, there is limited evidence to inform cross-cultural perspectives. Nevertheless, Friedlmeier et al. (2011) discuss cultural norms within the Euro-American context (in which many SEL intervention studies have been conducted) that emphasize self-expression and open communication of what is termed 'ego-focused' emotions that support self-assertion (e.g., anger, pride, disgust), in contrast to the East-Asian context that aims to foster relational emotional competence and expression of 'other-focused' emotions (e.g., sympathy, shame)(Chan et al., 2009). The possibility of within-group emotion socialization practice is also not discounted.

Cho et al. (2022) compared hypothetical maternal reactions to child emotions (both positive and negative) across interpersonal scenarios in Nepal, Korea, and Germany to explore potential links with child emotion regulation ability. The sample included 305 mothers of first-grade children. Overall, Nepali mothers reported higher levels of punitive and distress reactions, Korean mothers reported higher levels of distress reactions, and German mothers reported higher levels of emotion encouragement. Maternal distress in response to child shyness was related to poor child emotion regulation abilities across all

cultures. Maternal encouragement of pride specifically was related to child emotion regulation with cultural-specific variation: an inverse relationship in Nepal, a positive relationship in Germany, and no relationship in Korea.

Cross-cultural differences have also been studied in relation to the experience of emotions within individualistic versus collectivistic contexts (Basnight-Brown & Altarriba, 2018). De Leersnyder et al. (2013) attribute such differences in emotional experience to cultural differences in emotion regulation that include emotion display rules. The importance of differences when an emotion is elicited is also emphasized. De Leersnyder et al. (2013) advance that cultural ideals about behaviour impact on sources of emotion regulation (i.e., individual tendencies, relational co-regulation with others, structural conditions of a situation) that then shift the focus of emotion regulation. The focus of emotion regulation then acts on the endpoint of emotion regulation which is the resulting emotional experience. Consequently, individual emotional experience is understood to be aligned with the culturally valued ways in which individuals relate to each other via emotion regulation, emphasizing thus that the basis of relationships with others is emotional.

The need for sensitivity to context-specific socialization practices within the field of SEL is further reinforced by evidence of contextual variation in the acquisition of social-emotional skills. McCoy et al. (2019) conducted an extensive multi-site study of acquisition timings for 12 social-emotional skills with a sample of 5,447 infants and toddlers in 10 different countries including: Brazil, Chile, Ghana, Guatemala, India, Jordan, Lebanon, Pakistan, the Philippines, and the US. Social-emotional skill was captured via caregiver self-report on the CREDI (Caregiver Reported Early Development Instruments), that includes items belonging to six different conceptual categories understood as social-emotional development constructs relevant to cultural variation and income levels: 1) curiosity and imagination, 2) obedience and respect, 3) social competence and prosocial behaviour, 4)

attention, 5) behavioural self-regulation, and 6) emotional competence. The skills selected were as follows: 'involves others in play; usually follows rules and obeys adults; shows curiosity to learn new things; shows sympathy or looks concerned when others are hurt or sad; sometimes shares things with others without being told; can easily switch back and forth between activities; can concentrate on one task for 20 minutes; plays by pretending objects are something else; greets neighbors or other people he/she knows without being told; often kicks, bites, or hits other children; frequently acts impulsively or without thinking; can say what others like or dislike.'

McCoy et al. (2019) found significant heterogeneity in the median age of acquisition for each skill, both across and within sites. The skill with the most variation was 'greeting others' (highly correlated with the skill 'shows curiosity to learn new things'), whereas the skill with the least variation was 'impulse control,' potentially alluding to differences between cultural norms and expectations as opposed to a more generalizable development trajectory of self-regulation. Interestingly, country characteristics were significantly associated with only certain social-emotional skills, and correlations appeared to be driven by both country-level health (operationalized as life expectancy) and education (captured by expected years of schooling), but not SES. Within one site, the early acquisition of one skill did not necessarily relate to or engender the early acquisition of a different skill.

The strongest correlations were found between: country Human Development Index (HDI) and the skills of 'shows curiosity to learn new things' ($r = -.83$, $p < .01$) as well as 'can say what others like or dislike ($r = -.80$, $p < .01$); between country life expectancy and again the skill of 'shows curiosity to learn new things' ($r = -.81$, $p < .01$); and lastly, between expected years of schooling and whether children often physically aggress (i.e., kicking, biting, hitting) peers or adults ($r = -.77$, $p < .01$) (McCoy et al., 2019). These findings support a certain level of universality with regards to similar types of social-emotional skills being

acquired across different contexts. However, uniformity across social-emotional skills acquisition time and contextual relevancy cannot be supported and as such, need to be included in larger discussions of how social-emotional skill assessment is developed, as well as the way in which SEL programme content can be translated to different settings.

As raised previously, the choice to implement SEL in schools contributes to a child's socialization process as programmes reinforce contextually appropriate behaviours different from those of the home setting. Parents and caregivers as well as siblings have an influential role as socialization agents for a child's social-emotional development, but education research has increasingly focused on the role of teachers for their impact within this sphere, especially in early years education (Ahn, 2005; Cekaite, 2013; Cekaite & Ekström, 2019; Denham, Bassett, & Zinsser, 2012; Kilic, 2015; I. Li et al., 2021; C. A. S. Morris et al., 2013; Ornaghi et al., 2020). The teacher-student relationship can serve as a crucial interpersonal dynamic impacting student emotion socialization in the classroom.

In effect, Mainhard et al. (2018) advance that the teacher-student relationship drives student emotional experiences, applying *interpersonal theory* (Horowitz & Strack, 2010; Wubbels et al., 2006, 2012, 2015) to explain variability in student emotions as being related to the interpersonal quality of teaching. Cutting and Dunn (2002) found a relationship between individual differences in sensitivity to teacher criticism and social cognition in a sample of 113 preschool children followed into their first year of school. Children with higher levels of social cognition (operationalized as affective perspective-taking, theory of mind, and understanding both the emotional causes of situations and mixed emotions) were more sensitive to teacher criticism. Schenke et al. (2018) also note the importance of student perception of emotional support from the part of teachers as it relates to classroom climate.

Valiente et al. (2020) propose a model of emotion socialization in the classroom that emphasizes the importance of teacher-student relationships as well as peer relationships. The

model is based on that of Eisenberg et al. (1998) that focused on parental emotion socialization,[13] and also stresses the importance of embracing the complexity of socialization processes in the classroom—characterized as a space of collective peer group functioning. Bi-directional interactions between student characteristics and a) the classroom context, b) emotion-related interactions, c) student outcomes, and d) socialization agents (teachers and peer functioning) are described. Student characteristics flagged as shaping such relationships include age, sex, and temperament. Student outcomes in the model that are emotion-related include self-regulation, social competence, and problem behaviours—all construed to act on the academic-related outcomes of engagement and achievement.

The Valiente model pertains specifically to Preschool and primary school, but certain elements and perspectives can be generalized to all contexts of learning whether in secondary school or at university. Specifically, social interactions within the classroom are characterized as being emotional whether with teachers or peers, positive or negative. Emotion-related interactions include teacher reactions to student emotional displays and relate to teacher-student relationship quality as well as peer interactions.

The model also highlights the emotional experience of learning in itself. Students can experience motivation, failure, excitement, or engagement with learning material, as well as anxiety around testing or academic performance in general (Pekrun & Linnenbrink-Garcia, 2014; Roick & Ringeisen, 2017; Valiente et al., 2020; Valiente, Swanson, & Eisenberg, 2012; Wentzel & Miele, 2016). Emotions can also arise when students encounter difficulty understanding or grasping material whether it be confusion or frustration (e.g., Arguel et al., 2019; D'Mello et al., 2014; Engelmann & Bannert, 2019; Taub et al., 2021).

[13] Raval and Walker (2019) propose a conceptual framework for child emotion socialization that also extends Eisenberg et al.'s (1998) model to account for differences in caregiver practices across cultural groups.

Valiente et al. (2020, p. 580) note in line with Eisenberg et al. (1998) that "emotion-related outcomes may serve as a potential mechanism linking socialization processes to academic-related outcomes." Students who experience 'enhanced' emotion socialization, whether through SEL programme exposure and/or a teacher's social-emotional competence, can also experience a positive impact on EU development (Bjørk et al., 2022; Havighurst et al., 2013). The present study provides evidence in support of the direct positive impact of SEL programme participation on areas of child EU development, but this finding pertains only to children ages 8 to 11 and is also couched in a specific theoretical framework and subsequent definition of emotion understanding primarily outlined by Pons et al. (2004). The present study presents evidence in support of a) the claim that the understanding of an emotion is rooted in interpersonal dynamics, and b) of a relationship between the ability to identify and describe one's own feelings and one's sense of social connectedness. These findings, when taken together and in dialogue with the Valiente model of emotion socialization practices in education settings, position relationships within classrooms (whether between students and teachers or amongst peers) as an important lens through which SEL programme implementation should be explored to further clarify mechanisms pertinent to detailing how emotional learning relates to social learning in education settings.

5.3 Limitations

A main limitation to this study when considering its developmental perspective on how emotion recognition ability develops and relates to social behaviour is the lack of similar data that can be directly compared between its included samples of primary school children and undergraduates. Ideally longitudinal data would have been collected with the same participants or with cross-sectional parallel samples in the different age bands of interest. Such data collection was unfortunately not feasible in the timeframe available to complete the research project. Lack of child interpersonal accuracy (IA) data also limits this study's

discussion on how IA relates to emotion recognition and personality/temperament in childhood. Nevertheless, findings from Study 3 with undergraduates have highlighted areas of future research of interest with child samples (discussed in the next section).

There was also no data collected with adolescents, a period which previous research has shown to involve unexpected developmental trajectories for emotion differentiation. Due in part to constraints of the COVID-19 pandemic that began during this study's main data collection year (including school closures and lack of access to school-aged participants), there were multiple redesigns of this research project. In light of time constraints in completing the study, a decision was made to no longer engage with students who could not provide full consent without additional parties and who would need to be recruited via school contacts.

The resulting study design provided information on emotion understanding/representation and language in middle childhood (provided by Studies 1 and 2) that was then taken up in Study 3 with its question of whether exposure to emotion language could increase IA precision, and further explored links with personality. Some limitations also arose. A main assumption that was not verified was that inter-relationships between emotions (i.e., emotion blends) observed in middle childhood would be maintained in emotion representation in young adulthood. Unfortunately, there was not the possibility to record undergraduate participants defining emotions to verify this assumption. The demographic questionnaire administered to undergraduate participants in Study 3 also did not capture whether participants had participated in a SEL programme in childhood.

5.4 Conclusions and Future Directions

Considering emotions in education, whether via direct instruction through SEL programmes or the 'emotional' nature of both classrooms and the learning experience, can be beneficial to discussions on how to promote positive social-emotional development and

student well-being. This study is the first to the researcher's knowledge to provide evidence in support of: a) the positive impact of SEL programme participation to develop EU in middle childhood, b) the interconnected nature between emotion concepts in a child's representational system, and c) the inter-relational nature of child emotion understanding. Thematic analysis of child emotion definitions indicated how the meaning of emotions is primarily made in relation to others, whether through interaction or in the experience of their absence when one is alone. This study also highlighted the link between the ability to understand and identify one's own feelings with aspects of personality, however no further relationship was found with personality trait representation and trait-based behaviour prediction of others, that is to say aspects of interpersonal accuracy.

Future research is needed to see whether the same link between self-directed emotion understanding and temperament/personality is replicated with younger age bands, and to explore links between emotion understanding and interpersonal accuracy. Although SEL programmes may not alter temperament/personality, they can alter emotion recognition ability. The present study cannot answer these developmental questions, but its methodology and findings encourage SEL research to no longer ignore temperament/personality and the individual ability to represent others (whether emotion, traits, or thoughts) as part of understanding SEL programme impact and implementation.

Incorporating SEL programmes within curricula to promote student well-being is in support of overall student success (not just academic), and echoes calls from the international stage discussed earlier that stress the need for direct support of student social-emotional development. For example, enduring mental health (EMH) is not the norm in the UK context based on a study analysing data/predictors from the Millenium Cohort Study that tracked participants from ages 4 to 16. Deighton et al. (2021) found that 41% of students fell into the EMH category. Important factors shaping mental health profiles included effective or 'good'

emotion regulation, cooperation, and enjoyment of school in addition to cognitive ability and lack of special educational needs.

Pauletto et al. (2021) in a sample of 74 children ages 8 to 11 found trait emotional intelligence (EI), but not general intelligence, was associated with psychological well-being. Positive restructuring coping style also contributed to psychological well-being, but coping style did not explain the relationship between trait EI and well-being. Businaro et al. (2015) also assessed life satisfaction in middle childhood in relation to emotion regulation and intensity of emotional experience (both positive and negative). Word association analysis indicated that well-being for children was linked with company, happiness, enjoyment, family, feeling loved and protected, friendship, relaxation, school, and sports.[14] Interestingly, the intensity of emotional experience impacted child life satisfaction, but no relationship was found with emotion regulation and non-verbal intelligence. As such, findings from Businaro et al. (2015) do not support that high emotion regulation ability is linked with high life satisfaction, but do flag the importance of capturing the child's perspective directly when considering how best to support their social-emotional development. An effort to centre the child's perspective on social-emotional skill within research and arguably lacking in SEL interventions is echoed by this study's analysis of child emotion definitions.

SEL programmes administered in childhood can be seen to enhance emotion granularity in a student's larger representational system of emotion. The ability to recognize emotions may not mitigate the initial intensity of felt emotion, but it can help children to process them and as such, serve as a viable anchor for education initiatives committed to student well-being. Nook et al. (2021) explain how emotion differentiation may act as a buffer to how internalizing symptoms manifest (e.g., high levels of anxiety or depression being linked to stressful events) as emotion differentiation relates to emotion regulation

[14] Topics listed here are in alphabetical order and do not reflect importance or a hierarchy of significance.

ability. Should emotion recognition ability be enhanced in primary school and more specifically, should emotion differentiation ability developed at a younger age be maintained at older ages, SEL programme participation in primary school could potentially support student mental health entering secondary school even if they no longer receive SEL programme input.

However, there is a caveat to the benefit of high emotion differentiation as it may not be adaptive in adolescence and beyond. Nook et al. (2020) found that naming emotions impeded emotion regulation strategies to cope with emotional experiences across two studies with adults ages 18 to 33. Participants who labelled (i.e., named) their negative emotions before using the emotion regulation strategy of reappraisal reported feeling worse as compared to participants who regulated their emotions without labelling them. Nook et al. (2020) suggested naming an emotion may 'crystalize' one's understanding of their affective experience which then makes it harder to modify via emotion regulation strategies of reappraisal or acceptance. Having access to an emotion label for a negative feeling and using it may not necessarily be the most beneficial way to process negative affect within the self as a young adult. We cannot yet speak to whether Nook et al.'s (2020) findings would be replicated in middle childhood. However, both SEL and this study posit emotions within a shared or social context, that is to say the classroom. Should emotion labelling (whether of positive or negative affect) be directed externally as supported by SEL programmes, it is possible such emotion identification could be beneficial to interpersonal self-regulation.

Understanding SEL programme implementation in light of its potential as a buffer against strained student mental health is of growing interest. Contextualizing how SEL programmes are taken up in schools can allow practitioners, researchers, and wider school communities to better understand programme effects. Understanding the implementation context can also better inform the decision of choosing a SEL programme and grasp on what

makes a meaningful difference in terms of benefitting student outcomes and making programmes sustainable. Findings from this study on emotion representation stress the importance of context and specific experiences in how children understand emotions. Furthermore, there is empirical evidence to support cross-cultural differences in the acquisition of social-emotional skills, caregiver emotion socialization practices, and in the experience of emotions. As such, SEL programmes need to engage with cross-cultural differences in how they incorporate emotion into the classroom.

SEL as a field also has concern for ways in which education can develop responsible citizens. The present study focused on the EU component to social learning, but there is a dimension of character development in some SEL programmes that should be acknowledged in a discussion of future research. Links between affective perspective-taking ability and prosociality or prosocial behaviour have been found by other researchers (Knafo et al., 2011; Malti & Krettenauer, 2013; Vaish et al., 2009). Kuhnert et al. (2017) conducted a longitudinal study with children ages 5 to 7 to explore gender-differentiated effects of theory of mind (ToM), emotion understanding (EU), and social competence on prosocial development. ToM assessed at 5 years of age was found to predict later prosocial behaviour at age 7. EU was also positively associated with prosocial behaviour, but only for female children at age 7.

Whether there is a natural synergy between SEL programmes and promoting prosocial behaviour, or student moral or character development in schools is up for debate (Elias et al., 2007). As discussed in relation to the findings of Study 1, which EU components were emphasized in lesson content of SEL programmes can be said to have an external focus, whether regulating one's emotions so that they do not have a negative impact on others, or accurately identifying others' emotions so as to successfully navigate conflict and potentially undertake prosocial acts. SEL curricula as they relate to the assessment of social-emotional skill emphasize an "optimal" model of social-emotional development that may not

necessarily relate to overall student social-emotional well-being. Which aspects of social-emotional skill are emphasized across various SEL models can be said to favour an extroverted student and minimize bystander behaviour. That students who may present temperaments or personalities that do not perfectly fit such models may be considered socially and emotionally inept is problematic. There is also the risk of homogenizing student character to the detriment of their individuality should SEL programmes move beyond developing specific social-emotional skills beneficial to all towards developing particular kinds of individuals.

There are several lines of inquiry addressed across the three studies presented here than can be taken up by future research on the development of recognizing emotions in others and the influence of SEL programme participation. Longitudinal studies would be particularly beneficial to expand on work by Panayiotou et al. (2019) in order to identify SEL programme impacts on students upon exiting formal education.

Considering whether a SEL programme should include a component of developing teacher social-emotional competence could be another promising avenue. Anecdotally, this study in its review found SEL emotion-focused programme content was almost entirely directed at students with no additional teacher-specific content. As part of the search conducted for the systematic review in Study 1, it was more common to find teacher-focused material and teacher well-being outcomes in mindfulness intervention studies (*see* "Part II: Mindfulness in Education: Science and Applications with Educators" from Schonert-Reichl & Roeser, 2016 for review of teacher-focused programmes). As discussed previously, positive teacher-student relationships could play an important impact on the success of implementing a SEL programme. For example, one factor could be a student's level of trust in the teacher to facilitate discussions surrounding emotion recognition, regulation, and interpersonal skills. The Valiente classroom emotion socialization model presented earlier

identifies teacher stress level, emotions, self-regulation abilities, and mental health as mediating factors that shape the relationship between emotion-related socialization behaviours and student outcomes. Future research that tests such mediated relationships proposed by the Valiente model, as was done by Thompson et al. (2020) for Eisenberg et al.'s (1998) model of parental emotion socialization, poses great benefit for the SEL field.

Greater distinction between the priorities of SEL programmes is also needed. This study identifies three main support areas part of the past rationale to include SEL in schools: a) positive social-emotional development with the individual as it relates to well-being, that then impacts on interpersonal relationships; b) social-emotional skill development within students to contribute to effective classroom management and interaction as less disruptions can allow for more time spent learning; and c) character development that promotes prosociality and leadership linked with positive participation in society after formal education and professional prospects. This is not to say any of these goals is mutually exclusive, but without such clarity as to the motivations for including SEL programming within curricula, discussions of positive mental health cannot easily be combined with efforts to adopt a holistic approach to education.

Accepting both social and emotional learning as necessary to education without engaging with how the two influence each other is not fruitful for developmental research and advancing the SEL field. Promoting greater awareness of others whether of their emotions or experience begins with greater awareness within the self. As raised here, our understanding of emotions is interconnected and interpersonal, and of classrooms as a social space, emotional. SEL now operates on a world stage that recognizes and respects the impact of social-emotional factors on student success. As such, there is prime opportunity for research dedicated to explaining mechanisms in social-emotional development that engages with

student individual differences (developmentally and cross-culturally)—both in how they shape and manifest within greater interpersonal interaction.

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Appendices

Appendix A

PRISMA Checklist of Items to Include When Reporting a Systematic Review or Meta-Analysis

Section/Topic	#	Checklist Item	Reported on Page #
Title	1	Identify the report as a systematic review, meta-analysis, or both.	122
Abstract			
Structured Summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
Introduction			122 - 124
Rationale	3	Describe the rationale for the review in the context of what is already known.	125 -128
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	128 – 130
Methods Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	132
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	130
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated	130 - 131
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	131 – 136; 138 – 139
Data Collection Process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	136 – 142
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	136 – 142

Section/Topic	#	Checklist Item	Reported on Page #
Risk of bias of individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	143 - 144
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means.	139 - 142
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	139 - 142
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	143 -144
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	144
Results			
Study Selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	131 - 133; diagram on p. 133
Study Characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	145 - 147
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment *(see* Item 12).	160 - 162
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	155 - 160
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	150 – 160
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies *(see* Item 15)	160 – 162
Additional Analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression).	163 – 164
Discussion			
Summary of Evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers).	165 – 174
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	174 - 175
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	175 – 178
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

Note. Checklist reproduced from Moher et al. (2010)

Appendix B

Overall Study Analytic Procedure

Study	Research Question	Variable(s) of interest	Analysis
1	1. Which areas of EU (EU) have been promoted across school-based social-emotion learning (SEL) interventions from the past decade?	SEL programme components (i.e., lesson plan topics) included in SEL intervention studies conducted in primary schools from 2009 - 2019	Systematic review; narrative synthesis via mapping exercise of SEL programme components to *a priori* ten-facet EU framework
	2. Have school-based SEL interventions over the past decade impacted EU development across middle childhood?	Effect sizes of child performance on EU outcome measures used in SEL intervention studies (studies are a subset of those included in systematic review)	Statistical via Meta-analysis; mapping of EU outcome measures to EU framework
2	1. Which emotion terms co-occur across emotion definitions?	Co-occurrence of emotion terms in child emotion definitions	Descriptive frequency analysis of emotion term production in emotion definitions
	2. Do emotion term co-occurrence patterns in emotion definitions shift depending on: a. participant age and gender? b. an emotion term's valence or intensity?	Emotion term co-occurrence patterns at participant level and emotion term level; participant age band; participant gender; emotion term valence; emotion term intensity	Statistical: 2.a) one-way ANOVA for age; independent samples *t* – test for gender 2.b) independent samples *t* - tests
	3. Does mental state term (MST) production in emotion definitions shift depending on: a. emotion term co-occurrence patterns? b. participant age or gender? c. emotion term intensity or valence?	MST production in definitions at participant level and emotion term level; emotion term co-occurrence patterns; participant age; participant gender; emotion term intensity; emotion term valence	Descriptive frequency analysis of MST production and statistical: 3.a) simple linear regression 3.b) Kruskal Wallis H Test for age; independent samples *t* – test for gender 3.c) Kruskal Wallis H Test for emotion term intensity; independent samples *t* – test for gender
	4. Are there specific scenarios or topics common across emotion definitions?	Semantic content of child emotion definitions	Inductive thematic analysis based on Braun and Clarke (2006) six-step method

Study	Research Question	Variable(s) of Interest	Analysis
3	1. Are personality trait attribution and trait-based behaviour predictions influenced by the availability of emotional information about others and/or time spent at university?	Performance on interpersonal perception accuracy (IPA) task including trait attribution and trait-based behaviour predictions; IPA task condition (i.e., emotion language manipulation)—'emotion language rich' vs. 'emotion language neutral'; participant year at university (first-year vs. final-year)	Statistical: Mann Whitney U Tests
	2. Do trait attribution and trait-based behaviour predictions shift depending on: a. levels of social connectedness? b. the ability to identify and describe one's own emotional states? c. personality?	Trait attribution and trait-based behaviour prediction on IPA task; participant levels of social connectedness (SCS-R); participant difficulty appraising feelings (G-DAF subscale on PAQ); participant personality (TIPI)	Statistical: Spearman rank correlations
	3. Is trait covariance representation impacted by: a. the availability of emotional information? b. the ability to identify and describe one's own emotional states?	Personality trait covariance ratings on IPA task; IPA task condition; difficulty appraising feelings (G-DAF subscale on PAQ)	Statistical: 3.a) Independent samples *t* – test for trait covariance ratings of emotionality and task condition; Mann Whitney U test for remaining personality dimensions 3.b) Pearson correlation for G-DAF scores and emotionality covariance ratings; Spearman rank correlation for remaining personality dimensions
	4. Is there a relationship between personality and the ability to identify and describe one's own emotional states?	Participant personality (TIPI); difficulty appraising feelings (G-DAF subscale on PAQ)	Statistical: Pearson correlation for 'Extraversion' and G-DAF scores; Spearman rank correlation for G-DAF scores and remaining TIPI personality dimensions

Appendix C

EPHPP Quality Assessment Instrument Adapted from Thomas et al. (2004)

	RATING LEVELS		
COMPONENTS	**STRONG**	**MODERATE**	**WEAK**
Selection Bias	Sample very likely to be representative of the target population; participation rate > 80%	Sample somewhat likely to be representative of the target population; participation rate of 60 – 79%	All other responses OR if needed information to determine how representative/participation rate not stated
Design	Is a randomized controlled trial (RCT) or controlled clinical trial (CCT)	Is cohort analytic, case-control, cohort, or interrupted time series	All other designs OR study design not stated
Confounders	At least 80% of confounders are controlled for	60-79% of confounders are controlled for	Confounders not controlled for OR not stated
Blinding	Outcome assessor AND participants are blind to intervention status AND/OR research question	Blinding of either outcome assessor OR participants	Outcome assessor AND participants aware of intervention status and/or research question
Data collection methods	Use of valid and reliable tools/measures	Tools/measures are valid, but reliability not reported	No reporting of validity or reliability
Withdrawals and dropouts	Follow-up rate of >80% of participants	Follow-up rate of 60-79% of participants	Follow-up rate of <60% of participants OR withdrawals/dropouts not described in study

Note. 'Strong' studies are assigned a value of 1, 'moderate' studies a value of 2, and 'weak' studies a value for 3 for each component listed in the table.

Appendix D

Studies Originally Short-Listed for Inclusion in Study 1 Meta-Analysis

Study [Country]	Design	Child Participants (n)	Age Band (Years)/UK School Grade	SEL Programme
Amundsen et al (2020) [UK--England]	Pre-test/Post-test (with waitlist & active controls)	108	9 to 10/Year 5	Living Mindfully Programme, UK
Beaudoin et al. (2016) [USA]	Pre-test/post-test (with waitlist control)	353	8 to 10/Years 4 to 5	Narrative Therapy
Carroll et al. (2020b) [Australia]	Pre-test/Post-test within subjects	524	8 to 12/Years 5 to 7	KooLKids Whole of Class
Coelho et al. (2016) [Portugal]	Quasi-experiment	1,237	9 to 10/Year 5	Programme Positive Attitude
Coelho & Sousa (2017) [Portugal]	Quasi-experiment	982	10 to 12/Years 6 and 7	Positive Action (PA)
Collins et al. (2014) [UK--Scotland]	Between subjects; 3 (group) x 3 (time) mixed design	317	9 to 10/Year 4	Researcher-developed CBT-based
Crean & Johnson (2013) [USA]	Cluster-randomized Trial	779	8 to 11/Years 4 to 6)	Providing Alternative Thinking Strategies (PATHS)
Daunic et al. (2012) [USA]	Randomized Controlled Trial	1,296	7 to 12/Years 3 to 7	Tools for Getting Along (TFGA)
de Carvalho et al. (2017) [Portugal]	Quasi-experiment	454	8 to 10/Years 4 and 5)	MindUp
Filella-Guiu et al. (2014) [Spain]	Quasi-experiment pre-test/post-test (with control)	651	6 to 12/Years 2 to 7	Social Skills Improvement System Classwide Intervention Programme (SSIS-CIP)
Flook et al. (2010) [USA]	Randomized Controlled Trial	64	7 to 9/Years 3 and 4	InnerKids Programme
Gallegos et al. (2013) [Mexico]	Quasi-experiment (non-equivalent control group)	1,030	8 to 13/Years 5 and 6	FRIENDS for Life (Spanish Version)
Goossens et al. (2012) [The Netherlands]	Quasi-experiment	1,223	5 to 11/Years 1, 4, and 6	Providing Alternative Thinking Strategies (PATHS)
Humphrey et al. (2016) [UK--England]	Randomized Controlled Trial	4,516	7 to 9/Years 3 and 4	Providing Alternative Thinking Strategies (PATHS)
Humphrey et al. (2018) [UK--England]	Cluster Randomized Controlled Trial	5,218	7 to 9/Years 3 to 5	Providing Alternative Thinking Strategies (PATHS)
Kiviruusu et al. (2016) [Finland]	Cluster Randomized Controlled Trial	3,704	6 to 9/Years 2 to 4	Together at School
Kraag et al. (2009) [The Netherlands]	Cluster Randomized Control Trial (delayed intervention with random assignment)	1,467	11 to 12/Years 6 and 7	Learn Young, Learn Fair
Lewis et al. (2016) [USA]	Cluster Randomized Controlled Trial	1, 178	8 to 14/Years 4 to 9	Positive Action

Study [Country]	Design	Child Participants (n)	Age Band (Years)/UK School Grade	SEL Programme
Mateu-Martinez et al. (2013) [Portugal]	Quasi-experiment, pre-test/post-test (non-equivalent control group)	94	8 to 12/Years 4 to 7	Researcher developed CBT programme
Mira-Galvañ & Gilar-Corbi (2020) [Spain]	Quasi-experiment, pre-test/post-test (non-equivalent control group)	86	9 to 12/Years 4 to 6	OKAPI (emotional education programme)
Papieska et al. (2019) [Poland]	Quasi-experiment, pre-test/post-test	339	8 to 9/Year 4	EMOScope
Pophillat et al. (2016) [Australia]	Randomized Controlled Trial	206	6 to 9/Years 2 to 4	Aussie Optimism Programme: Feelings and Friends (AOP-FF)
Raimundo et al. (2013) [Portugal]	Quasi-experiment	318	9 to 10/Year 5	Slowly but Steadily
Santos & Langill (2020) [Canada]	Stratified Randomized Controlled Trial (no treatment control)	98	7 to 9/Year 4	MindMasters 2
Schonert-Reichl & Lawlor (2010) [Canada]	Quasi-experiment	246	9 to 13/Years 5 to 7	MindUP
Schonert-Reichl et al. (2012) [Canada]	Quasi-experiment	585	8 to 12/Years 5 to 8	Roots of Empathy (RoE)
Schonert-Reichl et al. (2015) [Canada]	Randomized Controlled Trial	99	9 to 11/Years 5 and 6	Mindfulness Education (ME)
Sibinga et al. (2016) [USA]	Randomized Controlled Trial	300	10 to 14/Years 6 to 9	Mindfulness-Based Stress Reduction (MBSR) programme, adapted
Terjestam et al. (2016) [Sweden]	Pre-test/post-test (with control)	358	10 to 14/Years 6, 8, and 9	COMPAS (Compassion and Attention in the Schools)
Viguer et al. (2017) [Spain]	Pre-test/post-test (with control)	228	10 to 11/Year 6	EDI Programme
Wang & Goldberg (2017) [USA]	Quasi-experiment	84	8 to 9/Year 4	Bullying Literature Project (BLP)-Moral Disengagement (MD)

Appendix E

Study 2 Excel Template for Emotion Term Co-Occurrence Matrix

	Total per blend term \/	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Total per target emotion term >																												
Adore																												
Afraid																												
1. Amazed																												
2. Angry																												
3. Annoyed																												
Anxious																												
Attached																												
Attracted																												
Awe-Struck																												
Bewildered																												
Boastful																												
4. Bor/ed/ing																												
Bothered																												
5. Calm																												
Caring																												
Cheerful																												
Comfortable																												
Compassion																												
Concerned																												
Depressed																												
6. Disappointed																												
7. Disgusted																												

	Total per blend term ∨	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Dissatisfied																												
8. Embarrassed																												
Envious																												
9. Excit/ed /ement/ing																												
Exhilarated																												
Fear/fearful																												
Forgiving																												
Fretting																												
Frightened																												
Frustrated																												
Furious																												
Grateful/ness																												
10. Grumpy																												
Guilty																												
11. Happy																												
12. Hate																												
Humiliated																												
Hurt																												
Impressed																												
Irritated																												
13. Jealous																												
Joy/ful/ous																												
14. Lonely																												
15. Love																												
Mad																												
Mortified																												
16. Nervous																												
Peaceful																												

	Total per blend term \/	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
17. Pleased																												
Protected																												
18. Proud																												
Quiet																												
Reassured																												
Regretful																												
Rejected																												
19. Relaxed																												
Relieved																												
Respect yourself																												
Respected																												
20. Sad																												
21. Safe																												
Satisfied																												
22. Scared																												
Secure																												
Shame/Ashamed																												
Shocked																												
23. Sorry																												
Stressed																												
24. Surprised																												
Terrified																												
25. Thankful																												
Uncomfortable																												
Unhappy																												
26. Upset																												
27. Worried																												

Appendix F

Study 2 MST List for Emotion Definition Coding

know	*think*	*learn*	*understand*
feel	*guess*	*perceive*	*recognize*
want	*wish*	*expect(ing)*	*notice*
prefer	*hope(ing)*	*imagine*	*remember*
decide	*believe*	mean	*forget*
confused	*discover*	anticipate	
plan	*hesitate(ing)*	*ignore*	

Appendix G

Study 2 A Priori Emotion Term Valence and Intensity Categorization

Negative Activating Emotion Terms	**Positive Activating Emotion Terms**
Scared Nervous Worried Disgusted Annoyed Angry Upset Hate Disappointed Grumpy Jealous Embarrassed Sorry	Surprised (on border positive/negative) Amazed Excited Happy Love Pleased Thankful Proud
Negative Deactivating Emotion Terms	**Positive Deactivating Emotion Terms**
Sad Lonely Bored	Calm Safe Relaxed

Appendix H
NVivo-Generated Codebook for Study 2 Thematic Analysis

Name	Files	References	Name	Files	References	Name	Files	References
a friend creeps up on you_scares you	3	4	at home	10	11	behaving well_good behavior	1	1
acting funny_ridiculous	1	1	at lunch	3	3	being a guest on a TV show	1	1
adult	1	1	at relative's house	1	1	being adopted	1	1
airplane	3	3	at school	10	22	being alone	21	26
alone in a room	3	4	at the beach	3	3	being attacked	2	2
amusement park	3	4	avoiding a fight	1	1	being cared for	1	1
animal	1	2	back from school	1	1	being excluded	1	1
annual event_activity	1	2	backpack ready_packed	1	1	being kept out of things	1	1
argument	1	1	bats	1	1	being in front of others	9	10
at a house	4	4	becoming a lawyer	1	1	being looked after	1	1
at friends' houses	1	1	becoming student representative	1	1	being looked at when getting changed_dressed	1	1
bedtime	1	1	being older	1	1	being lost	5	6
bees	1	1	being on a mission	1	1	Bible	1	1
birthday	16	22	being on a roller coaster	1	1	big dog	1	1
blame	1	1	being picked on	1	1	biology class dissection	1	1
blushing	3	3	being called fat	1	1	being raised	2	2

Name	Files	References	Name	Files	References	Name	Files	References
bombing	1	1	being made fun of	2	2	being saved	1	1
bought something that doesn't work	1	1	being slapped	1	1	Christmas list	1	1
boy on school bus	1	1	being tapped on the back	1	1	city	1	1
break time_recess	1	1	being the oldest	1	1	climbing a mountain	1	1
breaking a promise	1	1	being told off_scolded	3	3	Cornwall	1	1
broken bone	3	7	best friend	1	2	cousins	3	6
building	2	3	betting	2	2	creature	1	1
bullies	3	5	bumblebee sting	2	2	crying	9	10
close ones	1	1	burial	1	1	cuddling	2	3
close ones are busy	3	3	butterflies in your stomach	5	6	cursing	1	1
clothes laid out	1	1	can't go outside	1	1	danger	2	3
clothing	3	3	car trouble	1	1	danger to the public	1	1
comment on height_stature	2	2	cat nap	1	1	dark street	1	1
communion	1	1	changing school grades	2	8	death	4	4
comparing yourself to others	3	3	cheating	1	1	decorating room	1	1
cooking club	1	1	cheating romantically	1	1	did something bad	12	17
Christmas	4	4	chewing gum stuck underneath a desk	1	1	did something good	5	6

Name	Files	References	Name	Files	References	Name	Files	References
did something never done before	1	1	don't know what to say	1	1	family	2	2
did something poorly	3	3	don't want to be around someone	1	1	family meal	2	2
did something well	5	6	don't want to speak to anyone	1	1	family problems_trouble	2	2
difficult to define	1	1	dress code	1	1	family vacation	2	2
disruptive behavior	1	2	dress-down day	1	1	farting	1	1
dog	7	8	drowning	1	1	favourite TV show cancelled	1	1
doing nothing	14	15	eating cake	2	3	feeling paralysed	1	1
doing something dangerous	3	3	end of term	1	1	fighting	8	11
doing something stupid	1	1	epileptic fit	1	1	figuring out something no one else can	1	1
doing something wrong	14	17	failing a test_exam	3	3	fire	1	1
doing something wrong (Nodes)	1	1	fainting	1	1	fire alarms	1	1
don't know how things will turn out	1	1	falling down	4	5	fire emergency	1	1
don't know how to react	1	1	falling off a ride	1	1	first day of school	2	2
doodling	1	1	falling out	2	4	first time doing something	3	3
fixing something	1	1	getting a massage	1	1	ghosts	1	1

Name	Files	References	Name	Files	References	Name	Files	References
flight	4	4	getting a pair of shoes	1	2	gift you don't like	1	1
food	1	1	getting a pet	4	5	giving a presentation	2	2
forgetting to feed fish	1	1	getting a phone	3	3	going to school	5	6
freedom	1	2	getting a present	28	40	going to the circus	1	1
friend changing schools	2	2	getting a visa	1	1	going to the park	6	6
friend group	5	6	getting along with classmates	5	7	graduating a school year	1	1
friends	1	1	getting help	3	3	going a field trip	1	1
friends don't want to play	1	1	getting into trouble	4	4	going to an unfamiliar place	5	6
friends on a trip	2	2	getting punished	3	4	going to the Grand Canyon	1	1
friends play a joke	2	2	getting married	2	2	going somewhere you like	1	2
friends telling a secret	5	6	getting permission	2	2	going through something	1	1
gag reflex	1	1	getting red in the face	1	1	going to a hotel	1	1
get something you want	4	5	getting smacked	1	1	going to confession	1	1
getting a bad grade	5	6	getting up early	1	1	going to Harry Potter World	2	2
getting a cut	1	1	giving the wrong answer	4	4	going to judo class	1	1
getting a good grade	5	7	global warming	1	1	God_Christian	1	2

Name	Files	References	Name	Files	References	Name	Files	References
going home	3	3	having an accident	2	2	hugging someone	1	1
going on a trip	14	17	having an exam_test	9	13	hurt	2	2
grandparent	1	1	having an interview	1	1	hurt someone's feelings	12	16
grandparent visit	1	2	having breakfast	1	1	hurting yourself	2	3
gym class	1	1	having fun with friends	3	3	ignoring	2	2
have nothing planned	4	4	having kids	1	1	illness	5	7
have to do something	1	1	having no friends	6	7	in a car	3	3
having a badge	1	1	having not a lot of friends	3	3	in a cupboard	1	1
having a car	1	1	helping others	1	1	in a hot tub	1	1
having a child	1	1	hesitating about what to do	1	1	in a safe zone	1	1
having a girlfriend	2	2	hiding	2	3	in bed	5	5
having a good time	1	1	hit and run	1	1	in class	1	1
hiding under a blanket	1	1	hitting head against wall	1	1	in the sun	1	1
hiding your feelings	1	1	hitting someone	5	6	in town	1	1
having a nightmare	1	2	holiday weekend	1	1	injury	2	2
having a secret	5	5	homework	7	14	innocent	1	1

Name	Files	References	Name	Files	References	Name	Files	References
having a sugar rush	1	1	horse-riding	1	1	invite friends over	1	1
Jacqueline Wilson books	1	1	location cozy and warm	1	1	meeting with a friend	3	4
judgement of others	11	14	location where nothing bad can happen to you	2	2	midnight feast	1	1
juggling	1	1	locking the door	3	3	missing a party	2	2
juggling with sticks	1	1	London	1	2	missing out	3	4
jumping high	1	1	losing	1	1	missing break_recess	1	1
jumping off something	1	1	losing something	3	3	missing school	1	1
kicking someone	2	2	lying	2	2	mistake	3	4
kidnapping	2	3	lying down	9	11	money	3	3
last day of school	4	4	lying in the road	1	1	monsters	1	1
laughing	2	2	making a drawing	1	1	moving to another country	1	1
learning to swim	1	2	making a mess	1	1	mud	1	1
LED lights	1	1	making a noise in your ear	1	1	murder	1	3
left out	4	6	making friends	2	3	music	1	1
Lego	1	1	making up scenarios	1	1	music lessons	2	2
Lego Land	1	1	manager	1	1	nail biting	1	1
liking somebody	1	1	math	4	4	nap	1	2
listening to a speech	2	2	medal	1	1	need to tell friend something	1	1

Name	Files	References	Name	Files	References	Name	Files	References
living abroad	2	2	meditation	2	2	new game	1	1
living in a refuge	1	1	meeting a challenge	12	16	new lamp	1	1
new school	3	3	not having to go to school	1	1	parent	1	1
new video	1	1	not invited	1	1	parent divorce	1	1
news incident	1	2	not knowing anyone	1	1	parental affection	2	2
night	1	1	not liking food	16	20	parents	25	51
Nintendo Switch	1	2	not married	1	1	parents angry	2	3
no one around	1	1	not talking to other kids	3	3	parents at work	2	2
no one can attack you	3	3	nothing entertaining	2	2	parents jet-lagged	1	1
no one is listening to you	3	3	nothing to play with	1	1	parents not allowing something	2	2
no one to play with	19	20	nothing will fall on your head	1	1	parents not coming back	1	1
no one to talk to	5	5	on the sofa	2	2	parents tired	1	1
no people who seek you harm	3	4	only child	1	1	party	7	8
no school	1	1	other people cheating	2	2	peeing your pants	1	1
no siblings	2	2	others laughing at you	4	4	people against you	1	1
nobody there	2	2	outdoor environment	2	2	people being not nice	2	2
not being able to join	1	1	outside	1	1	people making an effort for you	1	1
not getting along with friend	6	18	pancakes	1	1	people staring at you	1	1

Name	Files	References	Name	Files	References	Name	Files	References
not having a job	1	1	panic attack	1	1	performance	12	18
pet	4	8	problems at school	1	3	Rush	1	1
pet died	3	4	pretend to be sick	1	1	Russians	1	1
phone	3	3	public speaking	2	2	Ruth Bader Ginsberg	1	1
physical activity	9	9	punching	1	1	Santa	2	2
physical feat	2	3	putting yourself down	1	1	school club	1	1
physical hurt	7	7	quality of sleep	1	1	see someone doing a flip	1	1
piano	2	3	race	2	4	see something	1	1
piano class	1	2	racial crime	1	1	see something out of this world	5	5
picking up a textbook	1	1	raining outside	2	4	see something you haven't seen before	1	1
planning	1	1	reading a book	5	5	seeing a lion	1	1
plate scratching	1	1	reconciliation	1	1	seeing an impressive picture_painting	2	2
playing	18	34	recovery	1	1	seeing your enemy	1	1
playdate	6	7	rejecting others	1	1	sense of smell	1	1
playing tag	1	1	relatives	3	3	shouldn't do something	1	1
playing video games	3	5	relatives passed away	4	6	sibling	12	22
playing with friends	4	4	religious ritual_festival	3	3	sibling has something	2	2
PlayStation	1	1	repetition	3	3	sibling has taken something	2	2
police	2	3	respect	1	1	sitting down	8	8
prank	5	5	robber	2	2	skateboarding	1	1

Name	Files	References	Name	Files	References	Name	Files	References
private	1	1	rude	3	4	skiing	2	2
sleeping	12	15	someone holds open the door for you	2	2	something going wrong	2	2
sleepover	2	2	someone is coming	2	2	someone popping out of a cupboard	1	1
slimy frog	1	1	someone is copying you	1	2	someone presses your buttons	2	2
slipping	1	1	someone is cute	1	1	someone returns your pen	1	1
smiling	4	4	someone is nice to you	5	5	someone richer than you	1	1
soccer game	3	3	someone jumping out_yelling boo	1	1	something got cancelled	3	3
solving something	1	1	someone made you a card	4	4	something looks cool	3	3
someone behaves unexpectedly	5	6	someone making faces at you	1	1	something said to them	10	11
someone being mean	7	9	someone picks their nose	4	4	something slimy	1	1
someone breaking up with you	1	1	something bad happened to someone	3	3	something smelly	1	1
someone does something for you	9	10	something bad will happen	1	1	something taken from you	1	1
someone doesn't want to play with you	1	1	something beneficial	1	1	something unpleasant on the floor	1	1
someone else gets you into trouble	1	1	something broke	1	1	speaking with someone	1	1
someone leaving	1	1	something fun	5	5	spiders	4	4

Name	Files	References	Name	Files	References	Name	Files	References
spitting	1	1	teasing someone	1	1	vacation	3	3
Sports Day	1	1	Teddy Bear	1	1	vacation (Nodes)	1	1
squeaking noise	1	1	temperature	1	1	vegetable	1	1
squished worm	1	1	Thanksgiving	1	1	waking up	8	9
stage-fright	9	11	the dark	5	5	waking up on the wrong side of the bed	6	6
Starbucks	1	2	the future	1	2	walls around you	1	1
stranger	2	2	things not going your way	1	1	want of destruction	1	1
studying_revising	1	2	threat	1	1	want someone out of their room	1	1
sudden noise	1	1	tornado	1	1	want something	1	1
summer fair	1	1	toy_stuffed animal	6	6	want something friends have	5	5
super-hero	1	1	trampoline park	1	1	want team to win	1	1
swimming pool	5	6	travel	2	2	want to be like someone	1	1
taking deep breathes	1	1	trigonometry	1	1	want to forget what you did	1	2
taking sides	2	3	trying to fix something	1	1	want to share something with others	3	3
taking the bus	1	1	unable to concentrate	1	1	wanting to punch someone	1	1
talent show	1	1	unable to control emotions	1	1	wasps	1	1
talking about emotions	1	1	unable to express emotions	1	1	watching a film	7	9
talking in class	1	1	under pressure	1	2	watching tv	2	3
teacher	9	11	unexpected	3	4	weekend	5	8
teacher explaining	2	2	unsure if what did was right or wrong	1	1	wine and chocolates	1	1

Name	Files	References	Name	Files	References	Name	Files	References
winning a competition	5	5	working hard	5	5	with family	14	19
winning an award	3	4	writing a story	1	1	with friends	1	2
winning an election	1	1	writing something on the classroom board	1	1	wolves	1	2
wish had not done something	1	1	XBOX	1	1	Woodlands	2	2

Appendix I

Mind Maze Task Sample Items and Prompts (Study 3)

The following images reflect task items developed for the fictional character named Suwint embodying the 'Conscientiousness' personality dimension:



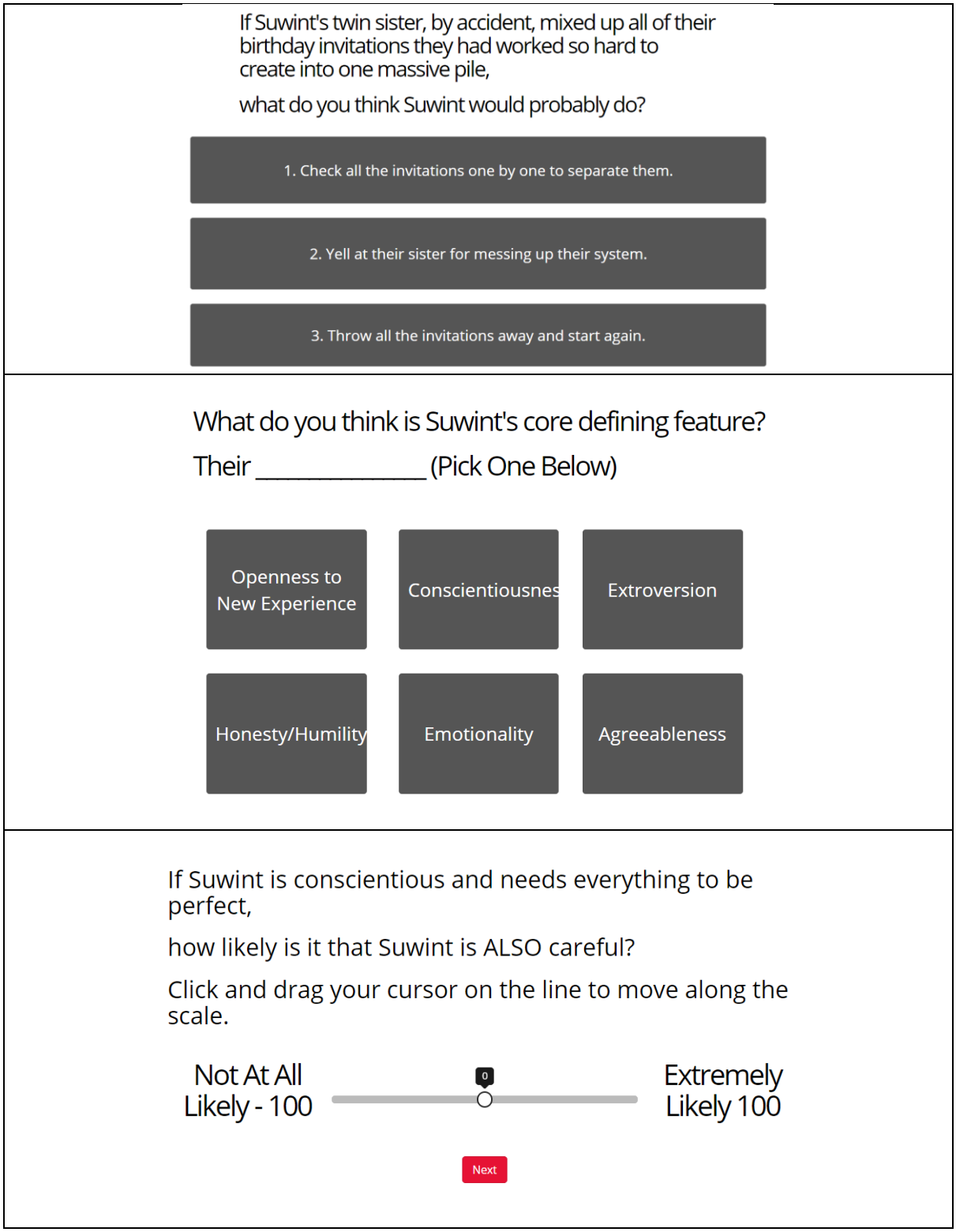
This is Suwint.

Next

Condition 1: 'Emotion Language Neutral'	Condition 2: 'Emotion Language Rich'
Suwint likes to keep things orderly, stick to a routine, pay attention to detail and is bothered when there is no system for doing things. Next	Suwint likes to keep things orderly, stick to a routine, pay attention to detail and is bothered when there is no system for doing things. Sometimes it takes a lot for Suwint to be pleased, but it's hard for them to be relaxed when there is work to be done. Next

Given what you have just read, how would you describe Suwint?
(choose one below)

Forgives people easily | Is Lazy | Needs everything to be perfect



The following presents character descriptions for all characters in the task representing each dimension of the HEXACO personality model, for either task condition:

Personality Dimension	Emotion Language Neutral	Emotion Language Rich
Honesty-Humility	Tiony is loyal, cares about fairness, values honesty, and does not like to hide neither what they are thinking nor what they are feeling.	Tiony is loyal, cares about fairness, values honesty, and does not like to hide either what they are thinking or what they are feeling. Tiony gets annoyed when others try to play tricks or don't tell the whole truth. Tiony may not always have a filter, but never feels sorry for speaking their mind. If the tables were turned, Tiony would be thankful to someone else for their honesty.
Emotionality	Cibins always tries to understand how other people are feeling, often depends on others, and tears up easily.	Cibins always tries to understand how other people are feeling, often depends on others, and tears up easily. Sometimes Cibins gets trapped in feeling sorry for themselves or can be grumpy for days, but it's all part of how they process things. It isn't easy for Cibins to feel safe, so they like to be around people who are more self-assured.
Extraversion	Macdus is social, waves to their neighbors, smiles often and exercises regularly.	Macdus is social, waves to their neighbors, smiles often and exercises regularly. It makes Macdus happy to meet new people, and they rarely get nervous in front of a crowd. Some people may think it boastful, but Macdus is not afraid to be proud of what they achieve.
Agreeableness	Abrux is thoughtful, and often tries to be the 'bigger' person in a given situation even if the individuals do not deserve it.	Abrux is thoughtful, and often tries to be the 'bigger' person in a given situation even if the individuals do not deserve it. Abrux likes to stay calm because that's often better for everyone versus getting angry all the time. Some people think it's easy to take advantage of Abrux, but Abrux doesn't worry about that too much. Abrux can get disappointed in others though when people don't do the right thing.

Personality Dimension	Emotion Language Neutral	Emotion Language Rich
Conscientiousness	Suwint likes to keep things orderly, stick to a routine, pay attention to detail, and is bothered when there is no system for doing things.	Suwint likes to keep things orderly, stick to a routine, pay attention to detail, and is bothered when there is no system for doing things. Sometimes it takes a lot for Suwint to be pleased, but it's hard for them to be relaxed when there is work to be done.
Openness to New Experience	Nablion often daydreams, makes jokes, and likes to think about how things work and how you can change them into something else.	Nablion often daydreams, makes jokes, and likes to think about how things work and how you can change them into something else. Nablion can get upset when things don't look nice, but doesn't stay sad for long because Nablion can easily come up with new ideas about how to make things better. Nablion is often excited when they're curious.

Appendix J

Highly Blended Emotion Terms Based on Study 2 Findings

For participants ages 8 to 9:

- Amazed
- **Angry***
- **Calm**
- **Excited**
- **Grumpy**
- **Pleased**
- **Relaxed**
- **Sad**
- Surprised
- **Upset**

For participants ages 9 to 10:

- **Angry**
- Annoyed
- **Calm**
- **Excited**
- **Grumpy**
- Happy
- Love
- Nervous
- **Pleased**
- Proud
- **Relaxed**
- **Sad**
- **Upset**
- Worried

For participants ages 10 to 11:

- **Angry**
- Annoyed
- **Calm**
- Disappointed
- **Excited**
- **Grumpy**
- Happy
- Nervous
- **Pleased**
- Proud
- **Relaxed**
- **Sad**
- Safe
- Sorry
- Thankful
- **Upset**
- Worried

**bolded terms indicate emotion terms common across age bands*

Appendix K
Emotion Term Co-Occurrence Matrix for 27 Target Emotions across All Participants

	Amazed	Angry	Annoyed	Bored	Calm	Disappointed	Disgusted	Embarrassed	Excited	Grumpy	Happy	Hate
Total	**25**	**44**	**33**	**5**	**38**	**24**	**9**	**18**	**31**	**47**	**43**	**18**
Adore	0	0	0	**0**	0	**0**	**0**	**0**	0	0	**0**	**0**
Afraid	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Amazed	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Angry	**0**	0	8	0	5	2	0	1	0	11	1	4
Annoyed	**0**	9	0	1	0	3	1	0	0	13	1	5
Anxious	0	0	0	0	1	0	**0**	0	0	0	0	0
Attached	0	0	0	0	0	0	**0**	0	0	0	0	0
Attracted	0	0	0	0	0	0	**0**	0	0	0	0	0
Awe-Struck	1	0	0	0	0	0	**0**	0	0	0	0	0
Bewildered	1	0	0	0	0	0	**0**	0	0	0	0	0
Boastful	0	0	0	0	0	0	**0**	0	0	0	0	0
Bored/ing	**0**	0	2	0	0	1	**0**	0	0	1	0	1
Bothered	**0**	0	2	0	0	0	**0**	0	0	0	0	1
Calm	1	0	3	1	0	0	**0**	0	1	2	1	0
Caring	0	0	0	0	0	0	**0**	0	0	0	1	0
Cheerful	0	0	0	0	0	0	**0**	0	0	0	0	0
Comfortable	0	0	0	0	0	0	**0**	2	0	0	0	0
Compassion	0	0	0	0	0	0	**0**	0	0	0	0	0
Concerned	0	0	0	0	0	0	**0**	0	0	0	0	0
Depressed	0	0	0	0	0	0	**0**	0	0	0	0	0
Disappointed	1	0	0	1	1	0	**0**	0	0	0	0	0
Disgusted	0	0	0	0	0	0	**0**	0	0	0	0	3
Dissatisfied	0	0	0	0	0	1	**0**	0	0	0	0	0
Embarrassed	0	0	1	0	0	0	**0**	0	0	0	0	0
Envious	0	0	0	0	0	0	0	0	0	0	0	0
Excited/ement/ing	1	0	0	0	5	1	0	1	0	0	12	0
Exhilarated	0	0	0	0	0	0	0	0	1	0	0	0
Fear/fearful	0	0	0	0	0	0	0	0	0	0	0	0
Forgiving	0	0	0	0	0	0	0	0	0	0	0	0

	Amazed	**Angry**	**Annoyed**	**Bored**	**Calm**	**Disappointed**	**Disgusted**	**Embarrassed**	**Excited**	**Grumpy**	**Happy**	**Hate**
Fretting	0	0	0	0	0	0	0	0	0	0	0	0
Frightened	0	0	0	0	0	0	0	0	0	0	0	0
Frustrated	0	3	3	0	1	0	0	0	0	1	0	0
Furious	0	1	0	0	0	0	0	0	0	0	0	0
Grateful/ness	0	0	0	0	0	0	0	0	0	0	0	0
Grumpy	0	2	1	0	0	1	0	0	0	0	1	0
Guilty	0	0	0	0	0	0	0	0	0	0	0	0
Happy	2	0	1	0	2	4	0	1	22	4	0	2
Hate	**0**	0	0	0	0	0	4	0	0	0	0	0
Humiliated	0	0	0	0	0	0	0	2	0	0	0	0
Hurt	0	3	0	0	0	0	0	0	0	0	0	0
Impressed	0	0	0	0	0	0	0	0	0	0	0	0
Irritated	0	0	2	0	0	0	0	0	0	0	0	0
Jealous	**0**	0	1	0	0	0	0	0	0	0	0	0
Joy/Joyful/Joyous	**0**	0	0	0	0	0	0	0	3	0	13	0
Lonely	**0**	0	0	0	0	0	0	0	0	0	0	0
Love	**0**	0	0	0	0	0	0	0	0	0	0	0
Mad	0	18	5	0	0	3	0	2	0	8	1	2
Mortified	0	0	0	0	0	0	0	0	0	0	0	0
Nervous	0	0	0	0	0	0	0	0	1	0	0	0
Peaceful	0	0	0	0	2	0	0	0	0	0	0	0
Pleased	0	0	0	0	0	0	2	0	0	0	2	0
Protected	0	0	0	0	0	0	0	0	0	0	0	0
Proud	1	0	0	0	0	0	0	1	0	0	1	0
Quiet	0	0	0	0	6	0	0	0	0	0	0	0
Reassured	0	0	0	0	0	0	0	0	0	0	0	0
Regretful	0	0	0	0	0	0	0	0	0	0	0	0
Rejected	0	0	0	0	0	0	0	0	0	0	0	0
Relaxed	0	0	0	0	7	0	0	0	0	0	0	0
Relieved	0	0	0	0	0	0	0	0	0	0	1	0
Respect yourself	0	0	0	0	0	0	0	0	0	0	1	0
Respected	0	0	0	0	0	0	0	0	0	0	0	0
Sad	0	3	3	1	4	7	0	1	1	5	4	0

	Amazed	Angry	Annoyed	Bored	Calm	Disappointed	Disgusted	Embarrassed	Excited	Grumpy	Happy	Hate
Safe	0	0	0	0	2	0	0	0	0	0	0	0
Satisfied	0	0	0	0	0	0	0	0	0	0	1	0
Scared	0	1	0	0	0	0	0	3	0	0	0	0
Secure	0	0	0	0	0	0	0	0	0	0	0	0
Shame/Ashamed	0	0	0	0	0	0	0	3	0	0	0	0
Shocked	3	0	0	0	0	0	1	0	0	0	0	0
Sorry	0	0	0	0	0	0	0	0	0	0	0	0
Stressed	0	1	0	0	1	0	0	1	0	0	0	0
Surprised	14	0	0	0	0	0	0	0	1	0	1	0
Terrified	0	0	0	0	0	0	0	0	0	0	0	0
Thankful	0	0	0	0	0	0	0	0	1	0	0	0
Uncomfortable	0	0	0	0	0	0	0	0	0	0	0	0
Unhappy	0	0	0	0	0	0	0	0	0	0	0	0
Upset	0	3	1	1	1	1	0	0	0	2	1	0
Worried	0	0	1	0	0	0	0	1	0	0	0	0

	Jealous	Lonely	Love	Nervous	Pleased	Proud	Relaxed	Sad	Safe	Scared	Sorry	Surprised	Thankful	Upset	Worried
Total	**12**	**19**	**24**	**27**	**44**	**28**	**43**	**45**	**24**	**21**	**30**	**26**	**16**	**57**	**33**
Adore	**0**	**0**	2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Afraid	**0**	**0**	**0**	2	**0**	**0**	**0**	**0**	**0**	5	**0**	**0**	**0**	**0**	3
Amazed	**0**	**0**	**0**	**0**	1	**0**	**0**	**0**	**0**	**0**	**0**	4	**0**	**0**	**0**
Angry	1	**0**	0	0	0	0	1	1	0	1	2	2	0	1	0
Annoyed	1	**0**	1	1	0	0	0	2	1	2	0	0	0	4	0
Anxious	0	**0**	0	4	0	0	0	0	0	0	0	0	0	0	3
Attached	0	**0**	1	0	0	0	0	0	0	0	0	0	0	0	0
Attracted	0	**0**	1	0	0	0	0	0	0	0	0	0	0	0	0
Awe-Struck	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Bewildered	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Boastful	1	**0**	0	0	0	1	0	0	0	0	0	0	0	0	0
Bored/ing	0	2	0	0	0	0	0	1	0	0	0	0	0	1	0
Bothered	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Calm	0	1	0	1	0	0	23	0	0	0	0	0	1	0	1
Caring	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0

	Jealous	**Lonely**	**Love**	**Nervous**	**Pleased**	**Proud**	**Relaxed**	**Sad**	**Safe**	**Scared**	**Sorry**	**Surprised**	**Thankful**	**Upset**	**Worried**
Cheerful	0	**0**	0	0	0	0	0	1	0	0	0	0	0	1	0
Comfortable	0	**0**	1	1	0	1	3	0	5	0	0	0	0	0	0
Compassion	0	**0**	1	0	0	0	0	0	0	0	0	0	0	0	0
Concerned	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	1
Depressed	0	**0**	0	0	0	0	0	1	0	0	0	0	0	0	0
Disappointed	0	**0**	0	0	1	0	0	5	0	0	0	1	0	3	0
Disgusted	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Dissatisfied	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Embarrassed	0	**0**	1	0	0	0	0	0	0	0	0	0	0	2	1
Envious	2	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Excited/ement/ing	0	**0**	0	1	1	0	0	0	0	0	0	1	0	0	1
Exhilarated	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0
Fear/fearful	0	**0**	0	1	0	0	0	0	0	0	0	1	0	0	0
Forgiving	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Fretting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Frightened	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Frustrated	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Furious	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grateful/ness	0	0	0	0	2	0	0	0	1	0	1	0	0	0	0
Grumpy	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0
Guilty	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Happy	2	0	4	2	24	24	8	11	6	1	7	7	13	7	0
Hate	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0
Humiliated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hurt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Impressed	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Irritated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jealous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Joy/Joyful/Joyous	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0
Lonely	0	0	1	0	0	0	0	6	0	0	0	0	0	3	0
Love	1	0	0	0	2	0	0	1	0	0	0	0	1	0	0
Mad	1	0	0	0	0	0	1	2	0	0	2	1	0	7	0
Mortified	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

	Jealous	**Lonely**	**Love**	**Nervous**	**Pleased**	**Proud**	**Relaxed**	**Sad**	**Safe**	**Scared**	**Sorry**	**Surprised**	**Thankful**	**Upset**	**Worried**
Nervous	0	0	0	0	0	1	0	0	0	2	0	0	0	0	8
Peaceful	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Pleased	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Protected	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0
Proud	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Quiet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reassured	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Regretful	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Rejected	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Relaxed	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Relieved	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Respect yourself	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Respected	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Sad	1	12	1	1	0	0	0	0	1	0	6	0	0	23	2
Safe	0	0	2	0	0	0	2	0	0	3	0	0	0	0	0
Satisfied	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scared	0	0	0	11	0	1	0	1	0	0	1	3	0	0	11
Secure	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Shame/Ashamed	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Shocked	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0
Sorry	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Stressed	0	0	0	2	0	0	1	0	0	1	0	0	0	0	0
Surprised	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Terrified	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Thankful	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0
Uncomfortable	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Unhappy	0	0	0	0	0	0	0	1	0	0	2	0	0	1	0
Upset	0	0	1	0	0	0	0	10	0	0	0	0	0	0	0
Worried	1	0	1	11	0	0	3	1	2	6	1	0	0	0	0

Appendix L

Table 21

Pearson Correlation Matrix for Study 2 Participant Level Analysis (Research Questions S2.2.a, S2.3.a, S2.3.b) Concerned with Age, Gender, Emotion Term Co-Occurrence Patterns, and Mental State Term Production

	Participant MST Production	Participant Blend Score	Is Female	Is Age 8 to 9	Is Age 10 to 11
Participant MST Production	1.00	0.557**	0.379**	-0.242	-0.066
Participant Blend Score	0.557**	1.00	0.334*	-0.183	-0.060
Is Female	0.379**	0.334*	1.00	-0.114	-0.022
Is Age 8 to 9	-0.242	-0.183	-0.114	1.00	-0.527**
Is Age 10 to 11	-0.066	-0.060	-0.022	-0.527**	1.00

* indicates $p < 0.05$. ** indicates $p < 0.01$.

Table 22

Pearson Correlation Matrix for Study 2 Emotion Word-Level Analysis Concerned with Emotion Term Valence, Intensity, Co-Occurrence Patterns, and Average Mental State Term Production

	Emotion Term Blend Score	Emotion Term MST Score	Emotion Intensity	Emotion Valence
Emotion Term Blend Score	1.00	-0.508**	-0.111	-0.077
Emotion Term MST Score	-0.508**	1.00	-0.078	-0.203
Emotion Intensity	-0.111	-0.078	1.00	-0.101
Emotion Valence	-0.077	-0.203	-0.101	1.00

** indicates $p < .01$.

Appendix M

Table 23

Spearman's rho Correlation Matrix Study 3 of Target Variables: Participant Levels of Social Connectedness, Personality, Ability to Identify and Describe Emotions within the Self, University Year Group, and Interpersonal Accuracy Task Performance

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Individual Factors																
1. SCS-R	1.00	0.138	**0.348****	**0.162***	0.050	0.128	**-0.372****	0.084	0.117	0.068	**0.197****	0.070	0.064	0.139	-0.025	0.083
2. TIPI: Emotional Stability	0.138	1.000	**0.159***	0.037	**0.186****	0.121	-0.134	0.040	0.065	-0.010	-0.102	**0.145***	-0.080	0.041	-0.093	**0.140***
3. TIPI: Extraversion	**0.348****	**0.159***	1.000	-0.050	0.064	**0.311****	**-0.238****	0.006	0.007	0.103	0.090	0.072	0.044	0.113	-0.130	0.043
4. TIPI: Agreeableness	**0.162***	0.037	-0.050	1.000	0.109	0.100	**-0.152***	0.074	0.068	0.037	0.067	-0.081	-0.014	-0.009	0.018	-0.020
5. TIPI: Conscientiousness	0.050	**0.186****	0.064	0.109	1.000	0.049	-0.005	0.065	-0.072	-0.027	-0.107	0.058	-0.002	-0.074	0.030	0.074
6. TIPI: Openness	0.128	0.121	**0.311****	0.100	0.049	1.000	**-0.180***	0.058	-0.047	0.059	-0.065	**0.154***	-0.084	-0.061	-0.072	0.015
7. G-DAF	**-0.372****	-0.134	**-0.238****	**-0.152***	-0.005	**-0.180***	1.000	-0.027	0.041	-0.083	-0.125	-0.041	-0.008	0.006	-0.035	0.013
8. Is Final-Year Undergraduate	0.084	0.040	0.006	0.074	0.065	0.058	-0.027	1.000	-0.038	-0.039	0.112	-0.064	0.060	0.041	-0.044	**0.147***

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Interpersonal Accuracy Task																
9. Trait Attribution Accuracy	0.117	0.065	0.007	0.068	-0.072	-0.047	0.041	-0.038	1.000	**0.215****	-0.037	-0.030	0.075	0.078	0.137	-0.071
10. Behaviour Prediction Accuracy	0.068	-0.010	0.103	0.037	-0.027	0.059	-0.083	-0.039	**0.215****	1.000	0.107	-0.006	-0.060	-0.022	-0.109	-0.022
11. Trait Covariance: Honesty-Humility	**0.197****	-0.102	0.090	0.067	-0.107	-0.065	-0.125	0.112	-0.037	0.107	1.000	-0.064	**0.315****	**0.261****	**0.251****	**0.252****
12. Trait Covariance: Emotionality	0.070	**0.145***	0.072	-0.081	0.058	**0.154***	-0.041	-0.064	-0.030	-0.006	-0.064	1.000	**-0.170***	-0.071	**-0.211****	0.000
13. Trait Covariance: Extraversion	0.064	-0.080	0.044	-0.014	-0.002	-0.084	-0.008	0.060	0.075	-0.060	**0.315****	**-0.170***	1.000	**0.357****	**0.483****	**0.307****
14. Trait Covariance: Agreeableness	0.139	0.041	0.113	-0.009	-0.074	-0.061	0.006	0.041	0.078	-0.022	**0.261****	-0.071	**0.357****	1.000	**0.240****	**0.220****
15. Trait Covariance: Conscientiousness	-0.025	-0.093	-0.130	0.018	0.030	-0.072	-0.035	-0.044	0.137	-0.109	**0.251****	**-0.211****	**0.483****	**0.240****	1.000	**0.158***
16. Trait Covariance: Openness to New Experience	0.083	**0.140***	0.043	-0.020	0.074	0.015	0.013	**0.147***	-0.071	-0.022	**0.252****	0.000	**0.307****	**0.220****	**0.158***	1.000

Note. Statistically significant results are bolded. * indicates $p < .05$. ** indicates $p < .01$. SCS-R reflects participant levels of social connectedness, TIPI scores reflect participant personality dimension ratings, G-DAF reflects participant ability to identify and describe their own emotions; items 9 to 16 comprise participant performance scores on the various items of the interpersonal accuracy task.