

Childhood bullying and mental health: Understanding risk, resilience, and the role of anti-bullying interventions



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Abstract

The primary focus of this thesis is to explore the relationship between bullying and mental health in children and young people. Globally 8-45% of children and young people are victims of bullying (Biswas et al., 2020). While most children and young people experience low and stable trajectories of bullying victimisation and/or perpetration throughout the school years, a few experience chronic and increasing levels of victimisation and/or perpetration (Barker et al., 2008). Children and young people in these latter groups are more likely to have elevated levels of mental health problems (Singham et al., 2017). It is widely known that there is a strong reciprocal association between bullying victimisation and mental health problems, however practical and methodological limitations in studying bullying (victimisation and perpetration) make it difficult to draw causal assumptions and establish what mechanisms and factors influence this relationship (Guzman-Holst & Bowes, 2021). The best approaches to study causal effects are natural experiments, longitudinal data, and randomised controlled trials of interventions. This thesis combines all these approaches to examine the relationship between bullying and mental health across different contexts.

The first part of this thesis uses opportunistic longitudinal data collected during the Covid-19 pandemic. The pandemic presented a unique opportunity to study the relationship between bullying and mental health in a “natural experiment” and to examine individual differences in different developmental trajectories. For example, what happened to bullying and children’s mental health when schools closed and then re-opened, and what individual, social and family risk and protective factors were associated to different trajectories?

The second part of this thesis focuses on the role and impact of interventions. If the relationship between bullying and mental health is causal, we would expect that reductions

in bullying would improve mental health symptoms. I will present evidence from a systematic review and meta-analysis and data from a randomised controlled trial (RCT) of an antibullying intervention in the UK to examine these associations. This thesis will also look at risk x intervention effects to determine which children and young people are most vulnerable and what can be done to best support them. Understanding who is at greatest risk of being bullied and why is important for maximising the effect of anti-bullying interventions and safeguarding young people from deteriorating mental health outcomes. Across all chapters, this thesis uses an ecological approach to understand risk and resilience by considering the school context, peer-group relationships, and individual differences.

Overall, this thesis uses multiple methodologies and ecological levels to understand the relationship between bullying and mental health in natural and experimental settings, associated risk, and protective factors, and elucidate the role and effectiveness of anti-bullying interventions in improving mental health. The general aims of this thesis are to a) evaluate the relationship between bullying and mental health in different contexts and using different methods, b) examine the role of individual differences in the joint development of bullying and mental health and in response to anti-bullying interventions and c) understand what risk and protective factors are associated with the development of bullying and mental health, and the role they play in determining anti-bullying intervention outcomes.

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Table of Contents

Abstract	2
Acknowledgements	4
Table of Contents.....	6
List of Figures	10
List of Tables	11
Declaration	12
List of Relevant Publications	13
Chapter 1: Introduction	14
Part 1. Bullying	14
Defining bullying.....	14
What constitutes bullying?	14
Types of bullying.....	16
Participant roles of bullying	18
Section Summary.....	21
Prevalence of bullying and trajectories across childhood and adolescence	21
Prevalence of bullying	21
Average trajectories.....	23
Individual differences and trajectories.....	25
Section Summary.....	26
Risk and Protective factors for bullying.....	27
Risk factors	27
Protective factors	29
Section summary	30
Part 2. Mental Health	31
Understanding mental health problems in childhood and adolescence.....	31
Prevalence of mental health and trajectories across childhood and adolescence..	33
Prevalence of common mental health problems.....	33
Average trajectories	36
Individual differences and trajectories.....	37
Section Summary.....	39
Risk and Protective factors for common mental health problems.....	39
Risk Factors	40
Protective Factors	41
Section Summary.....	42
Part 3. Anti-bullying interventions	43
What are anti-bullying interventions?.....	43
Whole-school interventions	43

Targeted interventions	45
A review of program effects and components	46
Are interventions working for everyone?	48
Implications	50
Section Summary	51
Overview	52
Summary and Structure of the thesis	52
Research Questions	54
Part 1. Probing the relationship between bullying and mental health	56
Chapter 2: The relationship between bullying and mental health	57
Introduction	57
Methodological difficulties associated with establishing causality	59
The relationship between bullying victimisation and internalising symptoms	61
Theoretical framework and supporting evidence	61
Pathways and Mechanisms	68
Resilient Pathways and Protective Factors	74
Implications for intervention	76
A note on bullying perpetration and internalising symptoms	78
Section summary	79
The relationship between bullying and externalising symptoms	79
Methodological problems specific to bullying and externalising symptoms	79
Theoretical framework and supporting evidence	81
Risk and protective factors, moderators and mediators in the relationship between bullying and externalising symptoms	86
Section Summary	87
Conclusions	87
Chapter 3. What happens to children's mental health and peer relationships during periods of restricted and unrestricted social interactions? Results from the Co-SPACE study in primary school aged children	90
Abstract	90
Introduction	92
Methods	95
Design	95
Participants	96
Measures	96
Statistical Analysis	98
Results	101
Examining the reciprocal relationship between mental health and peer problems .	103
Joint trajectories of peer problems and mental health	105
Factors associated with joint trajectories of peer problems and mental health	108
Discussion	110
Conclusion	116
Part 2. The role and impact of anti-bullying interventions	119

Chapter 4. Do anti-bullying interventions reduce internalising symptoms? A systematic review, meta-analysis and meta-regression exploring intervention components, moderators and mechanisms.....	119
Abstract	119
Introduction	121
Effectiveness of school anti-bullying interventions	122
Moderating and mediating effects of anti-bullying interventions	123
Study Aims	125
Methods	126
Protocol and Registration	126
Search Strategy	126
Eligibility Criteria.....	127
Study Selection	128
Data Extraction	128
Assessment of methodological quality (risk of bias).....	129
Effect Measures	129
Data synthesis and statistical analysis	129
Results.....	130
Search Results.....	130
Study Characteristics	131
Quality Assessment and Risk of Bias in Included Studies	132
Meta-analysis and Sub-group Analysis	133
Sub-group Analysis	134
Publication Bias	135
Meta-regression Analysis of Moderators	135
Meta-regression analysis of Intervention Components	136
Mediation Analysis.....	137
Discussion	140
Limitations and Future Directions	145
Conclusion	147
Chapter 5. Investigating the healthy context paradox in the ‘Stand Together’ KiVa anti-bullying intervention trial in the UK	149
Abstract	149
Introduction	151
Study Aims	153
Research Questions and Hypothesis.....	154
Methods	155
Design.....	155
Participants	156
Intervention.....	156
Control.....	157
Measures	158
Statistical Analysis	160
Results.....	163
Missing data and baseline characteristics	163

Interclass correlation coefficients (ICC).....	166
Do children who remain or become victimised in intervention schools experience higher levels of emotional or externalising problems than children who remain or become victimised in control schools?	166
Do children who remain or become victimised in intervention schools at follow-up experience higher psychological difficulties depending on whether classroom victimisation levels are low or high at follow-up in intervention versus control schools?	171
Do children who remain or become victimised in intervention schools at follow-up experience higher psychological difficulties depending on whether internalising or externalising and victimisation levels are low or high at baseline?.....	172
Discussion	173
Conclusion	182
Chapter 6. Discussion	185
Wider implications	194
Theoretical	194
Clinical and Practical	196
Research and Methodological	198
Limitations	200
How are we conceptualising bullying?.....	201
The use of different mental health and bullying measures	202
Type of informant	205
Additional confounders	206
Missing data.....	207
Mental health as a “secondary” outcome.....	208
Summary of limitations	209
Conclusions.....	209
References.....	211
Appendices	237
Appendix A. Chapter 3	237
Appendix B. Chapter 4.....	242
Appendix C. Chapter 5	252

List of Figures

Figure 1.1 *Prevalence of bullying across geographic region and income classification (Biswas et al., 2020)*

Figure 1.2 *Trajectories of self-reported peer victimisation from 6 to 17 years of age (Oncioiu, 2020)*

Figure 1.3. *Prevalence of mental health problems among ages 5-14 per WHO geographic region and country income classification (GBDS, 2019)*

Figure 1.4. *Trajectories of mental health difficulties from 4 to 12 years of age (Vella et al., 2019)*

Figure 3.1. *Non-cumulative frequency of surveys with all SDQ items completed by a parent across all time points*

Figure 3.2. *Pathways between A) mental health and peer victimisation and B) mental health and peer aggression*

Figure 3.3. *Peer victimisation and mental health trajectories*

Figure 3.4. *Peer aggression and mental health trajectories*

Figure 3.5. *Factors associated with trajectory membership in the mental health and peer victimisation model – using high and low stable groups as a reference*

Figure 3.6. *Factors associated with trajectory membership in the mental health and peer aggression model – using high and low stable groups as a reference*

Figure 4.1 *Prisma Flow Chart*

Figure 4.2. *Impact of school-based anti-bullying interventions on overall internalising symptoms*

Figure 4.3. *Duval and Tweedie trim-and-fill Funnel Plot*

Figure 4.4. *Mediation Model for Bullying Victimisation*

Figure 4.5. *Mediation Model for Bullying Perpetration*

Figure 5.1. *Interaction effects for (A) time x intervention condition and (B) time x victimisation*

Figure 5.2. *Interaction time x intervention condition x individual-level victimisation*

Figure 5.3. *Simple slopes analysis for the interaction between intervention condition x individual-level victimisation on emotional problems*

List of Tables

Table 1.1. *An overview of the main research questions and chapters*

Table 3.1. *Model selection results for GBTM*

Table 3.2. *Model Adequacy Results for GBTM*

Table 3.3. *Sample demographics and baseline characteristics*

Table 3.4. *Generalised linear regression results for all pathways between peer victimisation and mental health*

Table 3.5. *Generalised linear regression results for all pathways between peer aggression and mental health*

Table 4.1. *Meta-regression analysis of moderators*

Table 4.2 *Intervention components meta-regression analysis*

Table 5.1. *Factors at baseline predicting missingness at 12-Month follow up*

Table 5.2. *Sample demographics and baseline characteristics*

Table 5.3. *Intraclass Correlation Coefficients for Internalising and Externalising Models*

Table 5.4. *Results for linear mixed models for emotional and externalising outcomes*

Declaration

Three empirical chapters are based on published peer-reviewed journal articles that have been adapted, formatted, and edited for this thesis. For all the empirical chapters in this thesis, I declare to be the primary author. While I am fully responsible for the data management, data analysis, data processing, writing, editing and corrections for each individual study; the study conceptualisation and design and proofreading were done in collaboration with my PhD supervisors and study co-authors. Furthermore, Chapter 3 uses data from the main Co-Space study, which was designed by Professor Cathy Creswell and Dr. Polly Waite from the University of Oxford. Data was collected via online surveys and managed by the Co-Space team. Chapter 5 uses data from the Stand Together Trial, which was designed by Professor Judy Hutchings and Professor Lucy Bowes from Cardiff University and University of Oxford, respectively. The Stand Together team, including myself, was involved in recruitment and data-collection of multiple trial sites. The publication for this empirical chapter is currently embargoed until the main trial results are released.

List of Relevant Publications

Published

Guzman Holst, C. and Bowes, L. “Bullying and Internalising Symptoms.” The Wiley Blackwell Handbook of Bullying: A comprehensive and international review of research and intervention, In P.K Smith, J. O’Higgins Norman (Eds.), Wiley-Blackwell Publishing, 2021, Chapter 31.

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Guzman-Holst, C., Bowes, L., Waite, P., Skripkauskaitė, S., Shum, A., Pearcey, S., ... Creswell, C. (2023). Examining Children and Adolescent Mental Health Trajectories during the COVID-19 Pandemic: Findings from a year of the Co-SPACE Study. *JCPP Advances*, e12153.

Guzman-Holst, C., Zaneva, M., Chessell, C., Creswell, C. and Bowes, L. (2022), Do antibullying interventions reduce internalising symptoms? A systematic review, meta-analysis, and meta-regression exploring intervention components, moderators, and mechanisms. *JCPP*, 63(12), 1454–1465. Presented at the World Antibullying Forum (WABF), Stockholm, Sweden (2021).

In preparation

Guzman-Holst, C., Badger, J., Hastings, R., Ford, T., Broome, M., Patterson, P., Hutchings, J., Bowes, L. Investigating the healthy context paradox in the ‘Stand Together’ KiVa anti-bullying intervention trial in the UK.

Badger, J., **Guzman-Holst, C.**, Thompspon, P., Bowes, L., Hayes, R., Clarkson, S., Hutchings, J., Hastings, R. Effects of educational disruption and changes in school context on children’s mental health: associations with school level disadvantage and individual bullying involvement.

Chapter 1: Introduction

Part 1. Bullying

Defining bullying

What constitutes bullying?

In the 1500s the word “bully” was used to describe something very different than what we know today. Back then it was defined as “sweetheart” and used by poets and playwrights such as Shakespeare to express approval or affection, as he did in his play, *Henry V* (Crawford, 1999). Fast forward several centuries, where the word began to be associated with “villains” and “bullying” was used to describe personal tyranny and intimidation (Harper, 2001-2023). However, it wasn’t until the 1970s, when bullying emerged as a field of research, that it became recognised as a widespread phenomenon and defined as what we know as “bullying” today. The Swedish psychologist Dan Olweus is largely considered the pioneer of bullying research and the first person to define bullying based on scientific evidence. He began his studies on bullying in the early 1970s to examine the characteristics of victims and bullies, risk and protective factors associated with bullying involvement and measurements of bullying (Olweus, 1973, 1978). In his early work he gave the following definition of bullying: “a student is being bullied or victimised when she or he is exposed, repeatedly and over time, to negative actions on part of one or more other students” (Olweus, 1993, p.9). He further elaborated that negative actions refer to “when someone intentionally inflicts, or attempts to inflict, injury or discomfort upon another (p.9) and that for bullying to occur there must be an “imbalance in strength (an asymmetric power relationship)” (p.10), in which the victim has “difficulty defending him/herself and is somewhat helpless against the student or students who harass” (p.10).

This definition came to conceptualise the three criteria that we still use today: 1) intention to inflict harm, 2) repetition, and 3) imbalance of power. Today, as the field of bullying continues to grow, scholars have elaborated on this definition and sparked several controversies as new evidence emerges. Notably, many scholars argue that a universal definition of bullying does not exist and that there is a lack of consensus between countries, cultures, academics, professionals, and young people as to what it means, how it is perceived and therefore, how to define it. Unfortunately, these inconsistencies can have an impact on the way bullying is conceptualised, measured, and studied (Younan, 2018), thus it is imperative that researchers provide participants with a definition whenever they are measuring bullying or use measures where evidence of repetition, power imbalance and intentionality can be coded. Moreover, cyberbullying or online bullying, has sparked its own debate as to whether it should be considered a type of bullying that occurs through electronic devices or digital means (Campbell & Bauman, 2018; Smith, Del Barrio & Tokunaga, 2013) or whether it requires its own definition as other factors such as anonymity and publicity must be considered (Cross, Lester & Barnes, 2015; Menesini & Nocentini, 2009). Regardless of the many definitions that exist today, the three main criteria used by Olweus are still widely recognised and used in most definitions and measurements of bullying with some variations. Below are two widely used examples:

“Bullying is the repetitive, intentional hurting of one person or group by another person or group, where the relationship involves an imbalance of power. It can happen face to face or online” – Anti-Bullying Alliance (2022)

“CDC defines bullying as any unwanted aggressive behaviour(s) by another youth or group of youths, who are not siblings or current dating partners, that involves an

observed or perceived power imbalance, and is repeated multiple times or is highly likely to be repeated. Bullying may inflict harm or distress on the targeted youth including physical, psychological, social, or educational harm” – Center for Disease Control and Prevention (2022)

For this thesis different terms will be used to specify the nature of bullying. The term ‘bullying’ or ‘bullying involvement’ will be used to describe all aspects of bullying, including victimisation and perpetration in very general terms. When I use the terms ‘bullying victimisation’ or ‘peer victimisation’ I am describing the experience of the person being victimised or bullied. Finally, when I use the terms ‘perpetration’ or ‘peer aggression’ I am describing the experience of person perpetrating bullying or bullying others.

Types of bullying

Bullying can be divided into two main categories: traditional or face-to-face bullying and cyberbullying. The most common traditional or face-to-face types of bullying include direct forms of bullying such as physical (hitting, kicking, punching, damaging property) and verbal (threatening, insulting, teasing, saying hurtful things), and indirect forms of bullying such as relational (spreading rumours, social exclusion). Additional forms of bullying might be sexual bullying (being teased with sexual jokes, comments, or gestures), locking someone inside a room or closed space, extortion or blackmail. Cyberbullying or online bullying includes posting or sharing malicious or embarrassing content (e.g. comments, stories, pictures or videos) on public websites without a person’s consent, sending threatening or malicious messages to someone or excluding them from chats, groups or games. Despite traditional bullying being more prevalent, most children who are cyberbullied are also bullied in person, and face worse outcomes than those

experiencing either type of bullying alone (Modecki et al., 2014; Smith, 2019). This thesis will focus on traditional or face-to-face forms of bullying.

Evidence suggests that developmental trajectories for traditional forms of bullying emerge in early childhood, peak in early adolescence, and decline in later adolescence (Currie et al., 2012; Renshaw et al., 2016). In fact, physical, verbal and relational forms of bullying may appear among children as young as three or four (Iloa et al., 2016). Yet there may be individual variations among types of bullying - some studies show that physical forms are highest in childhood, whereas verbal and relational forms peak during adolescence (Vaillancourt et al., 2010). In terms of gender differences, a meta-analysis found that boys reported engaging in more bullying perpetration and girls reported being the targets of victimisation more often (Cook et al., 2010). However, cross-cultural evidence does not always support these findings. One meta-analysis of 135 studies representing 17 countries found that boys experience more overt forms of victimisation than girls, yet both experience similar levels of both relational bullying perpetration and victimisation (Casper & Card, 2017).

Different types of bullying may also lead to different outcomes. A meta-analysis found that emotional maladjustment (e.g., symptoms of depression, anxiety, loneliness) was more strongly correlated with relational victimisation than overt victimisation (Wu et al., 2015). However, informant bias may have played a key role since the association between victimisation and emotional maladjustment was stronger for self-reports of victimisation than for peer nominations. This is not surprising as peers may not be aware or overlook relational victimisation compared to overt victimisation. Similarly, Pickard, Hape and Mandy (2018) found that relational but not physical victimisation at age 8 predicted an increase in social anxiety symptoms. Forbes (2019) found that experiencing depressive symptoms at ages 9-11 predicted physical and relational victimisation at age 12-

13, while anxiety at age 10-11 predicted cyberbullying at age 12-13. Taking into account potential informant biases, overall, these studies suggest that emotional or internalising symptoms can be useful to predict different types of victimisation across the school years.

Participant roles of bullying

Bullying is widely recognised as a group process (Salmivalli & Voeten, 2004) that involves several participant roles: bullies, victims, bully-victims, and bystanders. Bullies are those who incite or start bullying, victims are the targets of bullying perpetration, bully-victims are those who perpetuate bullying but are also targets of victimisation, and bystanders encompass any other individual that can take action in a bullying situation. Bullying rarely occurs in isolation because behaviours are supported or not supported by the environment in which they occur. This means that most children in bullying situations are bystanders, which depending on factors such as classroom anti-bullying norms or attitudes, may take on different roles. These include pro-bullying roles including assisting or reinforcing the bullies, anti-bullying roles such as defending or comforting victims and discouraging bullies, or passive roles in which individuals do nothing or remain uninvolved. Research has shown that bullying roles may overlap and change over time (Demaray et al., 2021), thus it may not be appropriate to think of children as taking on a single role. For example, a study using longitudinal latent profile analysis, examined what bullying participant groups emerged based on students' reported levels of bullying and how they changed over the course of one year (Demaray et al., 2021). They found that four groups emerged: 1) uninvolved-occasional defending (with the largest proportion of student in this group), 2) frequent defending-occasional victimisation, 3) frequent victimisation-occasional broad involvement in defending and other outsider behaviours, and 4) frequent broad involvement in all bully participant behaviours (bullying, assisting,

victimisation, defending and outsider behaviours – with the lowest proportion of students in this group). Notably, most groups were unstable and changed over time – particularly the frequent broad involvement, with students moving to less occasional broad involvement. They also found gender differences with males engaging in more broad involvement behaviours and females and younger students engaging in more frequent defending-occasional victimisation behaviours. Overall, this study showed that categorising participant roles in bullying is not as simple as described in most of the literature because individuals' involvement may change even in the course of one year. These complexities should be considered when implementing anti-bullying interventions to protect students from potential harms (e.g. experiencing frequent victimisation when defending).

Influencing the behaviours of bystanders to reinforce anti-bullying norms (i.e. taking anti-bullying roles) can reduce the rewards gained by the bullies and consequently, their motivation to bully in the first place. Indeed, studies have found that in classrooms where reinforcing the bully is considered normative behaviour, the likelihood of bullying others is higher (Salmivalli, Voeten, & Poskiparta, 2011). In contrast, encouraging bystanders to follow anti-bullying norms can have a positive effect on victims' wellbeing. Studies have found that children who were victimised but defended or supported by their peers were less depressed and anxious, had a higher self-esteem, and felt less rejected by peers, than children without defenders, even when the frequency of victimisation was controlled for (Sainio, Veenstra, Huitsing, & Salmivalli, 2011). Notably, influencing the behaviour of bystanders to take anti-bullying roles may benefit children with pre-existing mental health problems. For example, one study found that children with elevated anxiety symptoms were more likely to be victimised in classrooms where reinforcing bullying behaviours was common, while classrooms high in defending behaviour minimised the

likelihood of having elevated levels of anxiety (Kärnä, Voeten, Poskiparta & Salmivalli, 2010).

While bystanders have a key role to play in bullying situations, it is important to consider that involvement in bullying may also negatively impact their mental health. Indeed, a cross-sectional study found that youth who had *low* involvement in bullying (i.e. victimisation and perpetration) and defending, had fewer symptoms of depression and anxiety than those who only acted as defenders, although defenders had fewer symptoms of depression and anxiety than youth who were *highly* involved in bullying and defending (Tennant et al., 2019). Similarly, another study reported that defending behaviours among uninvolved youth (i.e. youth that did not directly participate in bullying) were positively associated with psychosocial difficulties. For uninvolved boys defending was positively associated with anger, psychosomatic problems and internalising problems regardless of how often they had witnessed or had been exposed to bullying. For uninvolved girls defending was positively associated with anger and psychosomatic problems only when they were highly exposed to bullying (Lambe et al., 2017). There are two possible explanations for these findings; the first is that defending may come with a psychosocial cost to the individual, and the second is that witnessing bullying may elicit psychosocial responses similar to those after witnessing a traumatic event. Unfortunately, due to the cross-sectional design of this study, the direction of effects (e.g., whether distress due to witnessing an event leads to defending or defending leads to experiencing distress) cannot be examined. Regardless, it appears that witnessing bullying and defending may result in significant distress. Although defending can bring benefits for victims, particularly when implemented in anti-bullying interventions (Sainio et al., 2011), caution must be taken in over-encouraging such behaviours until we have a better understanding of what negative outcomes might be associated with defending and in what contexts. Yet, it is likely that in

schools with low anti-bullying norms and low defending (i.e. with no anti-bullying practices in place), negative outcomes might be more common.

Section Summary

Bullying is roughly defined by three criteria which involve intention to inflict harm, repetition of actions and an imbalance of power. There are different types of bullying that fall into two main categories: traditional or face-to-face bullying and cyberbullying. Most children who experience face-to-face bullying might also experience cyberbullying. Moreover, individuals who experience relational victimisation in person and online may be more likely to develop emotional problems than those who experience less persistent and overt face-to-face victimisation – although these findings may be influenced by informant bias. Type of bullying involvement may also lead to different psychological outcomes. While most research has focused on bullies, victims and bully-victims, children may also take on different bystander roles by reinforcing bullies, defending victims or remaining uninvolved. Although it is well-known that bully-victims tend to have poorer mental health compared to bullies and victims, less is known about the psychological impact on those in bystander roles.

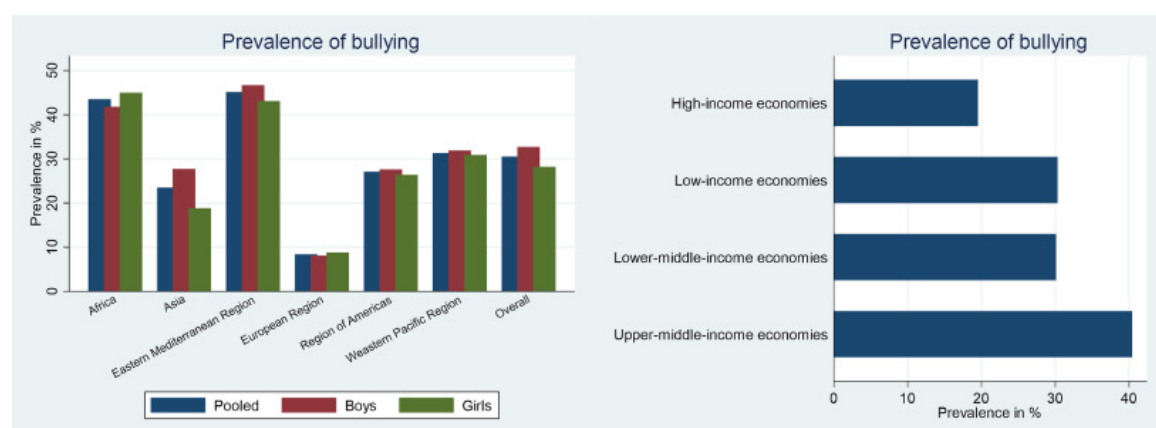
Prevalence of bullying and trajectories across childhood and adolescence

Prevalence of bullying

School-based bullying is recognised as a major public health issue. A study by UNESCO (2019) using data from 96 countries and territories found that one in three students aged 13-17 or 32% of young people globally had experienced bullying

victimisation on one or more days over the past month – 19.4% on one or two days, 5.6% on three to five days and 7.3% on six or more days (UNESCO, 2019). Data from younger individuals aged 9-10 from 50 countries showed that 29% of students were bullied every month (UNESCO, 2019). Biswas and colleagues (2020) found that the prevalence of being bullied varies across geographic regions, with estimates ranging from 8%-45% (Biswas et al., 2020). The highest pooled estimates per region were reported in the Eastern Mediterranean Region (44.5%) and the lowest in the European region (8.4%). According to country income classification, the pooled prevalence among young people being bullied is lowest in high-income countries (20%) and highest in upper-middle-income countries (40.4%, see Figure 1.1). It is possible that countries with lower- and middle-income economies have limited resources and interventions to deal with school-based aggression, peer and teacher support (Biswas et al., 2020).

Figure 1.1 *Prevalence of bullying across geographic region and income classification (Biswas et al., 2020)*



The prevalence of bullying also varies by gender and type of bullying. Overall, 33% of male adolescents reported being bullied at least once at school within the past month compared to 28% of female adolescents (Biswas et al., 2020). Physical and sexual bullying

are the most frequent type of bullying encountered across all regions (UNESCO, 2019). Physical bullying is particularly prominent in the Pacific and sub-Saharan Africa, whilst sexual bullying is most prominent in Central America, the Middle East and North Africa. Meanwhile relational bullying is most common in North America and Europe (UNESCO, 2019). Traditional bullying victimisation and perpetration predominantly occur within the school context, whilst cyberbullying can occur online at any time and place. Yet, a meta-analysis of 80 studies found that cyberbullying victimisation and perpetration was associated with a significantly lower mean prevalence (15%) than traditional bullying victimisation and perpetration (35%, Modecki et al., 2014). This could imply that individuals are less prone to experiencing only cyberbullying and are more likely to face traditional bullying in person, or a combination of both.

Across a wider context, studies have found that bullying victimisation, including peer and sibling victimisation, is the most prevalent form of abuse across all age groups up to 24 years in both the United States and United Kingdom (Finkelhor, Ormrod & Turner, 2007a; Radford, Corral, Bradley & Fisher, 2013). This highlights the urgent need for effective prevention and intervention programs to address bullying in all its forms.

Average trajectories

Many studies show that bullying victimisation and perpetration are present throughout the school years, but age-related variations in prevalence rates are not always consistent. For example, in a meta-analysis of 153 studies focusing on predictors of victimisation and perpetration among youth aged 3-18 years, researchers found a weak association between older age and more perpetration and a nonsignificant association between age and victimisation (Cook et al., 2010). The authors argued that different measurements, age-ranges, and assumptions of linear relationship in prevalence over time

could account for the differences seen in studies. Indeed, while some longitudinal studies suggest that there is a slight increase in victimisation rates - which peak around age 13 and then decrease over time (Zych et al, 2019; Swearer & Cary, 2003) - others suggest an overall decrease in victimisation rates from childhood to adolescence (Cross et al., 2015; Kim et al., 2009; Schafer et al., 2005; Sourander et al., 2000; Pellegrini & Long, 2010). Findings regarding perpetration are less consistent, with studies reporting stable rates at age 13 and 14 (Kim et al., 2009), an increase from childhood to age 13 (Schafer et al., 2005); a decrease from childhood to age 16 (Sourander et al., 2000), an increase from ages 13-15 (Swearer & Cary, 2003), a slight decrease from age 11-13 and increase from ages 13-15 (Zych et al., 2019), and a slight increase in the transition from primary school to middle school and then a decline (Pellegrini & Long, 2010). Generally, it is thought that transition periods, such as from primary to middle school may increase rates of bullying involvement as students try to form new relationships and improve their social status, while decreasing rates of bullying over time come as young people acquire more social skills and receive bullying awareness.

However, some of the differences in bullying involvement over time may also be the result of a statistical problem whereby unobserved heterogeneity is concealed in average trends. In other words, there may be individual differences over time that are not accounted for in these analyses. For example, we know that bullying roles are not stable and may change over time, meaning that children may cease to be involved, continue to be involved or become newly involved over time. To account for this unobserved heterogeneity and individual differences, other methods such as growth mixture models may provide more accurate insights into how different developmental trajectories emerge and develop over time. These methods allow for subject-specific deviations from the average trend. Thus, they can identify a finite number of subgroups or individuals that share

similar trends over time based on probabilities. The next section will elaborate on these trends.

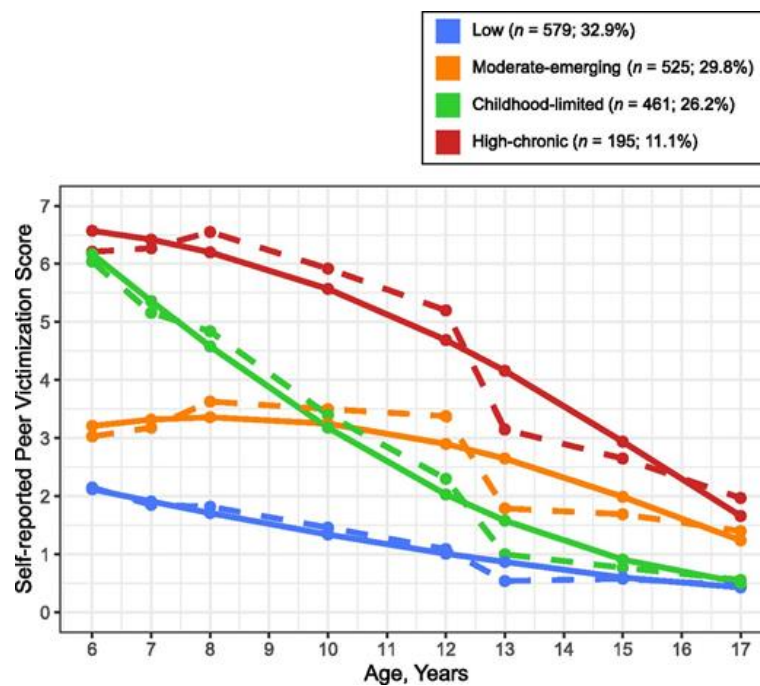
Individual differences and trajectories

Most studies looking at peer problem trajectories using latent growth curve modelling or growth mixture modelling consistently suggest the presence of 3-4 developmental trajectories (see Figure 1.2) typically characterised by either low, moderate/emerging, decreasing/high childhood only and chronic/severe peer problems across childhood and adolescence (Pepler et al., 2008; Geoffrey et al., 2018; Oncioiu, 2020). Whilst most children experience low and stable trajectories of peer victimisation throughout the school years, other children experience chronic and increasing levels of peer victimisation (Barker et al., 2008; Biggs et al., 2010). Indeed, research has shown that this latter group is also most likely to have elevated levels of internalising problems (Sukhawathanakul & Leadbeater, 2020).

When considering the co-development of bullying perpetration and peer victimisation, studies have shown that distinct subgroups emerge. For example in one study four distinct subgroups emerged: those low in both bullying perpetration and peer victimisation (low/limited involvement), those with moderately increasing levels of involvement in bullying perpetration and low levels of victimisation (bullies), those with low levels of bullying perpetration and moderate/decreasing levels of peer victimisation (initial/declining victims), and those characterised by increasing bullying perpetration and moderate decreasing victimisation (victim-to-bully) groups (Haltigan & Vaillancourt, 2014). Overall, several studies suggest that a pathway from peer victimisation to bullying perpetration is more likely than a pathway from bullying perpetration to peer victimisation (Haltigan & Vaillancourt, 2014; Barker et al., 2008). Moreover, as previously noted,

studies show that bully-victims often transition between roles (Zych et al., 2018) and are more likely to develop externalising behaviours and internalising problems in mid-adolescence compared to other groups (Barker et al., 2008).

Figure 1.2 Trajectories of self-reported peer victimisation from 6 to 17 years of age (Oncioiu et al., 2020)



Note: Dashed lines represent trajectories for the observed values, and solid lines represent trajectories as estimated by the best fitting model. Figure adapted from Oncioiu et al (2020).

Section Summary

Bullying victimisation and perpetration are highly prevalent during childhood and adolescence. Prevalence rates for bullying may vary depending on geographic location, socio-economic status, type of bullying and gender. Population studies looking at the development of bullying involvement during childhood and adolescence present mixed findings in terms of onset, stability, and change. Typically, these studies only represent mean trends - thus concealing any unobserved individual differences. Other methods such as growth mixture models may account for this statistical problem by modelling person-

specific rather than variable-specific trajectories and accurately portray changes in bullying involvement over time. Studies using these methods often find multiple trajectories and co-developments between bullying victimisation and perpetration. These methods will be further examined in Chapter 3. In addition, trajectories can also be used to examine their association with different known risk and protective factors. The following section will cover a brief overview of the most prominent risk and protective factors for bullying involvement.

Risk and Protective factors for bullying

Many factors can contribute to the risk of being bullied and bullying others. Likewise, protective or promotive factors, which have been less researched, can promote resilience and reduce the risk of bullying. Both risk and protective factors can be examined using a socio-ecological lens, that is from an individual, peer, family and school level perspective. The aim of this section is to provide a brief overview of both risk and protective factors, as these will be covered in greater detail and in relationship to mental health in Chapter 2. Risk and protective factors will also be examined in all empirical chapters.

Risk factors

At the individual level, genetics, cognitions, and personality may play a role in determining risk for bullying victimisation and perpetration. Genetically informed studies suggest that peer victimisation may not necessarily occur randomly in a child's life but be partly explained by a child's inherited characteristics. For example, in a longitudinal sample of Canadian twins, genetic factors explained more than 70% of individual

differences in stable teacher, peer and self-reported victimisation by classmates from kindergarten to grade 4 of primary school (Boivin et al., 2013). Personality traits such as agreeableness, conscientiousness, honesty-humility are all negatively correlated with all forms of bullying (Farrell, Cioppa, Volk & Book, 2014) while narcissism, Machiavellianism, sadism, psychopathy traits and callous-unemotional traits are linked with bullying perpetration (Van Geel, et al., 2017; Zych, Ttofi & Farrington, 2019). Cognitive processes such as moral disengagement, which refers to socio-cognitive distortions through which an individual justifies immoral conduct to avoid feeling guilt or remorse, has been positively associated with bullying perpetration (for review see Gini, Pozzoli & Hymel, 2014). Moreover, studies have found that children with high levels of CU-traits or moral disengagement are more prone to act as assistants and reinforcers of bullying than defenders (Crapanzano et al., 2011; Gini, 2006). At the family level, family conflict and domestic violence (Holt, Kantor & Finkelohr, 2008; Lereya et al., 2013; Grant, Merrin, King & Espelage, 2019) have been strongly associated with bullying perpetration and victimisation. Child maltreatment and abuse have been linked to an increase in bullying victimisation (Bowes et al., 2009; Nocentini et al., 2019). In addition, negative parenting styles and parenting behaviour (Baldry & Farrington, 2000; Lereya et al., 2013), the quality of attachment (Walden & Beran, 2010), family functioning (Espelage, et al., 2014), and parental attitudes and beliefs about bullying (Troop-Gordon & Gerardy, 2012) have also been identified as risk factors for bullying involvement. At the peer level, peer status and classroom status has been widely studied in relation to bullying; popularity (Dijkstra, Lindenberg & Veenstra, 2008), classroom norms where students have more negative attitudes towards bullying (Salmivalli & Voeten, 2004), lack of defending behaviours in the classroom (Pouwels, 2019), classrooms with high status hierarchies (Garandeau, Ahn & Rodkin, 2011) have also been linked to bullying behaviours, particularly perpetration.

Class moral disengagement (both average and cumulative) has also been associated with perpetration (Pozzoli et al., 2012) and victimisation (Thornberg et al., 2017). At the school level, unsupportive, unhealthy, unsafe and punitive school climates have been associated with bullying (Kasen et al., 2010). Teacher attitudes where children feel ignored or unheard have also been linked to higher levels of bullying (Holt, Keyes & Koenig, 2004). Beyond the school level, neighbourhoods may also confer risk for bullying; neighbourhoods that were unsafe, violent and disorganised were also linked to increased bullying (Espelage, Bosworth & Simon, 2000; Holt, Turner & Exum, 2014).

Protective factors

A systematic review and meta-analysis examining protective factors for bullying involvement found that personal competencies were the strongest protective factors against any type of victimisation. In contrast, school, peer, individual social competencies were the strongest protective factor against perpetration (Zych, Farrington & Ttofi, 2019). More specifically this systematic review found that children with high social and emotional competencies, including intelligence, problem solving, emotion regulation and self-esteem have been associated with low bullying involvement (Cook et al., 2010; Kowlaski et al., 2014). Prosocial behaviour (Kowlaski et al., 2014) and high academic achievement (Moore et al., 2017; Cook et al., 2010) have also been associated with lower levels of bullying victimisation and perpetration. While empathy has not been associated with victimisation, it has been negatively associated with bullying perpetration, meaning that children with high levels of empathy are less likely to perpetrate bullying (for review see Zych, Baldry, Farrington & Llorent, 2019). At the family level, high socio-economic status was associated with lower levels of peer victimisation (Tippet & Wolke, 2014). A positive family environment and interactions (Cook et al., 2010, Chen et al., 2017), parental

supervision and monitoring (Kowlaski et al., 2014; Lereya et al., 2013), parental involvement, communication and warmth (Lereya et al., 2013; Nocentini et al., 2019) were all related to lower bullying involvement. At the peer/classroom level, high peer status and peer support were related to low levels of victimisation (Cook et al., 2010, Kowalski et al., 2014). Positive peer influence was also protective of bullying perpetration (Cook et al., 2010). At the school level and above, positive communities, positive school climate and school safety (Cook et al., 2010, Kowalski et al., 2014) and higher levels of school belonging (Swearer et al., 2012) protected children against bullying victimisation and perpetration.

Section summary

Findings across multiple studies show the multitude of risk and protective factors for bullying involvement. The socio-ecological framework highlights the importance of considering the larger social environment in which behaviours take place to understand how individual characteristics such as genetic vulnerabilities may affect children's development. Clearly, there is no simple causal risk or protective factor for bullying involvement as these behaviours are multi-determined and often interacting with one another at different levels. Moreover, risk and protective factors may also interact with bullying experiences to influence children's psychological adjustment, as will be examined in Chapter 2. With this section we conclude part 1 of the introduction to bullying. Part 2 will now focus more in-depth on understanding prevalence, trajectories and risk and protective factors for common childhood and adolescent mental health disorders.

Part 2. Mental Health

Understanding mental health problems in childhood and adolescence

Mental health refers to an individual's psychological, emotional, and behavioural well-being. It encompasses a child's ability to understand and manage their emotions, develop healthy relationships, cope with challenges, and navigate the complexities of their daily lives. Childhood mental health is essential for growth and development, as it directly impacts their cognitive abilities, behaviour, and overall functioning. It includes various aspects such as self-esteem, resilience, emotional regulation, and the ability to adapt to new situations.

Mental health problems in childhood and adolescence can range from experiencing mild social difficulties to severe antisocial behaviours. Indeed, the most common mental health disorders diagnosed in childhood and adolescence fall within two categories: internalising or emotional disorders and externalising or behavioural disorders. Internalising disorders primarily involve internal emotional experiences and behaviours. Children and young people (CYP) with internalising disorders often internalise their distress, which means they direct their emotional and psychological difficulties inward. Common internalising disorders include anxiety, depression, post-traumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD). Anxiety disorders in childhood and adolescence involve excessive and persistent worry, fear, or unease. These may include generalised worries, social anxiety, separation anxiety and phobias or fear of specific objects or events. Depression in childhood can manifest as persistent feelings of sadness, hopelessness, loss of interest in activities, changes in appetite or sleep patterns, irritability and difficulties with concentration. In adolescence depressive symptoms may also include self-harm and suicidal ideation. PTSD can occur after experiencing or witnessing a

traumatic event. CYP with PTSD may have intrusive memories, nightmares, avoidance of triggers, and manifest irritability, sad mood or heightened anxiety. OCD in childhood and adolescence involves the presence of intrusive, unwanted thoughts (obsessions) and repetitive behaviours or mental rituals (compulsions) aimed at reducing anxiety. For example, a CYP might have an obsessive fear of germs or contamination and engage in compulsory hand-washing rituals.

Externalising disorders involve outwardly directed behaviours and difficulties with impulse control and self-regulation. CYP with externalising disorders often display disruptive or aggressive behaviours. Common externalising disorders include Attention-deficit/hyperactivity disorder (ADHD), conduct disorder and oppositional defiant disorder (ODD). ADHD is characterised by persistent patterns of inattention, hyperactivity, and impulsivity that interfere with daily functioning and development. For example, having difficulties completing one task at a time, losing or misplacing things, not being able to sit still or shouting answers in a classroom. Conduct disorder involves persistent patterns of behaviours that violate societal norms and the rights of others. These behaviours may include aggression, rule-breaking, deceitfulness, being cruel to animals and lack of empathy. ODD is characterised by a pattern of defiant, hostile, and oppositional behaviours towards authority figures. Children with ODD often exhibit frequent temper outbursts, argumentativeness, and refusal to comply with rules or requests. Professional evaluation and diagnosis by mental health professionals, such as child psychologists or psychiatrists, are crucial for accurate identification and appropriate treatment of mental health disorders in children. In the following sections I will discuss the prevalence of common mental health problems and trajectories of mental health across childhood and adolescence.

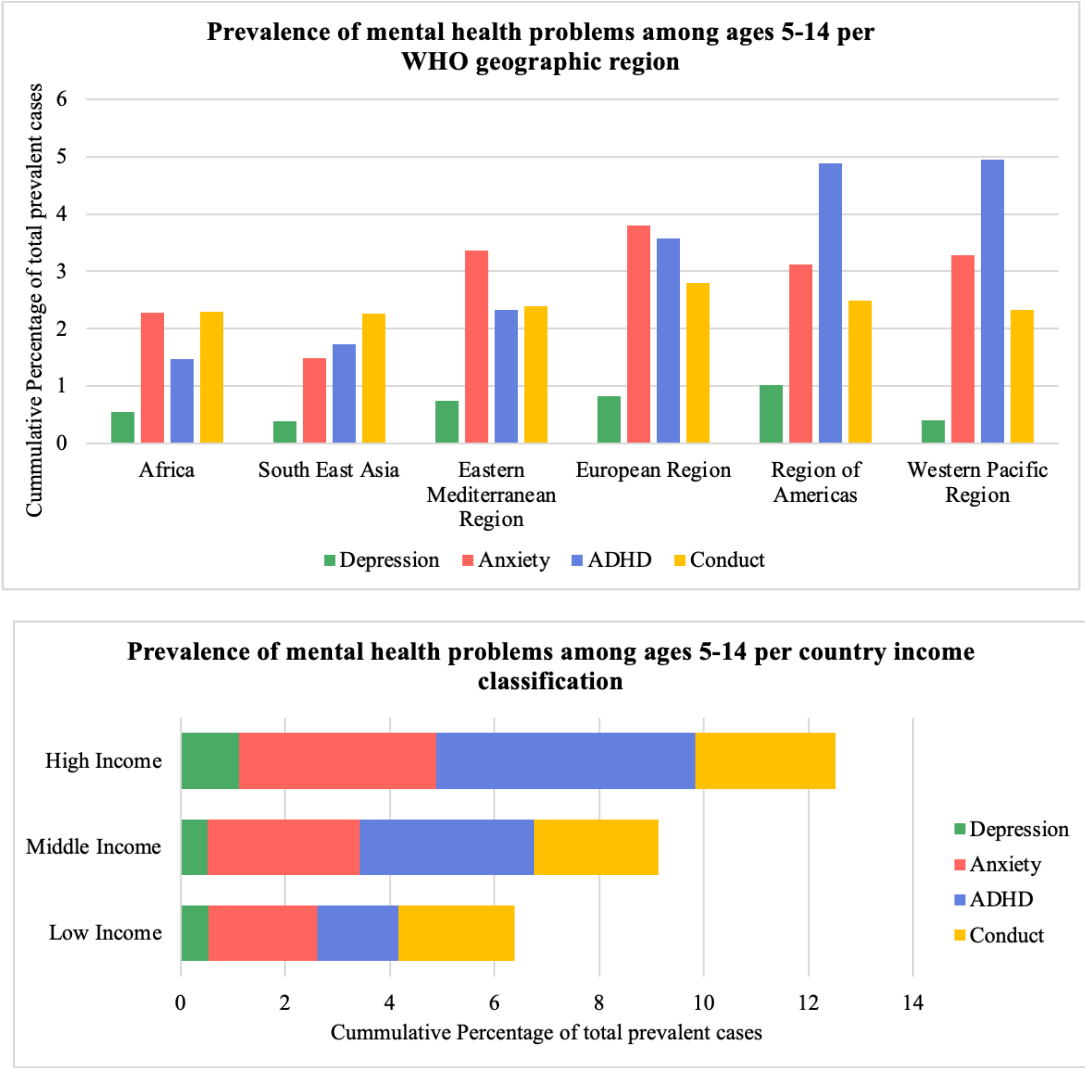
Prevalence of mental health and trajectories across childhood and adolescence

Prevalence of common mental health problems

Globally, it is estimated that 1 in 7 (14%) of 10-19 year-olds experience mental health problems (WHO, 2021). Indeed, a meta-analysis of 41 studies in 27 countries found that the overall pooled prevalence of mental disorders affecting CYP was 13.4% (Polanczyk et al., 2015). Figure 1.3 shows how the prevalence of mental health disorders may also vary by geographic regions and less so by country income classifications (Institute for Health Metrics and Evaluation, 2019). Specifically, depressive disorders were highest in the Americas region and lowest in the Southeast Asia region, anxiety disorders were highest in the Eastern Mediterranean region and lowest in the Southeast Asia region, ADHD was highest in the Western Pacific region and lowest in Africa and conduct disorder was highest in the European region and lowest in the Southeast Asia region. Overall, depression, anxiety, conduct, and ADHD disorders were highest in high income countries and lowest in low-income countries. Notably, ADHD has the highest prevalence in high- and middle-income countries while conduct problems had the highest prevalence in low-income countries.

Anxiety disorders and depression are among the most frequently diagnosed internalising mental health conditions in childhood and are the leading causes of disability and burden in young people (Ghandour et al., 2019; Erskine et al., 2015; WHO, 2021). Anxiety disorders, which may include generalised anxiety disorder, social anxiety disorder, panic disorder or specific phobias, have an estimated prevalence of 3.6% for 10-14 year olds and 4.6% for 15-19 year olds (WHO, 2021). In other studies, the global prevalence of anxiety disorders was estimated to be 6.5% (Polanczyk et al., 2015). Depression, which

Figure 1.3. *Prevalence of mental health problems among ages 5-14 per WHO geographic region and country income classification (Institute for Health Metrics and Evaluation, 2019).*



includes symptoms of persistent sadness, loss of interest in activities, changes in sleep or appetite, or in more extreme cases thoughts of suicide, has an estimated prevalence of 1.1% in 10-14 year olds and 2.8% for 15-19 year olds (WHO, 2021). In other studies, the world-wide prevalence of any depressive disorder was estimated to be 2.8% (Polanczyk et al., 2015). Notably, suicide is the fourth leading cause of death among 15-29 year-olds (WHO, 2021).

Among externalising disorders, attention/deficit hyperactivity disorder (ADHD) and conduct problems are among the most frequently diagnosed conditions. ADHD, which is characterised by difficulties concentrating and focusing, excessive activity or impulsiveness has an estimated prevalence of 3.1% in 10-14 year olds and 2.4% in 15-19 year olds (WHO, 2021). In other studies, the global prevalence of ADHD was estimated to be 3.4% (Polanczyk et al., 2015). Conduct disorder which is characterised by a defiance and disregard for rules, aggression towards others, lying, stealing or damaging property, has an estimated prevalence of 3.6% for 10-14 year olds and 2.4% in 15-19 year olds (WHO, 2021). In other studies, the global prevalence of any conduct disorder was estimated to be 5.7% (Polanczyk et al., 2015).

It is worth noting that there is considerable overlap between disorders. Indeed, almost 74% of children with depression also had an anxiety disorder and almost 48% of children with depression also had conduct problems (Ghandour et al., 2018). The prevalence of mental health disorders in childhood and adolescence highlights the need to identify modifiable risk factors that can be targeted during early developmental stages. Most of these disorders tend to arise early in life, with the median age of onset for anxiety, behaviour, and mood disorders occurring around the age of 14 years (Merikangas et al., 2011; Solmi et al., 2022). In a recent meta-analysis of 192 epidemiological studies including 708,561 participants, the proportion of individuals with onset of any mental disorders before the age of 14 was estimated to be 34.6% in the general population, with a peak age of onset at age 15. Specifically, before the age of 14, 3.1% of individuals had a depressive disorder, 38.1% of individuals had an anxiety disorder and 56.8% had attention deficit hyperactivity disorder (ADHD). While the peak age of onset for depression was 20 years, it was 6 years for anxiety disorders and 10 years for ADHD (Solmi et al., 2022).

Gender differences in the prevalence of childhood disorders have also been observed. Internalising disorders are more frequently reported in girls and externalising disorders more frequently reported in boys (Gutman & McMaster, 2020; Wittchen et al., 2011; Baranne & Falissard, 2018). However, this may also vary with age, with gender difference becoming more pronounced for internalising symptoms around the age of 11 (Gutman & McMaster, 2020). A study using data from the Adolescent Brain Cognitive Development Study (ABCD) found that transgender children were also more likely to score in the borderline or clinical range for internalising problems, but not externalising problems, than cisgender children (Russell et al., 2022). Considering these gender differences, most studies evaluating mental health conditions in childhood tend to control for gender (and age, as will be seen in the next section) in their models.

Average trajectories

During childhood and adolescence, mental health is often marked by fluctuations in behaviours and symptoms, with some difficulties emerging while others subside or disappear. These fluctuations can make it difficult to identify problematic behaviours in childhood and accurately estimate mental health trends. Population studies focusing on longitudinal development can be particularly helpful at examining these patterns. For example, one study using a large normative sample found that a general factor of psychopathology (p-factor) capturing variance common to multiple diagnostic domains remained relatively constant across childhood and adolescence, as measured in 8 time points between ages 7-15 (Murray, Eisner & Ribeaud, 2016). However, when looking at specific symptom clusters, longitudinal studies may paint a different picture. For example, one longitudinal study found that externalising problems decrease from early childhood to preadolescence, increase during adolescence, and decrease from late adolescence to

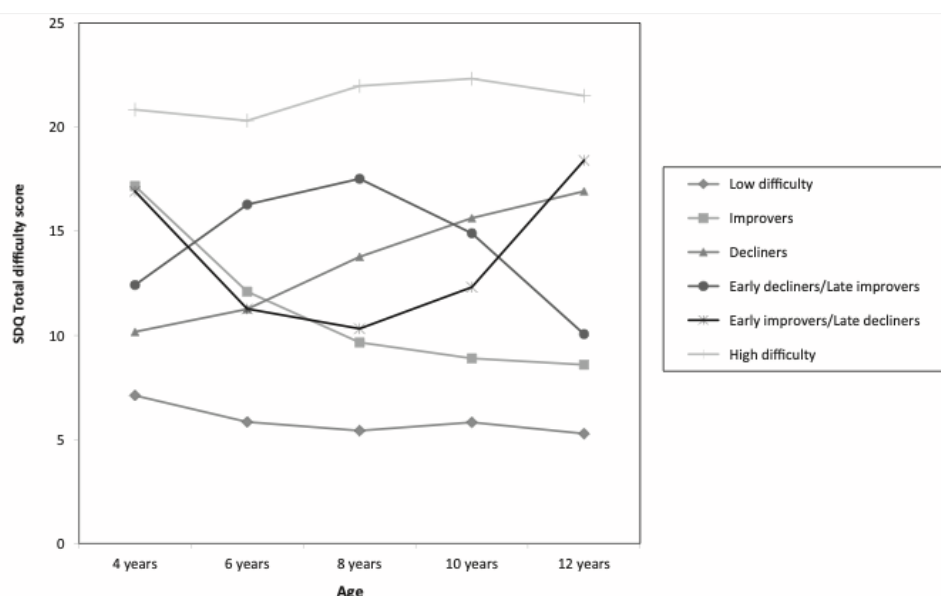
adulthood, suggesting a strong nonlinear continuity in symptoms over time (Petersen, Bates, Dodge, Lasford & Pettit, 2015). Moreover, several longitudinal studies investigating internalising symptoms suggest similar trends – symptoms such as shyness or worry are observed in early childhood (Colder, Motta and Berman, 2002), emerge as social anxiety disorder, generalised anxiety disorder, and depression around middle childhood or preadolescence, and then increase in adolescence (Merikangas et al., 2010; Costello et al., 2003). Yet, these trends are not always observed, with some suggesting internalising symptoms remain constant between ages 5-13 years (Keiley, Lofthouse, Bastes, Dodge and Pettit, 2003) or decrease from 7-12 years and then increase into adolescence (Cohen, Andrews, David & Rudolph, 2017). To account for these differences in trends, many studies suggest that onset and stability in problem behaviours throughout childhood and adolescence might be primarily due to genetic influences, while change may be primarily due to nonshared environmental influences (Hatoum et al., 2018; Lahey et al., 2014; Lahey et al., 2011). Similar to average bullying trends, individual differences in the development of mental health symptoms over time are not accounted for in these analyses and may be obscured by genetic and environmental influences. Thus, trajectory modelling may also provide more accurate insights into how different mental health trajectories emerge and develop over time. The next section will elaborate on trends using these methods.

Individual differences and trajectories

A meta-analysis examining individual differences in the development of depressive symptoms found that individual studies identified anywhere between 3-11 trajectories (Shore et al, 2018). However, as shown in Figure 1.4 more often studies typically find 4-6 trajectories which are characterised by low levels of symptoms sustained over time, moderate levels sustained over time, increasing or decreasing levels across time and high

levels of mental health difficulties (Shore et al., 2018; Musliner et al., 2016; Schubert et al., 2017; Pingault et al., 2011, Korhonen et al., 2014). Others studies suggest the presence of early increasing/late decreasing levels and early decreasing/late increasing levels in addition to the other more commonly observed trajectories from childhood to early adolescence (Vella et al., 2019; Dekker et al., 2007). Notably, this demonstrates that children may fluctuate in their risk for mental health- related problems, even moving above and below clinical and subclinical threshold values over time. The co-development of internalising and externalising symptoms has also been examined during childhood and adolescence. One study identified four distinct co-development patterns including a chronic co-occurring group, a moderate co-occurring group, a pure-externalising group, and a low-risk group (Shi, Ettekal, Deutz & Woltering, 2020), suggesting that internalising problems are often co-occurring with externalising problems across development, and thus should be considered simultaneously when possible.

Figure 1.4. *Trajectories of mental health difficulties from 4 to 12 years of age (Vella et al., 2019)*



Note: SDQ = Strengths and Difficulties Questionnaire. Trajectories are derived from the Longitudinal study of Australian Children (LACS). Adapted from Vella et al (2019).

Section Summary

Mental health problems are highly prevalent during childhood and adolescence. Prevalence rates for internalising problems such as anxiety and depression, and externalising problems such as conduct disorder or ADHD are among the highest for the 5-14 and 15-20 age groups and account for the largest portion of disability and burden in CYP, particularly as they often co-occur. Their prevalence varies widely by geographic region; however, they are more prevalent in high-income than middle- or low-income countries. Population studies looking at the average development of common mental health problems during childhood and adolescence present different findings in terms of onset, stability, and change. Understanding why there are such differences in individual response requires the use of more sophisticated methods such as growth mixture models. These models will be used in Chapter 3, to investigate the joint development of mental health and bullying trajectories over the pandemic. Furthermore, once developmental trajectories are identified, they can then be used to determine associations with known risk and protective factors. The next section will delve into different risk and protective factors for different mental health problems. These will also be further examined in Chapter 3.

Risk and Protective factors for common mental health problems

Risk and protective factors for mental health problems in childhood and adolescence can also be examined using a socio-ecological model. Although most research has focused on exploring risk factors, there has been a growing interest in protective factors, motivated by the observation that many children who experience adversity do not go on to develop mental health problems. Such observations suggest that there may be a range of protective factors that act to mitigate the effects of exposure to risk factors. While

there is considerable variation across mental health disorders, including age and gender differences, the aim of this section is to provide a brief and general overview of some of the most important risk and protective factors during childhood and adolescence.

Risk Factors

Several individual risk factors have been linked to an increase in mental health problems in childhood. Genetics appears to confer a significant risk for mental health problems (Rice, 2010; Pettersson, Lichtenstein, Larsson & Song, 2019; Faraone & Larsson, 2019). Heritability estimates ranging between 30 – 80% vary greatly by disorder (e.g. with ADHD having the highest estimates) and suggest that gene x environmental interactions play a large role (Caspi et al., 2003). Other individual-level factors such as gender, sexual orientation, deprivation, ethnicity and age have also been linked with increased odds of experiencing mental health difficulties during childhood and adolescence in large community samples (Deighton et al., 2019; Fergusson & Horwood, 2001). Specifically related to internalising problems, emotion regulation and temperament, including behavioural inhibition (i.e., the tendency to exhibit fear, shyness, avoidance or withdrawal in a new situations), as early as infancy, is one of the strongest predictors of childhood and adolescent anxiety disorders (Sandstrom, Uher & Pavlova, 2020). Chronic illness, disability and developmental co-morbidities also act as risk factors for mental health problems (Brady, Deighton & Stansfeld, 2021; Emerson & Hatton, 2007). Studies have also found strong links between mental health problems in children and young people and social disadvantage, with children and young people in the poorest households three times more likely to have a mental health problem than those growing up in better-off homes (Green, McGinnity, Melzer, Ford & Goodman, 2005). Parental mental illness has also been associated with increased rates of mental health problems in children and young people,

with an estimated one-third to two-thirds of children and young people whose parents have a mental health problem experiencing difficulties themselves (Manning & Gregoire, 2009; Goodman, Gledhill & Ford, 2003). Family conflict including violence between parents, child abuse and neglect and experiencing early childhood adversity, also increases the risk of children and young people developing mental health problems (Fergusson & Horwood, 2001; Spence et al., 2002; Dahal, Swahn & Hayat, 2018). Specifically parental maltreatment, including physical abuse, emotional abuse and neglect during childhood can double the risk of developing conduct disorder (Norman et al., 2012). Peer problems, particularly experiencing peer victimisation, appears to be one of the most tractable risk factors for internalising symptoms such as depression. Specifically, research has shown that over a quarter of cases of depression at age 18 might be attributable to bullying victimisation during early adolescence even after accounting for baseline depression (Bowes et al., 2015). Lastly, neighbourhood and broader contextual influences may also confer risk to CYP's mental health. For example, unsupportive neighbourhoods (e.g., with less social support and trust between individuals) were associated with an increased risk of current mental health problems in a large community sample of children (Dahal, Swahn & Hayat, 2018).

Protective Factors

Several factors may also reduce the risk and buffer against poor mental health outcome. Studies have found that individual-level factors such as self-efficacy, positive self-appraisal, emotion regulation and positive coping skills may all protect against internalising problems (Daniel, Abdel-Baki & Hall, 2020; Breton et al., 2015; Carbonell et al., 2002). Family cohesion and connectedness, positive family climates and parental involvement, social support and good interpersonal relationships were also associated with

a reduced risk of mental health problems (Carbonell et al., 2002; Domina, 2005; Klasen et al., 2015; Resnick et al., 1997). Furthermore, family climate and social support were found to moderate the detrimental influence of parental psychopathology on child's depressive symptoms (Klasen et al., 2015). At a broader level, perceived school connectedness (Resnick et al., 1997), participation in extracurricular activities (Mahoney, 2000), and perceived and actual income equality (Piera Pi-Sunyer et al., 2023; Elgar et al., 2015) appear to also counterbalance the impact of vulnerability and protect against internalising and externalising problems. While these are some of the most documented protective factors, this list is by no means exhaustive.

Section Summary

A vast body of research has identified multiple factors that may confer risk or buffer mental health problems in childhood and adolescence. Risk and protective factors may interact at different levels of a CYP's ecological system and accumulate over time to increase the risk of mental health problems. As mentioned, bullying victimisation is one of the most tractable risk factors for mental health problems, and thus, may be an ideal candidate for intervention. Part 3 of the introduction will focus on the role and effectiveness of anti-bullying interventions, and their association with mental health will be further discussed in Chapter 2, and empirically examined in Chapters 4 and 5.

Part 3. Anti-bullying interventions

What are anti-bullying interventions?

Anti-bullying interventions are specifically designed to reduce bullying based on theoretically driven and evidence-based knowledge. The same way that bullying is considered a multifactorial problem, interventions should aim to target multifactorial systems involving personal, contextual, school and family factors (Smith, Pepler & Rigby, 2004). Most anti-bullying interventions follow either a) a whole-school universal prevention approach aimed at reducing risk and promoting skills, and/or c) a targeted or indicated intervention approach, directed at those who are at risk or have already been exposed to bullying behaviours and need more intense or specific support. These approaches and their individual components, in addition to their effectiveness and implications will be discussed in this section.

Whole-school interventions

The socio-ecological theory (Swearer & Espelage, 2010) describes how various systems may interact and influence students' development and social relationships including individual, family, school, community, cultural and historical wide factors. This ideology was adopted in interventions to address bullying (Smith, Pepler & Rigby, 2004) and known as the whole-school approach. This approach considers how all aspects of the school environment may influence students and thus requires multiple strategies to prevent them or deal with them. This means whole-school approaches are multicomponent and may include schools adopting policies on bullying behaviours, enforcing classroom rules on bullying behaviours, or developing anti-bullying curriculums. Additionally, whole-school interventions may also include other components such as including supervision of students during breaks, conducting whole-school assemblies, delivering social skills training to

students, or training teachers and giving information to parents in line with a socioecological approach.

Some of the most widely known and researched interventions fall within this category, such as the Olweus Bullying Prevention Program (OBPP) and the KiVa program. The OBPP is a Norwegian school-based multilevel, multicomponent intervention designed to prevent and reduce bullying. The goal of this program is to restructure the existing school environment to reduce opportunities and rewards for bullying. School staff are largely responsible for implementing the program which includes improving peer relationships and increasing perceptions of school safety (Olweus & Limber, 2010). This intervention uses several multilevel components including developing schoolwide rules against bullying and a coordinated system of supervision during break periods (schoolwide intervention), meetings with parents from the same classroom and regular classroom meetings about bullying and peer relationships (classroom level interventions) and meeting individually with children who bully, are targets of bullying or with parents of children involved (individual-level interventions). The effectiveness of OBPP has been considerable in Norway with reductions in bullying victimisation ranging from 24-43% and perpetration from 21-52%, both of which were retained over a 5-year period (Olweus & Limber, 2010). Implementation of the OBPP in the United States was also successful, with nearly all grades experiencing a decrease in victims (8-19%) and perpetrators (29-35%) over a 2-year period (Limber, Olweus, Wang, Masiello & Breivik, 2018). The other program, KiVa which stands for 'Kiusaamista Vastaa' and translates to "*against bullying*", is a whole-school anti-bullying program directed at all students which focuses on prevention, intervention, and monitoring (Kärna et al., 2011). KiVa is aimed at changing the behaviour of bystanders to reinforce anti-bullying norms. Universal actions include student lessons (e.g. discussions, video films and exercises that cover topics related to bullying prevention),

virtual learning environments (e.g. computer games), parent guides, symbols (e.g. highly visible vests for teachers on playground supervision), among other. More on the components and effectiveness of KiVa will be discussed in Chapter 5. Other notable interventions include The Friendly Schools Project in Australia (Cross et al., 2018), The No Trap! Intervention in Italy (Palladino, Nocentini & Menesini, 2019) and the Learning Together Intervention in the United Kingdom (Bonell et al., 2018).

Targeted interventions

Schools may also choose to include selective prevention for individuals at risk of being victimised or perpetrating bullying. This may include identifying bullying hotspots in schools or managing behaviours or attitudes that may contribute to bullying. Similarly, schools may also decide to adopt a targeted approach to support individuals who have already been victimised or who engage in bullying perpetration. In this case, programs tend to target more intensely the needs of those involved and may include restorative activities, conflict mediation, talks with victims and bullies, targeted emotional and behavioural support, among other components. Some whole-school interventions, such as KiVa, may also include targeted or indicated components which are implemented when bullying instances are identified. They include discussions with bullies and victims run by a designated KiVa team, and separate discussions with classmates who are challenged to support the victimised classmate run by classroom teachers (for more detailed description of program contents, see Salmivalli, Kärnä & Poskiparta, 2010). Other interventions focus only on indicated actions, which involve using components designed for a target population. For example, the S.S Grin Intervention (DeRosier, 2004), The Social Skills Training Programme (Fox & Boutlon, 2003) and The Confident Kids Program (Berry & Hunt, 2009) focus on teaching social learning and cognitive behavioural skills to anxious

children with peer difficulties or who have been bullied in the past. These targeted programs are often taught by school psychologists or councillors rather than school staff and are shorter but more intense in duration than whole-school interventions.

A review of program effects and components

Several systematic-reviews and meta-analyses have examined the effectiveness of anti-bullying interventions in reducing bullying perpetration and victimisation. Among the most widely known, Gaffney, Farrington and Ttofi's (2019) meta-analysis showed that, on average and when compared with school usual practice, these programs decreased bullying by 19-20% and victimisation by 15-16% (Gaffney et al., 2019). While effects could be considered small to moderate, they still translate to thousands of children being helped every year. Yet some meta-analyses have found that most studies, specifically randomised controlled trials, don't show positive effects in the long term (Cantone et al., 2015) while others have reported that whole-school interventions are more effective at reducing and preventing bullying than targeted interventions or those involving one component (Vreeman & Carroll, 2007). Notably, other systematic reviews have found that intervention effects are inconsistent – with some reporting decreases in bullying involvement, while others show significant effects on bullying prevalence, or find negative effects such that bullying prevalence actually increases (Valle, Williams & Stelko-Pereira, 2020). While results may be mixed, most interventions have significantly positive effects on increasing the willingness to report bullying occurrences, increasing anti-bullying attitudes, and increasing bystander intervention (Valle et al., 2020). Other studies have also found positive intervention effects which include increased knowledge about bullying and improved defending skills (Kärnä et al. 2011). It is not unusual to see that anti-bullying interventions have small to moderate effect sizes, which in fact, still have quite a significant

impact (Carey et al., 2023), but very unusual to observe harmful effects. One reason why we might not find large effects (ie. reduction in bullying prevalence) or find harmful effects is that when interventions are trialled, schools are not always able to adhere to programs protocols. This problem, known as low fidelity, can have a massive influence on outcomes. For example, fidelity evaluations from the Finnish implementation of KiVa revealed that after nine months of implementation, lesson adherence and lesson preparation time (but not duration of lessons) were associated with reductions in bullying victimisation at the classroom level (Haataja et al., 2014). Thus, interventions should be implemented as intended, in terms of both quality and quantity in order to achieve their desired aims.

Understanding which specific intervention components are more effective at reducing bullying perpetration and victimisation can also provide important recommendations on how to maximise the effectiveness of future anti-bullying programs. Farrington and Ttofi's (2009) metaanalysis found that increased teacher training, increased duration and intensity of the intervention, parental involvement, playground supervision, and using disciplinary methods were associated with a decrease in both bullying victimisation and perpetration. Working with peers was associated with an increase in victimisation, although this was recently found to not be the case in a follow-up review (Gaffney et al., 2021). This follow-up review found that interventions with a whole-school approach, anti-bullying policy, classroom rules, information for parents, informal peer involvement, work with victims, cooperative group work and mental health approaches were associated with larger reductions in bullying perpetration, and informal peer involvement and information for parents were associated with larger reductions in bullying victimisation. The absence of socio-emotional skills components was associated with significantly larger reductions in both perpetration and victimisation outcomes. This component was conceptualised as involving "specific social, emotional and psychological

concepts such as empathy, conflict resolution, problem-solving, self-control, decision-making and prosocial or coping skills” (Gaffney et al., 2021, p. 41). Since these components were examined independently from one another it is unclear whether other critical components were excluded from interventions using socio-emotional skills, or whether they are effective only when used in combination with other components. Regardless, targeting students with socio-emotional skills is probably not enough to reduce bullying and other components targeting the classroom and school context are also necessary. Lastly, program richness (i.e. the number of intervention components used) was not significantly associated with changes in perpetration or victimisation (Gaffney et al., 2021). From these systematic reviews, it is clear that incorporating evidence-based components using a socio-ecological approach (i.e. targeting individual, family and contextual levels) is crucial in developing and implementing effective anti-bullying interventions.

Are interventions working for everyone?

It has become evident that some children are still victimised despite involvement in a universal school-based bullying intervention. For example, the prevalence of self-reported victimisation at post-assessment was 23.3% 1 month after the termination of the Fear Not! intervention (Sapouna et al. 2010), and 19.2% 2 years after the implementation of CAPSLE (Fonagy et al. 2009). Evaluations of the KiVa anti-bullying intervention (Salmivalli et al., 2011) showed that rates of victimisation did not decrease to zero: out of the total sample, 8.9% of children in Finland (Kärnä et al. 2011) and 12.7% of children in Netherlands (Veenstra, 2015) were still being victimised 1 and 2 years, respectively, after the intervention started. While most antibullying interventions seem to be effective for the majority of children, unfortunately sometimes bullying perpetration and victimisation

continue despite interventions taking place. One explanation for this, might be the “healthy context paradox” (Garandeau & Salmivalli, 2019) which describes how in schools with low levels of bullying, or in schools where antibullying interventions are taking place, children who continue to be victimised fare worse in terms of victimisation and mental health than children who continue to be victimised in schools where bullying happens more frequently or no interventions are taking place. Such persistent victims may even be worse off after an intervention that results in the discontinued victimisation of other children, as it reduces a child’s opportunities to form friendships (Pan et al., 2021). Children who are bullied are more likely to befriend other children who are bullied, however it becomes more difficult for them to make friends in a social environment where fewer children are victimised (Garandeau et al. 2018). Consequently, not being able to form friendships can then make a child feel less supported, connected and more isolated from their peers. Another reason persistent victims may be worse off after an intervention happens when children who are victimised in classrooms with low victimisation compare themselves to other children who are not victimised and therefore perceived to be better off. These social comparisons can affect self-regard and self-esteem and affect mental health. Similarly, victims are more likely to blame themselves for the bullying in schools where there is less bullying (Schacter & Juvonen, 2015). In turn, self-blaming tendencies can lead to more anxiety and other emotional difficulties. Indeed, in one intervention children who remained or became victimised in intervention schools had more depressive symptoms after being targeted by the intervention for 1 year, compared to those who remained or became victimised in control schools (Huitsing et al., 2019). This means that the most vulnerable children can be at risk despite anti-bullying policies and interventions taking place and it is important we address this problem and support these children with targeted support. It is crucial for interventions to elucidate individual-level differences in intervention

responsiveness and explore why some victims of bullying are helped whereas some others are not. This topic will be explored in depth in Chapter 4.

Implications

School-based anti-bullying interventions can have huge implications on the prevalence rates of bullying worldwide. Notably, traditional bullying victimisation and perpetration predominantly occur within the school context (Department for Education, 2018) and have been associated with higher mean prevalence rates than non-traditional cyberbullying victimisation and perpetration (Modecki et al., 2014). This highlights the important role of schools as grounds for anti-bullying prevention.

Beyond examining intervention effects, it is also important to establish how intervention components, other moderators and mechanisms may influence the effectiveness of interventions. Evidence-based research on anti-bullying interventions needs to move beyond basic questions related to anti-bullying intervention efficacy. The mechanisms through which improvement is observed, the factors that alter the efficiency of the intervention within different subsamples, and the identification of those who are most likely to benefit from a given intervention are relevant research questions that need to be addressed. Above all, given the amount of robust evidence showing an association between bullying and mental health (Chapter 2, Reijntjes et al., 2010, Christina et al., 2021) more information is needed about the effectiveness of antibullying interventions on mental health in order to maximise their impact. More of this will be discussed in Chapter 4 of this thesis.

Section Summary

Theoretical frameworks for bullying can be very important for informing interventions. Most anti-bullying interventions follow either a whole-school universal prevention approach and/or a targeted or indicated intervention. These interventions may contain multiple evidence-based components designed to reduce bullying, however, they are not effective for everyone. Chapters 4 and 5 will focus on the impact of antibullying interventions on mental health and ways to maximise their impact.

Overview

Summary and Structure of the thesis

The primary focus of this thesis is to explore the relationship between bullying and mental health in young people, including understanding risk, resilience, and the role of anti-bullying interventions. Indeed, while it is widely known that there is a strong reciprocal association between bullying and mental health problems, practical and methodological limitations in studying bullying make it difficult to draw causal assumptions and establish what mechanisms and factors influence this relationship (Guzman-Holst & Bowes, 2021). The best approaches to study causal effects are to use natural experiments, longitudinal data, and randomised controlled trials of interventions. This thesis combines all these approaches to examine the relationship between bullying and mental health across different contexts. Furthermore, it uses a socio-ecological approach to understand risk and resilience by considering factors affecting this relationship in the school context, family context, peer-group or classroom context and individual differences. Lastly, it evaluates the use of anti-bullying interventions to target mental health and provides insights as to how to maximise their impact and reduce potential intervention harms.

Part 1 of this thesis consists of two chapters. Chapter 2 includes a literature review on the relationship between bullying and mental health and covers the theoretical framework for studying this relationship presenting all working hypothesis, associated methodological challenges, and factors moderating and mediating this relationship – including risk and protective factors. Chapter 3 uses opportunistic longitudinal data collected during the Covid-19 pandemic to illustrate the application of theoretically driven and novel methodologies presented in Chapter 2 to study this bidirectional relationship. The pandemic presented a unique opportunity to study the relationship between bullying

and mental health and individual differences in their joint trajectories in a “natural experiment.” For example, what happened to bullying and children’s mental health when schools closed, and face-to-face bullying presumably stopped? Did bullying improve or get worse when schools re-opened? What individual, social and family risk and protective factors were associated to different joint trajectories?

Part 2 of this thesis consists of two chapters which focus on anti-bullying interventions. Chapter 4 presents evidence from a systematic review of anti-bullying interventions to understand what components, moderators and mediators have an impact on mental health. If the relationship between bullying and mental health is causal and reciprocal, we would expect that reductions in bullying would improve mental health symptoms. Chapter 5 presents findings from a randomised controlled trial (RCT) of an antibullying intervention in the UK and explores whether the intervention was helpful in reducing mental health for all children or if there was evidence of potential harms. Understanding who is at a greater risk of mental health problems and why is important for maximising the effect of anti-bullying interventions and safeguarding young people from the negative consequences of bullying. This is particularly true for more vulnerable individuals (e.g., those with prior mental health problems or being repeatedly victimised) as anti-bullying interventions and policy tend to focus on universal effects, not on the individual characteristics or differences of young people.

Overall, this thesis will use multiple methodologies and ecological levels to understand the relationship between bullying and mental health in different contexts, including individual differences in their joint development, associated risk, and protective factors, and elucidate the role and effectiveness of anti-bullying interventions.

Research Questions

- 1) What can we learn from the relationship between childhood bullying and mental health across different contexts and using different methods?
 - a. What happens to bullying and mental health in a longitudinal ‘natural experiment’ during periods of restricted and unrestricted social interactions?
 - b. What happens to mental health in school-based anti-bullying interventions?
- 2) Are there individual differences in the joint development of bullying and mental health and in the response to antibullying interventions?
 - a. Are there different trajectories in the joint development of bullying and mental health in a natural setting?
 - b. Can we determine who is most at-risk and less at-risk of experiencing bullying and developing mental health problems during a school-based anti-bullying intervention?
 - c. Can we identify who will benefit the most from anti-bullying interventions?
- 3) What factors are associated with the individual and joint development of bullying and mental health and what role do they play in determining anti-bullying intervention outcomes?
 - a. Are individual and family risk and protective factors associated with the joint trajectories of bullying and mental health during periods of restricted and unrestricted social interactions?
 - b. Can we identify what factors and components influence anti-bullying intervention effects on mental health outcomes?

- c. What can we do to maximise the effect of anti-bullying interventions?

Table 1.1. *An overview of the main research questions and chapters*

Main RQ	Chapter	Aim	Method
What can we learn from the relationship between bullying and mental health across different contexts and using different methods	Chapters 2, 3, 4 and 5	a) What happens to bullying and mental health in a ‘natural experiment’ during periods of restricted and unrestricted social interactions? b) What happens to mental health in school-based anti-bullying interventions?	Literature Review Natural Experiment; group-based trajectory modelling; regression models Systematic review & meta-analysis; meta-regression analysis; meta-mediation analysis Randomised controlled trial of an anti-bullying intervention; multilevel mixed effects modelling
Are there individual differences in the joint development of bullying and mental health and in the response to antibullying interventions?	Chapter 3 and 5	a) Are there different trajectories in the joint development of bullying and mental health in a natural setting? b) Can we determine who is most at-risk and less at-risk of experiencing bullying and developing mental health problems during a school-based anti-bullying intervention? c) Can we identify who will benefit the most from anti-bullying interventions?	Natural Experiment; group-based trajectory modelling; regression models Randomised controlled trial of an anti-bullying intervention; multilevel mixed effects modelling
What factors are associated with the individual and joint development of bullying and mental health and what role do they play in determining anti-bullying intervention outcomes?	Chapter 3 and 4	a) Are individual and family risk and protective factors associated with the joint trajectories of bullying and mental health during periods of restricted and unrestricted social interactions? b) Can we identify what factors and components influence anti-bullying intervention effects on mental health outcomes? c) What can we do to maximise the effect of anti-bullying interventions?	Natural Experiment; group-based trajectory modelling; regression models Systematic review & meta-analysis; meta-regression analysis; meta-mediation analysis

Part 1. Probing the relationship between bullying and mental health

Chapter 2: The relationship between bullying and mental health

Introduction

The previous chapter covered the definition and types of bullying, prevalence and developmental trajectories for bullying and common mental health problems in childhood and adolescence, and the different types of anti-bullying interventions, their effectiveness and impact. Although bullying involvement (perpetration and victimisation) and mental health were evaluated separately, in this chapter we will examine their relationship. This chapter will review the current state of research using different study designs and statistical approaches to explore the direction of effects, potential moderators and mechanisms between bullying and mental health. Current evidence suggests that internalising and externalising mental health problems may be antecedents and consequences of bullying victimisation and perpetration. Although several pathways have been proposed to explain these bidirectional relationships, the detailed mechanisms are not yet clear, particularly as not all children who display mental health problems are bullied or go on to bully others and not all children who are bullied or bully others go on to develop mental health problems. Understanding the theory and research behind these associations, and what risk and protective factors buffer these associations can help us predict resilient outcomes and inform interventions.

While most research in the field has focused on studying the relationships between bullying victimisation and internalising symptoms, there is also evidence for an association between bullying perpetration and externalising symptoms. In fact, a meta-analysis showed that while both bullies and victims report mental health problems, victims are more likely

to report internalising problems and bullies are more likely to report externalising problems (Cook et al., 2010). Moreover, studies also show that even when considering both internalising and externalising simultaneously, internalising behaviours predict victim status while externalising behaviours predict bully status in middle school, even after controlling for previous bullying involvement (Natesan, Mitchell & Glover, 2018). While this may be an oversimplified model of bullying involvement and mental health, there is less conclusive evidence to support bidirectional associations between victimisation and externalising problems and perpetration and internalising problems. Furthermore, there is an added complexity in studying the relationship between bullying perpetration and externalising symptoms as these may be behaviours underlying the same construct. Thus, this chapter will primarily focus on the relationship between bullying victimisation and internalising symptoms, with some discussion on bullying perpetration and externalising symptoms.

This chapter will discuss the role of several factors moderating the relationship between bullying victimisation and internalising symptoms including both contextual factors and individual level factors. Current evidence suggests that internalising behaviours in the context of bullying may persist from childhood to adulthood, vary according to age and gender, and differ by types of bullying (e.g., cyberbullying, relational, verbal, and physical). The relationship between internalising problems and victimisation may also differ according to participant roles of bullying (e.g., bully, victim, bully-victim, bystander). The chapter will conclude with a discussion on the implications, significance, and further recommendations on this topic – for example, whether modifiable protective factors can be identified to support targeted interventions for children involved in bullying, and whether novel methodologies can improve the direction of research in this area to produce a better understanding of causal pathways that may lead to resilient outcomes.

Methodological difficulties associated with establishing causality

In a flagship study, Hawker & Boulton (2000) compiled twenty years of research to study the link between peer victimisation and psychological maladjustment. They found that individuals who were victimised by peers were also more likely to report internalising problems such as depression, loneliness and anxiety. However, all the studies in this review and most subsequent studies in the years after used cross-sectional and retrospective designs. These designs preclude inferences about causality and have potentially more confounding sources of bias. Fortunately, in the past decade, a small but growing subset of longitudinal and prospective studies have provided insights into the direction of associations and allowed researchers to control for multiple confounding variables.

Most studies demonstrating significant associations tend to adjust for confounding variables in their analysis, which generally leads to a reduction in the strength of associations (Moore et al., 2017). Many studies may be confounded by shared method variance, retrospective reporting or personal circumstances and psychological characteristics. Shared method variance refers to when the same informants (rather than multiple informants) are used to report on all outcome variables. A meta-analysis of studies examining whether internalising symptoms were antecedents or precedents of victimisation found that a significantly larger effect size was observed for studies using the same informant to provide information on both victimisation and internalising symptoms than those who avoided shared method variance (Reijntjes, Kamphuis, Prinzie, & Telch, 2010). Retrospective reporting is also common, which may introduce biases from memory recall. While not specifically related to bullying, a meta-analysis of studies suggested that agreement between prospective and retrospective measures of childhood maltreatment were poor and as such identified different groups of individuals (Baldwin, Reuben, Newbury & Danese, 2019). Lastly, in cases where bullying and mental health symptoms

are self-reported, an individuals' own perception of social circumstances and individual psychological characteristics can influence associations. For example, adolescents at risk of depression are also predisposed to negative affective and memory biases and are thus more likely to remember and/or over-report bullying by attributing hostile intent to peer interactions (Quiggle et al., 1992). This may lead to inflated associations compared to other informant reports. Ultimately, even with a prospective, longitudinal, and multi-informant design, it is difficult to make causal inferences due to the presence of multiple confounders, including children's individual, psychosocial, family, and wider environmental characteristics – including possible school-level effects.

In many studies, information about bullying and mental health are only collected at one assessment point or are used to test only one competing hypothesis at a time (e.g., victimisation leads to poor internalising outcomes), thus making it impossible to establish temporal priority and determine whether it is being bullied that leads to internalising problems and not the reverse (Arseneault, Bowes, & Shakoor, 2010). Fewer studies have proposed causal theories on the effects of bullying by employing prospective, longitudinal, and twin study designs, where genetic and environmental confounds are controlled, and temporal priority can be established. Even though these methodological problems apply to all associations involving bullying involvement and mental health, most of the research has focused on the relationship between bullying victimisation and internalising symptoms. Thus, the following section will examine methodologies used to test the three main causal hypotheses related to this specific relationship.

The relationship between bullying victimisation and internalising symptoms

Theoretical framework and supporting evidence

The relationship between bullying victimisation and internalising symptoms is complex, and causality has been difficult to assess based on current study designs, methods, and statistical approaches. There are three main causal hypotheses explaining the link between victimisation and internalising symptoms: (1) internalising symptoms are antecedents of subsequent victimisation, (2) victimisation leads to the development of internalising symptoms, and (3) victimisation and internalising symptoms influence each other reciprocally over time.

Does bullying victimisation lead to internalising problems?

The first hypothesis proposes that bullying victimisation in early childhood leads to later internalising symptoms. This pathway has been more widely studied than its reverse association and is supported by several theoretical frameworks. The interpersonal risk model highlights the role of social relationships in the development and maintenance of internalising disorders. According to this model, internalising symptoms such as depression and anxiety are not only the results of cognitive distortions, but rather a consequence of being exposed to social environments where relationships are limited, conflicted, and unsupportive (Hammen, 1992). Also consistent with the cognitive-diathesis stress model (Beck, 1976), this model suggests that significant life stressors such as frequent victimisation may lead to a diminished sense of belonging, loneliness, avoidance, and withdrawal that produces negative evaluations. Negative cognitive biases can persist over time, developing into more severe internalising problems such as depression and suicidal

behaviours (Beck, Rush, Shaw, & Emery, 1979). Based on both models, anxiety may also develop if a victim of repeated bullying feels unsafe and hypervigilant in their environment. Over time, over-estimation of threat levels, high alertness and increased physiological arousal may increase the risk of developing anxiety (Espelage & Holt, 2001; Roth et al., 2002).

Findings from several multi-informant, longitudinal studies support this hypothesis. Schwartz and colleagues (2005) found that peer victimisation in 3rd and 4th graders (aged 7–9) predicted self-reported depressive symptoms up to one year later. Arseneault and colleagues (2006) found that victims of bullying, particularly those involved as bully-victims, had more internalising problems compared to children not involved in bullying at ages 5 and 7, even after controlling for baseline problems at age 5. These studies suggest that associations remain stable across similar age groups. In doing so, they raise the question of whether they would also remain stable across vital transition periods such as from childhood to adolescence.

Kumpulainen and Räsänen (2000) found that victims of bullying at ages 8 and 12 scored higher on internalising behaviours, relationship difficulties and psychosomatic symptoms at age 15 compared to non-involved children. Similarly, Bowes et al. (2013) found that children who experienced frequent victimisation both before and after the transition from primary to secondary school were at an increased risk for mental health and academic difficulties compared to children only bullied before or after the transition or that were not bullied at all. In line with other research, this study highlights the importance of investigating transition periods in bullying research to reduce the likelihood of children entering a pathway towards chronic victimisation.

The outcomes produced by bullying victimisation may be more harmful in adolescence than in childhood, as adolescents are at a greater risk of suicidal ideation and

at increased odds of attempting suicide (Kim & Leventhal, 2008). Bowes, Joinson, Wolke, and Lewis (2015) found that over a quarter of cases of depression at 18 years of age might be attributed to victimisation in adolescence, even after controlling for pre-existing internalising symptoms and a range of other covariates. Lastly, a systematic review of longitudinal studies found that being a victim of bullying increased the risk of being depressed an average of seven years later in life, even after controlling for other childhood risk factor (Farrington, Losel, Ttofi & Theodorakis, 2012).

Some studies have compared the associations between peer victimisation and anxiety. Stapinski and colleagues (2015) found that even when controlling for family, emotional, and behavioural factors, adolescents who had been bullied uniquely predicted symptoms of anxiety, and comorbid anxiety and depression. There may be gender differences in the relationship between bullying, depression, and anxiety; Sentse and colleagues (2017) found that depression was consistently predictive of victimisation over time (and not vice versa), whilst anxiety was reciprocally related to victimisation for girls, and a result of victimisation for boys. These results suggest that associations between internalising problems and bullying may differ between anxiety and depression and between genders. More on these moderating factors will be discussed later in this chapter.

Studies with multiple strengths including prospective, longitudinal, multi-informant measures, as well as controlling for baseline emotional and behavioural symptoms suggest that independent of any symptoms at baseline, bullying is still predictive of anxiety and depressive disorders later in life. However, there is also evidence from twin studies that genetics may play a role in the association between bullying and internalising. Two longitudinal, multi-informant studies examining monozygotic twin (MZ) differences tested this association. As MZ twins are genetically identical and share the same familial factors (e.g., poverty, parental depression, domestic violence) the outcomes cannot be

confounded by genetic variation or shared-environmental factors between the two twins. Arseneault and colleagues (2008) found that MZ twins who had been bullied had close to half a standard deviation more internalising problems compared to their co-twins who had not been bullied, even after controlling for age 5 internalising problems prior to being bullied. This study provided strong support for a causal effect, as it demonstrated temporal priority between exposure and outcome variables. In another study, Singham and colleagues (2017) found that exposure to bullying at age 11 was concurrently associated with anxiety and depression. However, when looking at longitudinal associations and controlling for pre-existing mental health symptoms, bullying at age 11 was predictive of anxiety two years later but not depression or anxiety five years later, suggesting that pre-existing vulnerabilities do not necessarily persist into adulthood and that protective factors may play a role in influencing future outcomes and promoting resilience over time.

Despite much research consistent with this hypothesis, experimental design may play a role in the effect size and stability of the associations observed. A meta-analysis by Schoeler, Duncan, Cecil, Ploubidis, and Pingault (2018), looking at the short- and long-term consequences of bullying using stringent evidence from quasi-experimental studies, found small yet significant effects that victimisation may causally impact children's anxiety and depression in the short-term, yet dissipate over time. This suggests the potential for resilience in individuals who have experienced bullying and calls for a review of current experimental designs aimed at testing this association.

Do pre-existing internalising problems lead to bullying victimisation?

The second hypothesis proposes that internalising symptoms increase the likelihood of children being victimised by peers in school. This is consistent with a symptom-driven model and “scar” theories, whereby symptoms of depression interfere with social skills

development over time, promoting other difficulties such as dysfunctional attitudes, negative attribution styles and peer relationship problems (Haeffel et al., 2005; Kochel, Ladd, & Rudolph, 2012; Rudolph, 2009). Children with internalising symptoms often exhibit highly emotional and specific behaviours such as fearfulness, withdrawal, loneliness, crying, and low self-esteem (Arseneault et al., 2006; Baker & Bugay, 2011; Egan & Perry, 1998), which might signal emotional vulnerability to bullies looking for easy targets to dominate. Furthermore, children with internalising difficulties may have more trouble defending themselves or getting support from other peers, thus being more vulnerable to bullying, as bullies may expect few repercussions (Reijntjes et al., 2010).

Findings from several multi-informant, longitudinal studies have supported the hypothesis that internalising symptoms precede bullying victimisation. Kochel et al. (2012) examined the temporal ordering of depressive symptoms and peer difficulties using path analysis, finding that elevated symptoms of depression in Grade 4 were linked to increased frequency of peer victimisation in Grade 5. Vaillancourt, Brittain, McDougall, and Duku (2013) used cascade models to examine the temporal sequence of victimisation and mental health symptoms, finding that increased internalising symptoms in Grade 5 and Grade 7 subsequently predicted increased self-reported peer victimisation in Grade 7 and Grade 8, respectively. These findings support symptom driven pathways between internalising symptoms and victimisation as no other associations were found to support reverse or reciprocal relationships. They also demonstrated that these effects can be stable over time and can be replicated using different methodologies.

Most of the evidence to support this hypothesis comes from classical observational studies. However, new and emerging research on polygenic risk scores, or the aggregated effect of many common genetic variants associated within any given trait, might be able to provide greater insights into this association. For example, one study found that polygenic

risk scores linked to depression and ADHD were associated with a greater risk of being bullied, lending support to the argument that genetic risk factors for internalising and externalising symptoms may also be a risk for being bullied (Schoeler et al., 2019). While research in this specific field is particularly promising, it is important to acknowledge that genetic risks operate in particular contexts (i.e. genetic x environmental effects) – thus wider environmental and social factors may also play a role in determining risk.

Despite studies showing support for the hypothesis that internalising symptoms lead to bullying victimisation, the findings remain somewhat inconsistent, with others observing no such association (Bond, Carlin, Thomas, Rubin, & Patton, 2001; Kim, Leventhal, Koh, Hubbard, & Boyce, 2006). This inconsistency suggests there may be substantial variation in risk factors for bullying victimisation.

Do bullying victimisation and internalising symptoms influence each other?

Transactional models of depression suggest that bullying victimisation and depressive symptoms are reciprocally related across time. This model implies that (a) depressed individuals exhibit social-emotional and behavioural difficulties that disrupt interpersonal relationships, and (b) such interpersonal difficulties perpetuate depressive symptoms that feed into the same cycle of social and behavioural problems over time (Rudolph, 2009). By testing the bidirectional causal association between bullying victimisation and depression simultaneously, temporal antecedence can be observed. A limited number of studies have tested this model.

In a series of meta-analysis of longitudinal studies, Reijntjes and colleagues (2010; 2011) found evidence for such reciprocal relationships: internalising and externalising problems significantly predicted changes in peer victimisation over time and peer victimisation significantly predicted changes in internalising and externalising symptoms

over time. Yet, the authors found the association to be stronger between peer victimisation and subsequent internalising symptoms and found no differences between strength of associations related to externalising symptoms. Among the studies in this review, Fekkes et al. (2006), in a six-month prospective study, found that depressive and anxiety symptoms, but not physical health symptoms, at the start of the school year increased the risk of being bullied for the first time at the end of the year. Similarly, children who were bullied at the start of the school year were more likely to develop new symptoms of anxiety, depression, and other somatic symptoms at the end of the year. Although this study controlled for baseline factors, the shared method variance and short lapse between assessments made it unclear as to whether these effects would persist in the long-term and be replicated using multiple informants.

Two large multi-informant, longitudinal studies have examined bidirectional associations between depression and internalising symptoms. Sweeting and colleagues (2006) found a significant reciprocal relationship between depression and victimisation. The association between victimisation at age 11 and depression at age 13 was stronger than that of depression at age 11 and victimisation at age 13. Yet two years later, depression increased in strength as a predictor of victimisation, while victimisation had no impact on depression. Forbes and colleagues (2019) found that depression, anxiety, and peer victimisation had small but significant unique bidirectional relationships. Depressive and anxiety symptoms at age 10–11 predicted later victimisation at age 12–13, and peer victimisation at age 10–11 uniquely predicted both depressive and anxiety symptoms at age 12–13. Over time the majority of predictive relationships were through the overlap and stability among constructs between assessments. This gives rise to another interesting suggestion, which is that bidirectional associations may be partly accounted for by common

symptomology in both internalising disorders, rather than unique variance specific to either depressive symptoms or anxiety symptoms.

These studies support a transactional model where youth are constantly interacting with their environment leading to different developmental outcomes. Although there might be a stronger association between peer victimisation and future internalising, we can conclude that internalising symptoms may be both antecedents and consequences of bullying. Even if reciprocal relationships were observed when all pathways were tested, the mechanisms related to the stability of bullying trajectories over time are still unclear. Some studies suggest that victimisation is related to characteristics that individuals carry with them across contexts, which might make them more prone to chronic bullying and worsened outcomes later in life (Forbes et al., 2019). Future research needs to assess these associations continuously for longer periods of time and continue to explore factors that may alter the strength, stability, and trajectory of bi-directional associations.

Pathways and Mechanisms

There is strong evidence that being bullied may lead to internalising symptoms over time, and that the relationship may be reciprocal. However, we have very limited knowledge about the pathways and mechanisms involved in these associations. A systematic review by Kretschmer (2016) summarised research on mediation pathways between peer victimisation in adolescence and later outcomes and concluded that research has mostly focused on self-perceptions, emotional constructs, and behavioural reactions to peer victimisation. Findings suggest that emotion dysregulation and poor emotional assertion (McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2009; Mahady Wilton, Craig, & Pepler, 2000) self-blame (Chen & Graham, 2012) and rejection sensitivity (i.e., anxious expectations of not being accepted or of being overtly rejected;

Zimmer-Gembeck, Trevaskis, Nesdale, & Downey, 2014) mediate the association between peer victimisation and internalising symptoms. Substance abuse and violent behaviour partially mediated the association between cyber victimisation and suicidal behaviour (Litwiller & Brausch, 2013), and self-esteem and self-evaluation also partially mediated the association between peer victimisation and internalising symptoms (Raskauskas, Rubiano, Offen, & Wayland, 2015; Ybrandt & Armelius, 2010). Children exposed to bullying at a young age may develop distorted beliefs about their social environment and themselves, facilitating the development of negative cognitive biases that are known to develop and maintain internalising symptoms such as depression and anxiety (Beck et al., 1979). Although it is possible that affective biases in cognition may play a mediating role, this pathway has not yet been studied. Only one study has looked at behavioural, emotional, and cognitive regulation as a mechanism linking peer victimisation and internalising symptoms. Adrian, Jenness, Kuehn, Smith, and McLaughlin (2019) found that difficulties with behaviour regulation mediated the association between peer victimisation and depression symptom, whereas cognitive regulation difficulties mediated the association with anxiety symptoms. This suggests that even among different dimensions of emotional and cognitive processing, there can be specific mechanisms that link bullying with internalising symptoms.

Moderators

Contextual factors

Many contextual factors (such as the school context) can strengthen or weaken individual and interpersonal risk factors associated with bullying victimisation. For example, the association between internalising symptoms and bullying can be influenced

by school policies on disinhibiting or promoting aggression, protecting, or failing to protect children seeking support, and bystander behaviour. Karna, Voeten, Poskiparta and Salmivalli (2010) investigated the role of bystander behaviour in bullying situations, finding that social anxiety and peer rejection were strongest in classrooms that were high in reinforcing bullying and low in defending victims. This suggests that bystanders' behaviours in bullying situations may moderate the effects of individual and interpersonal risk factors for victimisation.

Within the social and classroom context, peer-rejection and absence of protective friends may act as risk factors. Peer rejection can moderate the relationship between internalising symptoms and victimisation (Hodges & Perry, 1999). Longitudinal studies have found that the number and peer status of friends protect children from peer victimisation by buffering the impact of individual and family risk factors (Fox & Boulton, 2006; Schwartz, Mcfadyen-Ketchum, Dodge, Pettit, & Bates, 1999). Having a high quality friendship marginally moderated the impact of internalising on victimisation (Hodges, Boivin, Vitaro, & Bukowski, 1999). Thus, many school and contextual factors can interact with individual level factors to influence associations.

Individual factors

Gender: Gender has been examined as potentially exerting differential effects on the associations between victimisation and internalising symptoms. Lester and colleagues (2012b) found that depression in males was both a precedent and antecedent for victimisation over the primary to secondary school transition, whereas for females, depression was an antecedent only. On the other hand, anxiety was found to be both a precedent and antecedent for victimisation for both genders. Kaltiala-Heino, Fröjd and Marttunen (2010) found that victimisation and bullying perpetration at age 15 predicted later depression at

age 17 in boys, whereas for girls, depression at age 15 predicted subsequent victimisation at age 17. Sentse et al. (2017) found results to vary substantially by gender; depression preceded victimisation for boys and girls, anxiety preceded victimisation in boys and was reciprocally related to victimisation for girls. Gender and age differences raise important issues in relation to the temporal sequencing of victimisation and internalising problems. Being female might be a risk factor for the association between depression and subsequent victimisation, whereas both genders are equally at risk for depression following victimisation. Yet, there is an equally large body of evidence showing no gender differences in the relationship between bullying and internalising symptoms (Schwartz et al., 1999; Fekkes et al, 2006; Vaillancourt et al., 2013; Bowes et al., 2013). However, it is possible that these results may be explained by other methodological factors such as recruitment and sampling designs, adjustment or lack of adjustment of other confounders, different types of statistical analysis procedures, or sample characteristics. Future research should continue to disentangle the moderating role of gender.

Age, duration, and trajectory: Bullying is known to start as early as preschool, increase through middle childhood and adolescence and decrease close to early adulthood (Pellegrini et al., 2010). Similarly, the onset for some internalising problems occurs in early childhood, with the median incidence of anxiety disorders peaking at age 6 and depressive disorders, a bit later, at age 15 (Solmi et al., 2021). Despite their different onset ages, trajectories typically worsen in adolescence and persist into early adulthood (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). It is possible that early victimisation in preschool or elementary is situational and only as children are constantly exposed to bullying do they get caught in a cycle in which bullying and maladjustment feed of one another and the effects become apparent (Hodges & Perry, 1999). Consistent with these

observations, primary school children who exhibit or report internalising symptoms were at increased odds of being persistently bullied through secondary school compared to non-bullied controls (Lester & Cross, 2014).

Evidence from longitudinal studies show that trajectories of bullying victimisation where children are chronically victimised are associated with worse mental health outcomes than those only transiently victimised. Bowes and colleagues (2013) tested whether victims of chronic bullying differed in mental health outcomes compared to groups of non-victimised children, primary school victims only, and secondary school victims only. Children who experienced chronic victimisation from primary to secondary school were the most vulnerable group; they reported significantly greater levels of internalising problems when compared to all other groups, even after controlling for earlier internalising problems and family background characteristics before victimisation occurred. Biometric analyses revealed that stability in victimisation over this period was influenced primarily by genetic and shared environmental factors.

Although the onset of bullying may be important in determining chronicity, there is some evidence to suggest that the impact of bullying is worse in adolescence as it's a time where peers matter the most, both in terms of identity formation and for social support, and mental health problems may develop or worsen. Indeed, even under laboratory conditions, where any effects from the immediate social environment were controlled, older adolescents (age 14-15) exposed to rejection through the Cyberball paradigm (Williams et al., 2000) reported lower mood and greater anxiety following the rejection condition than young adolescents (11-13) and adults (Sebastian et al., 2010). This study suggests that the ability to regulate distress resulting from social rejection may be particularly magnified during adolescence.

Types of bullying: Different types of victimisation may relate differently to internalising problems. The main types of bullying identified include traditional forms of bullying such as physical (e.g., physical threats and harm), relational/emotional (e.g., social exclusion and spreading rumours) and verbal (e.g., teasing and name calling) and newer forms such as cyber or online bullying (Smith, Cowie, Olafsson, & Liefhoghe, 2002; Smith et al., 2008). Verbal and relational bullying occur more frequently than physical and cyber bullying (Wang, Nansel, & Iannotti, 2011).

Most studies covered in this chapter used traditional bullying in their measures to establish temporal associations. Yet, limited evidence coming from longitudinal studies indicate that there is also a bi-directional relationship between cyberbullying and internalising symptoms. Adolescent victims of cyberbullying were more likely to develop depressive symptoms, and adolescents reporting depressive symptoms were more likely to be victims of cyberbullying (Gamez-Guadix, Orue, Smith & Calvete, 2013). Other research has linked cyberbullying with low self-esteem, anxiety, and depression even after controlling for traditional bullying (Fredstrom, Adams, & Gilman, 2011), suggesting that independent of each other, both types of bullying may contribute to internalising symptoms. Although effect sizes tend to be lower for cyberbullying compared to traditional forms of bullying, a consistent finding is that worse outcomes result from being a victim of both cyberbullying and traditional bullying (Smith, 2019).

Different types of bullying may result in other internalising outcomes besides depression. Pickard, Happé, and Mandy (2018) found that self-reported relational but not physical victimisation at age 8 predicted increased social anxiety symptoms, as reported by their parents, at age 13. A large, randomised, two-year prevention trial found that the relationships between different forms of victimisation, anxiety, and depression were moderated by gender; reductions in relational victimisation for girls moderated rates of

depression and anxiety, whereas reductions in physical victimisation predicted reductions in the same outcomes for boys (Vuijk, van Lier, Crijnen, & Huizink, 2007). This suggests sex-specific pathways for different types of victimisation leading to internalising symptoms.

Less focus has been directed at the proposition that internalising symptoms may invite a specific type of bullying victimisation. Forbes et al. (2019) found that depressive symptoms at age 10–11 predicted physical and relational victimisation at age 12–13, while anxiety at age 10–11 predicted cyber victimisation at age 12–13. Although it is unlikely that these factors are acting in isolation, these findings warrant future examination as they could contribute important information regarding the dynamics of bullying.

Resilient Pathways and Protective Factors

Not all children who are bullied will develop internalising symptoms and not all children with internalising symptoms will be bullied. Identifying factors that influence vulnerability to bullying victimisation as well as protective factors that help to buffer bullied children from developing internalising problems is important for informing targeted intervention programmes. This section will look at possible resilient pathways mediating the relationship between internalising symptoms and bullying, and both individual and contextual factors influencing this relationship.

Consistent with a stress-buffering model which posits that social support protects individuals from the potentially adverse influence of stressful events (Cohen & Wills, 1985), family, social, and environmental contexts may play a role in promoting resilient pathways. Families in particular may play an important role. Bowes, Maughan, Caspi, Moffitt, and Arseneault (2010) found that family level protective factors such as sibling warmth, a positive atmosphere at home and maternal warmth led to greater emotional

resilience following victimisation. Using a twin differences design to account for genetic confounding, they also showed that differences in maternal warmth correlated with differences in behavioural resilience following bullying victimisation (conceptualised as fewer behavioural difficulties than would be predicted, given the level of bullying experienced). These findings provide strong support that maternal warmth can be a protective factor.

Individual factors may also influence the relationship between bullying and internalising symptoms. Barchia and Bussey (2010) examined social cognitions as mediators for the relationship between peer victimisation and later depressive symptoms. They looked at the role of self-efficacy (i.e., the belief in one's ability) to enlist adult and peer support, and collective efficacy (i.e., the belief in a group's ability to achieve a collective outcome) in the school's ability to inhibit peer aggression. The relationship between victimisation and depressive symptoms was partially mediated by collective efficacy beliefs in students and teacher's ability to stop bullying, and self-efficacy to enlist support from a friend. Students with high self-efficacy to enlist the support of friends were less depressed than those low in self-efficacy to enlist support. Victimization impacted self-efficacy to enlist support via collective efficacy beliefs in students' and teachers' ability to stop bullying. Thus, being bullied undermined children's beliefs in their schools' collective ability to stop bullying, which lowered their own perception of being able to enlist support from friends. This study suggests that promoting positive cognitions and self-efficacy may result in increased help-seeking, less internalising and further victimisation for individuals with a history of victimisation. However, another interpretation is that we need to improve students and teachers' actual ability to reduce and stop bullying, by giving them the tools and training to feel confident in taking action.

Sapouna and Wolke (2013) examined the role of individual, family, and peer characteristics on emotional and behavioural resilience following victimisation. Adolescents who reported low depression at age 14 despite frequent victimisation at age 13, were more likely male, had higher self-esteem, felt less socially alienated, experienced low conflict with parents and were not victimised by siblings compared to those with higher levels of depression. This study provides additional evidence in support of the protective effect of families, but the factors examined only accounted for a small amount of variance in resilience to bullying. Research into factors that promote resilience to bullying victimisation is still in its infancy.

Implications for intervention

We have identified three direct pathways influencing the association between bullying and internalising symptoms, and possible risk and protective factors that may buffer victimised children from the negative effects of bullying. These factors rarely act in isolation; they are closely correlated and often form part of a network producing combined, additive, or synergistic effects. Disentangling the various effects associated with these major factors could aid in informing interventions and promoting resilience. Establishing that internalising symptoms are both antecedents and consequences of bullying can have tremendous implications in health and school policies. Notably it recognises that two direct pathways can be intervened to prevent further risk and increase resilient outcomes (a) internalising symptoms can be identified and treated to prevent bullying and (b) bullying can be targeted in schools to prevent internalising problems. Whether one path is more effectively targeted than the other may depend on the context and specific characteristics of the target population.

If being bullied is causally linked to future internalising symptoms, the focus of interventions should be on stopping bullying as they may result in the added benefit of reducing distress in victims once the bullying has stopped. Several randomised controlled trials of antibullying interventions provide support for this hypothesis. For example, Bonell et al. (2018) tested the Learning Together intervention in the UK; a whole-school approach to modify the school environment, incorporate restorative practices and promote emotional education by teaching social and emotional skills in secondary schools. After three years, results showed reductions in bullying victimisation in intervention schools compared to control schools. Students in intervention schools also reported higher quality of life, psychological wellbeing, and less emotional problems than students in control schools.

If internalising symptoms precede bullying, then interventions should focus on targeting internalising symptoms as they may have the additional benefit of decreasing children's vulnerability to being bullied. For example, in a randomised controlled trial, Berry and Hunt (2009) reported the effects of a cognitive behavioural intervention on the incidence and impact of bullying outcomes in anxious adolescent boys. This intervention was aimed at teaching anxiety management, coping strategies and social skills to deal with bullying. At post-intervention, anxious adolescent boys in the intervention condition reported a significant reduction in their bullying experiences, anxiety, and depression, compared to the control condition. Despite a small sample size, these results suggest that interventions focusing on early internalising symptoms may be effective at reducing the frequency and consequences of bullying. By building adolescents' resilience through the use of effective social and coping skills, interventions such as this may reduce the incidence and impact of numerous mental health problems. However, these individually focused programs do not target the full range of factors that may place children at risk. They also place the focus on individuals rather than the social context, which means that if school

norms are not changed or new policies adopted, then bullying can persist. Overall, large whole-school anti-bullying interventions can benefit from using tailored support to help individuals as many contextual factors can influence the relationship between bullying and internalising symptoms. Furthermore, in transition periods from primary to secondary school, where peer relationships are often determined, programmes could include time-sensitive components aimed at helping children build healthy social skills, manage internalising symptoms, and maintain positive contact with peers.

A note on bullying perpetration and internalising symptoms

The relationship between bullying perpetration and internalising does not appear to be reciprocal in the same way as with bullying victimisation. Studies show that while perpetration predicts internalising problems (O'Moore & Kirkham 2001; Kumpulainen et al., 2001) internalising symptoms do not consistently predict bullying perpetration across studies (Kljakovic & Hunt, 2016; Farrington & Baldry, 2010). Indeed, most studies suggest that children who are nervous, inhibited, shy, depressed, with low self-esteem or anxious don't tend to be aggressive later in life (Farrington & Baldry, 2010). For example, in the Cambridge Delinquent Study, researchers found that there was no tendency for children rated as nervous or withdrawn by their mothers at age 8-10 to become bullies, or for bullies to be rated as nervous or shy at age 12-14 (Farrington & Baldry, 2010). Only one study has in fact found evidence for a bidirectional association between bullying perpetration and internalising symptoms. Da Silva et al. (2019) found that in a sample of 13,200 youths aged 12-17, bullying perpetration was associated with an increased likelihood of moderate/high internalising problems at follow up while youth with moderate/high internalising had higher odds of bullying at follow-up. It is possible that the association between perpetration and internalising problems is generally overestimated as it may be confounded by conduct

problems, which are in turn highly correlated with internalising problems (Ghandour et al., 2018). Indeed, a study found that after adjusting for conduct problems, bullying perpetration was no longer significantly associated with later depression (Ganesan et al., 2021). Overall, perpetration appears to be more strongly associated with subsequent internalising symptoms, rather than the reverse pathway, but more longitudinal studies controlling for other externalising problems are needed to confirm this.

Section summary

Internalising symptoms have been reciprocally linked to bullying victimisation across childhood and adolescence. The relationship with bullying perpetration has been more difficult to determine and does not appear to be reciprocal. Indeed, the directions of any causal relationships can be challenging to establish given several methodological issues and limited research on mechanisms that might explain these associations. Notably, research suggests that the relationship between internalising symptoms and bullying victimisation, and to some extent other relationships between internalising symptoms and bullying perpetration may persist into adulthood and vary according to age, gender, type of bullying or participant roles of bullying. Indeed, disentangling this relationship could produce a better understanding of causal pathways that may lead to resilient outcomes and inform interventions in targeting the specific needs of young people.

The relationship between bullying and externalising symptoms

Methodological problems specific to bullying and externalising symptoms

The methodological limitations discussed earlier in this chapter also apply to bullying perpetration and externalising symptoms. However, there are several other

considerations for studying this relationship. As mentioned previously, bullying perpetration and externalising symptoms may both be symptoms of the same underlying theoretical construct, which persists over time and has different behavioural manifestations at different ages. For example, bullying perpetration may be an earlier stage in a developmental sequence leading to other externalising problems such as offending. If this was the case, perpetration would not predict later externalising problems after controlling for earlier externalising problems. In order to establish whether bullying perpetration has a causal effect, two options would be to control for externalising problems at baseline or use propensity score matching to predict the probability of engaging in bullying perpetration or developing externalising problems for bullies and non-bullies with and without externalising problems. However, from a broader perspective, we should also use externalising problem scales that don't overlap with measures of bullying or develop and validate such measures to prevent construct overlap as much as possible.

Another methodological issue in studying this association is that becoming a bully has been associated with multiple risk factors – particularly related to the family context – that may also predispose someone to poor mental health outcomes. For example, witnessing domestic violence or parental drug use, persistent conflict at home, experiencing abuse, being bullied by siblings, having permissive parents or lack of parental guidance may contribute to the risk of becoming a bully (Duncan, 2010; Cook et al, 2010; Espelage et al., 2018; Chow, Pingault & Baldwin, 2022) but may also increase the risk of externalising and internalising mental health problems. Thus, it is difficult to pinpoint whether its externalising problems or the environment that contribute to the risk of being bullied. Indeed, examining gene x environment interactions could provide insights into this association, particularly as studies have estimated the heritability of perpetration to be

about 70% (Veldkamp et al., 2019). This suggests that genetic influences make children more vulnerable to becoming a bully, over and above environmental influences.

Examining this issue is of considerable importance in developing interventions that might buffer any association between early bullying and later externalising problems. Indeed, if these associations are accounted for by the common effects of comorbid or correlated externalising behaviours, then the best approach would be to implement an intervention that targets conduct problems in general rather than ones which focus only on bullying (Fergusson & Boden, 2011; Scott, 2008; Webster-Stratton & Taylor, 2001). However, if bullying exerts an effect on later externalising independently of comorbid externalising problems this would suggest the need for interventions that are targeted specifically at reducing bullying behaviours (Rigby & Slee, 2008; Stevens, De Bourdeaudhuij, & Van Oost, 2001).

Theoretical framework and supporting evidence

Both aggression and victimisation in the peer group have been associated with externalising problems such as inattention, aggression, deviancy, delinquency, or other antisocial behaviours. In the following sections we will briefly examine the evidence for individual and reciprocal relationships for a) bullying perpetration and externalising problems and b) bullying victimisation and externalising problems.

Perpetration and externalising problems

Bullying perpetration has been reciprocally linked to externalising problems, meaning that experiencing externalising problems increases the risk of becoming a bully and bullying others increase the risk of future externalising problems. In support of the first association linking prior externalising to bullying, a study that examined childhood risk

factors measured at age 8–10 in the Cambridge Study in Delinquent Development found that externalising behaviours but not internalising problems predicted bully status at age 14. Furthermore, bully status was significantly correlated with behavioural problems such as high violence and antisocial tendencies, and individual problems such as aggressiveness and hyperactivity (Farrington & Baldry, 2010). Similarly, another longitudinal study of 977 Dutch children found that pre-school aggressiveness and motor function were associated with bully status at age 11 (Jansen et al., 2011). Notably, a large meta-analysis of 153 studies found that externalising behaviour was a predictor of both bullies and victims (Sadek, 2010). Effect sizes were small for victims and medium for bullies, suggesting that externalising might be more closely linked to bullying perpetration. These studies all suggest there is an association between externalising and future bully status, however they don't all account for confounding variables or potential genetic influences.

More often, however, studies find support for the second association – linking bullying perpetration to subsequent externalising problems. As previously mentioned, this association can be confounded by similar aetiologies. However, some studies have shown that even after controlling for a number of covariate factors, bullying perpetration during middle childhood was predictive of antisocial problems, later crime including self-reported violent offending, property offending and arrests or convictions (Gibb, Horwood & Fergusson, 2011; Farrington & Ttofi, 2011). For example, a meta-analysis of 28 studies found that the school bullies had more than twice the probability of offending than non-involved students, even after controlling for major risk factors including earlier predictors of offending (Ttofi, Farrington, Lösel & Loeber, 2011). Yet, in some cases part of the association between childhood bullying and adult offending could be explained by childhood externalising behaviours (Gibb et al., 2011). Another study using data from the Environmental Risk (E-Risk) Longitudinal Twin Study, found that bullying perpetration

and conduct (externalising) problems co-occurred in childhood and were independently associated with the same risk factors including low maternal warmth, parental antisocial behaviours, uncontrolled temperament, domestic violence and social disadvantage. Only low maternal warmth remained independently associated with bullying behaviours after controlling for conduct problems, suggesting that this factor is specifically associated with bullying perpetration. Furthermore, both perpetration and conduct problems were associated with the same poor outcomes at both ages 12 and 18. Despite this, bullying perpetration was uniquely associated with behavioural, emotional, educational and social problems at age 18 (Ganesan et al., 2021). Thus, despite the overlap between bullying perpetration and externalising problems and their shared predictors, they independently predict poor outcomes later in life.

Very few studies have examined the bidirectional relationship between bullying perpetration and externalising problems using longitudinal designs. In a study involving 1655 middle school students, Kim et al (2006) found no evidence that prior psychopathology predicted bullying behaviours, but found that bullying perpetration predicted aggression even after controlling for psychopathology at baseline. Thus, it seems that longitudinal studies with repeated measures accounting for prior levels of bullying perpetration and externalising problems are required to address these two causal hypotheses.

Victimisation and externalising problems

Bullying victimisation has also been reciprocally linked to externalising problems, meaning that being victimised increases the risk of externalising problems and experiencing externalising problems increases the risk of victimisation. For instance, children who are often the target of peer victimisation are at risk of developing hostile

social-cognitive biases (Dodge et al., 1990), which may turn into aggressive behaviours later on. Children who are victimised may use aggression to defend themselves against their bullies or even become bullies themselves (Barker et al., 2008; Haltigan & Vaillancourt, 2014). In support of this hypothesis, Rusby et al (2005) found that students experiencing frequent victimisation during middle school were more likely to exhibit aggressive and antisocial behaviour in high school even when accounting for earlier levels. While verbal harassment specifically predicted antisocial behaviours, physical harassment predicted both antisocial behaviours and aggression. While most studies examining externalising symptoms have linked experiences of peer victimisation in childhood to violence and crime (Gibb et al., 2011) or attention and aggression (McGee et al., 2011), another study found that being bullied as a child was associated with later alcohol and drug abuse compared to not being bullied (Radliff et al., 2012; Tharp-Taylor et al., 2009). Notably, one study found that being victimised in grade 10 predicted a twofold increase in the likelihood of depressive symptoms as well as increased likelihood of weapon-carrying, theft and violent behaviours in grade 11 (Hemphill et al., 2011). Overall, these studies suggest that there is a high probability of developing aggression and other dangerous outcomes after experiencing different types of peer victimisation, thus only focusing on internalising symptoms and general forms of victimisation may lead to oversimplified and inaccurate representations of these relationships.

Research examining the link between externalising symptoms and risk of victimisation also proposes that children who often exhibit behaviours such as disruptiveness, aggression, and argumentativeness may irritate and provoke other children, which may invite bullying. Children who display aggressive or hostile behaviours and are victimised as a result are sometimes referred to as “provocative victims” or “aggressive victims” (Schwartz et al., 2001). Some studies have demonstrated that externalising

problems may predict significant increases in peer victimisation (Hanish and Guerra, 2000). For example, a large, nationally representative, multi-informant, longitudinal study found that early externalising problems such as acting out behaviours and attention problems in kindergarten, 1st, 3rd and 5th grade predicted bully status at Grade 8 (Natesan, Mitchell & Glover, 2018). This relationship has not been the focus of research in many studies and thus requires further attention.

In support of a bidirectional relationship, Reijntjes et al (2010) examined prospective linkages between peer victimisation and externalising problems. Specifically they examined whether (a) peer victimisation at Time 1 predicted changes in externalising problems from Time 1 to Time 2 (i.e., differences in Time 2 externalising problems after controlling for Time 1 externalising problems) and (b) externalising problems at Time 1 predicted changes in peer victimisation from Time 1 to Time 2 (i.e., differences in Time 2 peer victimisation after controlling for Time 1 peer victimisation). They found that peer victimisation significantly predicted increases in externalising problems over time and externalising problems significantly predicted peer victimisation over time. The strength of association for both paths were equal in magnitude, suggesting a symmetrical bidirectional relationship. The findings suggest the existence of an escalating cycle of peer victimisation, in which children who display externalising problems behave in ways that appear to further elicit attacks against them. The experience of peer victimisation, in turn, leads to increases in these behaviours (e.g., use of aggression to defend oneself against peer torment).

Risk and protective factors, moderators and mediators in the relationship between bullying and externalising symptoms

Several moderators and mediators have been proposed in the relationship between victimisation and externalising. For example, one study found that the impact of being bullied was moderated by gender – males reported more aggressive behaviour than females and females reporting more somatic problems than males (McGee et al., 2011). Another study found that aggression predicted cross-sectional and longitudinal victimisation by peers even after controlling for numerous covariates, but this relationship was moderated by peer rejection (Hanish & Guerra, 2000). In contrast, high levels of parental and teacher emotional support attenuated later emotional and behavioural problems for victimised children (Yeung & Leadbeater, 2010). Similarly, a study that examined the association between friendship support and bullying involvement in 880 12–16 year olds, found that higher levels of support from friends was related to lower levels of bullying perpetration and victimisation one year later, suggesting that the quality of friendship support can protect against bullying involvement (Kendrick, Jutengren & Stattin, 2012). Other factors that have been associated with higher levels of bullying perpetration include moral disengagement and low levels of empathy. Specifically, a growing number of studies have shown that cognitive processes where a moral judgment is required can be activated in bullying situations (see meta-analysis by Killer et al., 2019). These typically involve mechanisms such as minimising responsibility, distorting consequences or euphemistic labelling (Runions et al., 2019; Romera et al., 2020). Hostile contexts can also affect the moral judgment of individuals, meaning that in schools with no anti-bullying norms or high rates of bullying, the moral judgment of individuals might be lower and thus feed into a cycle of bullying perpetration. Other studies have also shown an inverse relationship between bullying and subsequent empathy (Falla, Romera & Rosario Ortega-Ruiz, 2021)

suggesting that continuous aggression over time can lead to perpetrators developing less empathy or understanding for other people's thoughts, feelings, and emotions. Lastly, as previously mentioned, gene x environment interactions have shown that genes play a crucial role in explaining which children are at a higher risk of bullying others (Veeldkamp et al., 2019), indicating these can be useful moderators to study. More research is needed to understand the mechanisms and factors involved in the relationship between bullying involvement and externalising problems as these may inform anti-bullying programs on what intervention may be helpful at reducing both problems.

Section Summary

While research suggests a reciprocal relationship between perpetration and externalising, it is hard to distinguish between the two as they may be part of the same theoretical construct and highly influenced by genetics. The relationship between perpetration and internalising is not reciprocal – while perpetration may predict future internalising, internalising symptoms don't seem to predict bullying perpetration. Family and social support may buffer this association, while moral judgement and lack of empathy may exacerbate bullying perpetration and externalising symptoms. More research is needed in this area to determine causality and inform interventions that can maximise the reduction of both bullying and externalising problems.

Conclusions

This chapter examined the association between bullying involvement and mental health with a focus on methodological issues in studying this relationship, the theory and supporting evidence, risk and protective factors and implications for interventions. While the primary focus of this chapter is the relationship between internalising problems and

bullying victimisation, it also briefly discusses the relationship between bullying perpetration and externalising problems and bullying victimisation and externalising problems. Most of these relationships appear to be somewhat bidirectional, yet there is still mixed evidence for some.. Internalising problems might be the most salient precursor and outcome of being victimised, and externalising problems might be the most salient precursor and outcome for bullying others. However, this is a very simplistic model and not necessarily accurate, as many children who are bullied also display externalising behaviours and children who bully others may also struggle with internalising problems. It has been difficult to determine the magnitude and direction of these associations due to multiple methodological limitations, including shared method variance, personal characteristics influencing associations and lack of longitudinal studies. Moreover, confounding variables, shared risk factors, and potentially overlapping theoretical constructs also make it difficult to establish causal associations. Several factors have been identified as potential risk and protective factors moderating these relationships and include school factors such as anti-bullying norms and school climate, family factors such as level of sibling bullying, parental support or parental conflict, and also peer factors such as having a close friend and peer rejection. It is important to understand these associations as they can inform the approach and components anti-bullying interventions pursue in tackling both bullying and mental health. For example, whether internalising or externalising problems should be targeted more specifically as these may reduce bullying involvement, or if reducing bullying is the best approach for reducing mental health problems. Most evidence suggest that both approaches would maximise the impact of interventions, however these should always be dependent on the population and context in which they are being applied. In the following chapters, I build upon some of the methodological limitations and knowledge of known risk and protective factors discussed

in this literature review to illustrate the application of theoretically driven and novel methodologies to examine the relationship between bullying and mental health in a ‘natural’ experiment.

Chapter 3. What happens to children's mental health and peer relationships during periods of restricted and unrestricted social interactions? Results from the Co-SPACE study in primary school aged children

Abstract

Background and aims: Children's experiences of peer victimisation and peer aggression have been strongly linked to their mental health. This study explored the bidirectional association between children's peer problems and mental health in a 'natural' experiment where temporary social restrictions (i.e. school closures) that reduced peer victimisation and peer aggression were implemented and then lifted. To capture individual differences, this study also examined the joint development of peer victimisation, peer aggression and mental health and factors associated with these joint trajectories over 13 months during the COVID-19 pandemic in the United Kingdom.

Methods: The sample consisted of 2160 children aged 4-10 years for whom parents/carers completed a baseline and at least one follow-up online survey between March 2020 and May 2021 as part of the Co-SPACE study. I used generalised linear models to examine bidirectional associations, group-based trajectory modelling to map joint trajectories and multinomial logistic regressions to identify factors associated with trajectories.

Results: Experiencing mental health difficulties during school closures increased the risk of experiencing peer victimisation, but not peer aggression on return to school. Experiencing any peer problems during school closures did not predict subsequent mental

health difficulties. The majority of children followed joint trajectories of low exposure to peer problems and mental health, however 16-17% of our sample followed joint trajectories of high exposure to peer problems and mental health. Low family income, family conflict, parental distress, special educational needs and lack of friendships were associated with high exposure mental health and peer problem trajectories.

Conclusions: Using data from a ‘natural experiment’ we found evidence of a unidirectional relationship between mental health and subsequent peer-victimisation. Thus, increasing children's mental health support during periods of isolation may reduce concurrent and future mental health problems and also prevent subsequent peer problems for both vulnerable and non-vulnerable children. Individual differences are key in the joint development of mental health and peer problems and can be linked to several modifiable individual and family risk and protective factors.

Introduction

Peer relationships have an important function in children's social and emotional wellbeing. While close friendships can enhance resilience and improve mental health in young people, negative peer experiences such as peer victimisation and peer aggression (hereafter collectively referred as peer problems in this chapter) can have detrimental impacts on mental health (Bagwell et al., 2005; Demir, Ozdemir & Weitekamp, 2007). Indeed, evidence from population-based longitudinal studies suggests there is a strong reciprocal relationship between peer problems and mental health problems including depression, anxiety, conduct problems and hyperactivity inattention problems, meaning that victims of bullying and perpetrators of bullying, are more likely to develop mental health difficulties, whilst having pre-existing mental health difficulties puts young people at risk of being bullied or bullying others (Reijntjes et al., 2010; Farrington, Lösel, Ttofi & Theodorakis, 2012; Schoeler et al., 2018; Schoeler et al., 2019; Vrijen et al., 2021). However, studies have also shown that when bullying victimisation and perpetration are targeted through traditional experimental methods such as anti-bullying interventions, bullying moderately decreases on average by 15-16% and perpetration by 19-20% (Gaffney, Farrington & Ttofi, 2019) but internalising mental health outcomes such as depression and anxiety do not substantially improve (Guzman-Holst et al., 2022). This might suggest that other factors such as relationships with peers and family, parental psychopathology, or an individual's pre-existing mental health might be influencing this relationship, and that perhaps other non-traditional methods may provide novel insights into this association. For instance, a natural experiment such as the COVID-10 pandemic where social interactions were periodically restricted and then unrestricted, may allow us to understand new aspects of this association and potentially open up new avenues for future research. In other words, we can leverage the disruption caused by the pandemic to

examine what happens to children's mental health when we put a temporary restriction (i.e. school closures) that reduce peer victimisation or aggression and what happens when this restriction is lifted.

In the UK (with some differences across England, Wales, Scotland and Northern Ireland), all primary schools were closed for in-person teaching from mid-March to June 2020 for the first lockdown, and from mid-December 2020 to early March 2021 for the second/third lockdown, except for children of key workers and children considered vulnerable. A timeline of full coronavirus measures from March 2020 to December 2021 can be found at The Institute for Government (Institute for Government, 2021).

There is no question that children experienced unprecedented disruptions to their social experiences as a result of the COVID-19 pandemic. Repeated school closures, online learning, social distancing guidelines, and transitioning back into in-person teaching at schools led to significant changes in key areas of daily life, with many people raising concerns about the detrimental impact this could have on children's mental health and social experiences (Holmes et al., 2020). Indeed, some studies found that limited social experiences including school closures had a negative impact on children's mental health (Rodman et al., 2022; Viner et al., 2022). Another study looking at trajectories of young people's mental health during the pandemic found that not having a quality and supportive friendship was associated with trajectory groups characterised by high levels of mental health difficulties (Guzman-Holst et al., 2022).

Yet, the impact of these enforced school transitions on peer relationships and their association with mental health during the pandemic is less clear. While we expected rates of peer problems to decrease drastically as opportunities for face-to-face social interactions were limited, we don't know the extent to which children's exposure to online interactions or social media use, and potentially cyberbullying increased to compensate for restrictions.

Nevertheless, school closures combined with other measures limiting social experiences also had the potential to decrease social support, increase children's emotional and behavioural difficulties and lead to a sharp increase in face-to-face peer problems on return to school. Only one study to date has examined changes in specific peer problems including peer victimisation and peer aggression before and during the pandemic (Vaillancourt et al., 2021). In this study, over 6,000 school-aged children were randomised at the school level to retrospectively report on rates of bullying pre-pandemic or during the pandemic. They found that 66% of primary school students reported being bullied before the pandemic compared to 48% during the pandemic, and 14% reported bullying others before the pandemic compared to 7% during the pandemic (Vaillancourt et al., 2021). Whilst this study suggests that bullying victimisation and perpetration rates were higher before lockdown than during periods of school closures, there is no study to date examining the joint development of peer problems and mental health throughout the pandemic when schools closed and re-opened several times.

In addition to studying the relationship between peer problems and mental health and their joint development over time, it is important to consider factors that may be associated with different co-development profiles. Indeed, younger children with pre-existing mental health problems, special educational needs or neurodevelopmental disorders might be more susceptible to both peer problems and mental health problems (Sentse, Prinzie & Salmivalli, 2017; Limber et al., 2016) and require additional support transitioning between school closures and re-openings. Furthermore, several other risk factors might also play a role in children's experiences of peer problems when they return to school and after. This includes risk factors specific for peer victimisation such as internalising symptoms or limited social support (Holt & Espelage, 2007; Arseneault, Bowes & Shakoor, 2009) and risk factors for peer aggression including externalising

symptoms and exposure to family conflict, including sibling bullying (Bowes et al., 2009; Wolke, Tippet & Dantchev, 2015). Disentangling trajectories and pathways between peer victimisation or peer aggression and mental health, and potential risk and protective factors associated with different trajectories can help us determine which children are more vulnerable and might benefit from additional support.

For the present study, I conducted a preliminary exploratory analysis to determine whether (a) children's peer problems during school closures predicted subsequent mental health when schools re-opened, and (b) whether children's mental health during school closures predicted subsequent peer problems, accounting for pre-school closure levels in both pathways. To further examine this association considering individual differences, my aims were (i) to identify the joint trajectories of (a) peer victimisation and mental health and (b) peer aggression and mental health, during the first thirteen months of the pandemic using parent-reported emotional, conduct and attentional/hyperactivity difficulties subscales from the Strengths and Difficulties Questionnaire (SDQ), (ii) to examine whether several known individual, family and peer-level factors such as children's pre-existing mental health problems, special educational needs or neurodevelopmental disorders (SEN/ND), child demographics, family conflict, parental psychological distress and friendship quality and support were associated with specific joint trajectories of victimisation or perpetration and mental health.

Methods

Design

The 'COVID-19: Supporting Parents, Adolescents and Children during Epidemics' (Co-SPACE) study is an online longitudinal study comprised of a convenience sample of UK parents and carers (hereafter known as parents) of children and young people aged between

4 and 16 years, who were invited to take part in monthly online surveys from late March 2020 to May 2021. The research protocol is available via the Open Science Framework (OSF; <http://osf.io/8zx2y/>), where more details on the eligibility, recruitment, procedure and participants can be found. The pre-registered protocol of the current study can be found at: <https://osf.io/jtg3h>. Deviations from the protocol can be found in [Appendix A](#). From December 2020 participants had an opportunity to enter a prize draw every month to win one £50 voucher. Ethical approval for the study was provided by the University of Oxford Medical Sciences Division Ethics Committee (reference R69060). Parental consent was obtained for participation in the study and for this report to be published.

Participants

The current study consisted of a sub-sample of parents (n=2160) who completed a baseline survey for their child (aged 4-10) between 30th March 2020 and 29th April 2020 and then completed at least one out of thirteen follow-up surveys between 1st May 2020 to 31st May 2021. Only those who completed all items for the emotional, conduct and hyperactivity/inattention subscales of the SDQ and single items for peer victimisation and peer aggression at baseline were included in the analysis. Participants with missing data on predictor variables were included in the analysis. Table 1 shows demographic and baseline characteristics for our sample.

Measures

My main outcomes including peer problems and mental health measures were assessed over the first 13 months of the pandemic and other risk and protective factor measures were assessed only at baseline (time 0). Main outcomes using the SDQ were assessed ‘over the

past six months’ at baseline (in line with SDQ guidance) and ‘over the past month’ at subsequent waves as follow-ups occurred monthly.

Peer victimisation and Peer aggression: Assessed using the SDQ single-item questions: “Picked on or bullied by other children” (peer victimisation) and “Often fights with other children or bullies them” (peer aggression), which were both rated using a 3-point Likert scale from 0 (“not at all”) to 2 (“certainly true”). Responses were dichotomised by “not at all” coded as 0 and “somewhat true” or “certainly true” coded as 1. The item for peer aggression was labelled this way (as opposed to peer bullying perpetration) to account for other types of aggression measured in this item.

Child mental health: Parents completed the parent-report version of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001) which is a widely used measure of mental health in children. This study used three of the five subscales that focus on mental health: emotional symptoms, conduct problems, hyperactivity/inattention problems. The peer aggression item was excluded from the conduct subscale in the peer aggression model. Each subscale consists of 5 items (4 in the conduct subscale) scored using a 3-point Likert scale ranging from 0 (“not at all”) to 2 (“certainly true”). SDQ scores were coded based on the 4-categorisation band for the parent-rated SDQ: low, moderate, high, very high (see www.sdqinfo.org). For more details on coding see [Appendix A](#).

Child’s pre-existing conditions: Parents reported on whether their child had any pre-existing diagnosed mental health disorders (depression, anxiety or other), and special educational needs or neurodevelopmental disorders (autism spectrum or attention deficit/hyperactivity disorders). All variables were coded as binary.

Child demographic information: Parents were asked about their child’s age, gender (male or female), ethnicity (white or non-white), and usual total household income. Income was

coded into more than £16,000 per year and less than £16,000 per year, as this reflects an income below 60% of the median income in the United Kingdom.

Family conflict: Parents responded to two single-item questions: “My child and I argue a lot” (parent-child conflict), and “My child and their siblings argue a lot” (child-sibling conflict). Each statement is rated on a 4-point Likert scale and summed to derive one cumulative continuous variable. Cumulative scores were only computed for participants who responded to both questions.

Parent psychological distress: Symptoms were assessed at baseline using a subset of 9-items (McElroy et al., 2020) from the Depression Anxiety Stress Scales (DASS; Antony et al., 1998). Each statement is rated on a 4-point severity/frequency scale ranging from 0 (“Did not apply to me at all”) to 3 (“Applied to me very much, or most of the time”) over the past week. An overall score was obtained by summing the scores for each item with a total maximum score of 27 and treated as continuous.

Friendship quality and support: Parents were asked whether their child had “at least one friend that they can turn to for support.” This was rated on a 4-point scale: “not at all”, “a bit”, “a lot” and “completely.” Responses were dichotomized by “not at all” and “a bit” coded as 0 and “a lot” and “completely” coded as 1.

Statistical Analysis

I used descriptive statistics to analyse participant demographic and baseline characteristics using R (R Core Team, 2018; v.4.1.2). A time variable was devised based on the month of survey completion, which ranged from ‘0’ for March/April 2020 to ‘13’ for May 2021. If participants had multiple entries per calendar month, then only the first entry was used in the analysis. Missing data was handled using full information maximum likelihood.

I conducted an exploratory analysis using generalised linear models to examine the relationship between mental health and individual peer problems before, during and after the second wave of school closures. For this analysis emotional, conduct and hyperactivity/inattention subscales were aggregated into a total mental health symptoms variable. Peer victimisation and peer aggression remained the same and were examined separately. Mental health and peer problem variables were averaged across 3 time points for T1 (before lockdown - October, November and December), 2 time points for T2 (lockdown – January and February) and 3 time points for T3 (after lockdown – March, April and May). When only 1 score was available for any time point (e.g. January of lockdown) these were used. The model used mental health and peer problems during school closures (T2) to predict mental health and peer problems when schools re-opened (T3), whilst controlling for both variables before school closures (T1). This analysis requires complete cases, therefore only participants with no missing data on these variables were included in this analysis (N=752). In total, four GLM models were used – two examining bidirectional associations between mental health and peer victimisation and two examining bidirectional associations between mental health and peer aggression. Binomial distributions were used for mental health outcomes and Gaussian distributions for peer problem outcomes.

For our main analysis I used group-based multi-trajectory modelling (GBTM) to model the trajectories of (a) peer victimisation and mental health, and (b) peer aggression and mental health. This modelling approach is based on semi-parametric mixture models and maximum likelihood to identify clusters of children following similar trajectories with multiple exposures over time (Nagin, 2005). I used a censored normal model for the SDQ subscales and a logit model for peer problems. I did not control for any variables to derive trajectories as this might affect true latent class formation and classification (Asparouhov

& Muthen, 2014). To determine the number of groups we fitted a series of models between one and eight trajectories with cubic, quadratic and linear functions. Once the number of groups was established, we improved model fit by examining each individual trajectory function. I determined that a combination of quadratic and linear functions best fit the data for the SDQ subscales and cubic functions for the peer problem items. Model selection was based on Bayesian information criterion (BIC), with lower values denoting a better fit (Nagin, 2005). Model adequacy was based on average posterior probabilities (APP) and odds of correct classification (OCC). Specifically models with APP values greater than 0.70 and OCC values greater than 5.0 were considered good fits. Other considerations included successful convergence and ease of interpretability. For full model specification see tables Table 3.1 and Table 3.2. Analyses were conducted using the ‘traj’ procedure in STATA 14 (Jones & Nagin, 2013).

Table 3.1. *Model selection results for GBTM*

Number of groups	BIC	AIC
<i>Peer Victimisation</i>		
1	-51848.49	-51811.59
2	-46848.52	-46780.39
3	-45635.35	-45535.99
4	-44913.40	-44782.80
5	-44315.01	-44150.35
6	-43966.33	-43773.29
7	-43547.46	-43323.19
8	-43282.04	-43026.54
<i>Peer Aggression</i>		
1	-48372.43	-48335.52
2	-43962.99	-43894.85
3	-42936.40	-42837.03
4	-42099.98	-41963.71
5	-41637.53	-41475.71
6	-41235.65	-41042.61
7	-40920.28	-40696.00
8	-40769.38	-40513.88

Note: BIC – Bayesian information criterion; AIC – Akaike information criterion. To determine the number of groups I fitted a series of models between one and eight trajectories with cubic, quadratic and linear functions. I determined that quadratic functions had the best fit in most models and a five-trajectory and a four-trajectory model had the best fit and interpretability for peer victimisation and peer aggression respectively. I then improved model fit by examining individual

trajectory shapes. Emotional symptoms followed a quadratic trend in all groups, conduct and hyperactivity problems followed a linear trend in all groups and peer victimisation and peer aggression items followed a combination of mostly quadratic and cubic trends. I also examined individual trajectory functions for N-1 and N+1 trajectory groups to make sure model fit and interpretability was still best for a N=5 or N=4 trajectory models. For the sake of comparison, this figure shows model fit indices BIC and AIC based on quadratic functions for all exposures.

Table 3.2. *Model Adequacy Results for GBTM*

Trajectory group	N(%)	AvePP	OCC
Model: Peer Victimisation			
Low MH no PV	759 (34.3)	0.92	20
mod MH low PA	401 (19.2)	0.83	22
Mod MH high VP	211 (9.9)	0.87	61
Mod-High MH low VP	416 (19.3)	0.86	26
High MH high VP	378 (17.3)	0.92	57
Model: Peer Aggression			
Low MH no PA	836 (38.1)	0.92	18
Mod-high MH low PA	511 (23.7)	0.86	19
Mod MH low PA	455 (21.4)	0.86	22
High MH mod PA	358 (16.8)	0.92	59

Note. AvePP - average posterior probability; OCC – odds of correct classification.

Membership probability (AvePP) greater than 0.70 and OCC greater than 5 represent a good model fit

In addition to the main analysis, I also examined the associations between baseline factors and trajectory group membership using multinomial logistic regression analysis in R (*lme4* package). To note, I excluded the pre-existing mental health variable as there were not enough cases per group to run the analysis. I conducted sensitivity analysis for the family conflict variable including values for participants with and without siblings to account for any differences (see [Appendix A](#), Table A1). For these analyses I report odds ratio (OR) with 95% confidence intervals (CI).

Results

My data consisted of 2,160 parental reports of children. Table 3.3 shows demographic and baseline characteristics for the sample. The mean age of the sample was 7 years old. 49% of the sample was female, 91% was of White ethnicity and most came from middle-high income families. Most of the sample had no pre-existing mental health problems or SEN/ND.

Table 3.3. *Sample demographics and baseline characteristics*

Characteristics	Frequency (%)	Range (Max Score) ^a
Child mean age (SD)	7.12 (1.89)	4-10 (10)
Child gender		
Female participants	1049 (48.6)	
Male participants	1104 (51.1)	
Prefer not to say or missing	7 (0.3)	
Child ethnicity		
White (British, Irish or Other)	1979 (91.6)	
Other ethnic backgrounds	168 (7.8)	
Prefer not to say or missing	13 (0.6)	
Pre-existing child mental health problems		
No mental health problems	2103 (97.4)	
Mental health problems	57 (2.6)	
Child SEN/ND		
No SEN/ND	1856 (85.9)	
SEN/ND	304 (14.1)	
Parental Psychological Distress (SD)	5.35 (4.46)	0-25 (27)
Prefer not to say or missing	3 (0.1)	
Family Income		
< £16,000 a year (<£310 a week) ^b	95 (4.4)	
> £16,000 a year (>£310 a week) ^b	1938 (89.7)	
£16,000 - £29,000 a year	218 (10.1)	
£30,000 - £59,000 a year	675 (31.3)	
£60,000 - £89,000 a year	524 (24.3)	
£90,000 - £120,000 a year	277 (12.8)	
More than £120,000 a year	244 (11.3)	
Prefer not to say	127 (5.9)	
Friendship Quality and Support ^c		
Has no good friends	1139 (52.7)	
Has at least one good friend	1020 (47.2)	
Prefer not to say or missing	1 (0.0)	
Parent Child Conflict M (SD)	0.84 (0.63)	0-3 (4)
Prefer not to say or missing	7 (0.3)	
Sibling Child Conflict M (SD)	1.21 (0.68)	0-3 (4)
Prefer not to say, missing, not applicable	530 (24.5)	
Family Conflict M (SD) ^d	2.07 (1.07)	0-6 (8)
Prefer not to say, missing, not applicable	578 (24.7)	

Note: SEN/ND = special educational needs or neurodevelopmental disorders; M = mean; SD = standard deviation

^a Scores include the sample range and possible score maximum score in parenthesis for continuous variables

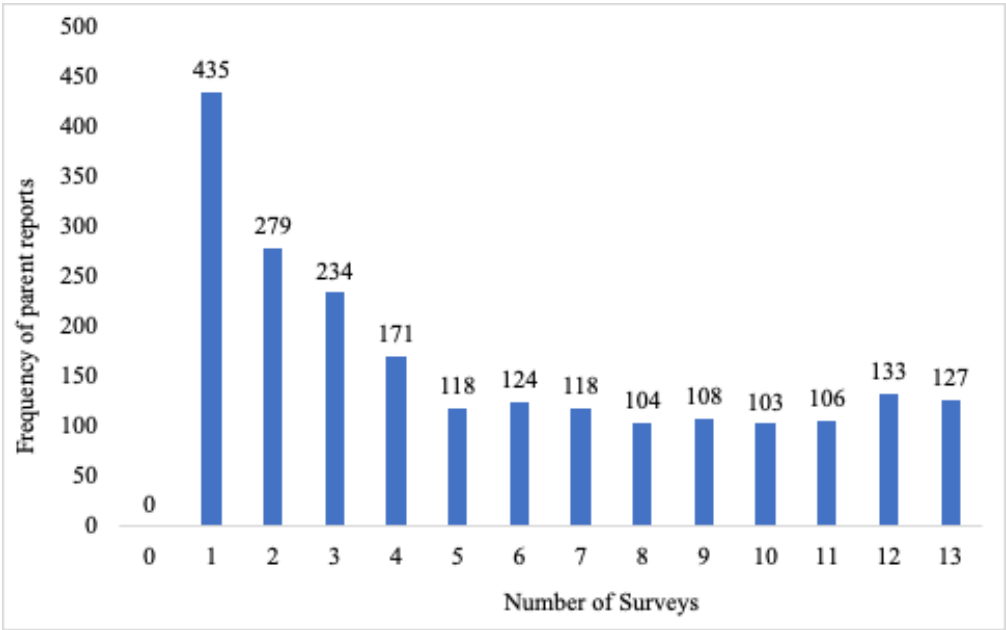
^b binary measure of family income used for analysis

^c Parents who responded “a bit” to the item asking whether their child had any friend they could turn to for support were coded as 0 and included in the group of ‘has no good friends’ as this answer does not seem to fully capture a stable quality and supportive friendship. Changing the code for this rating to 1 ‘has at least one good friend’ does not change any of the results.

^d family conflict variable includes participants with responses to both parent and sibling conflict.

Attrition was difficult to determine because respondents were allowed to complete surveys at any follow-up time point. Figure 3.1 shows that 435 parents completed two surveys including the baseline survey, most parents in our sample completed 2-4 out of 13 surveys with SDQ items, including the baseline survey. 127 parents completed all SDQ items in the survey for all time points.

Figure 3.1. *Non-cumulative frequency of surveys with all SDQ items completed by a parent across all time points*



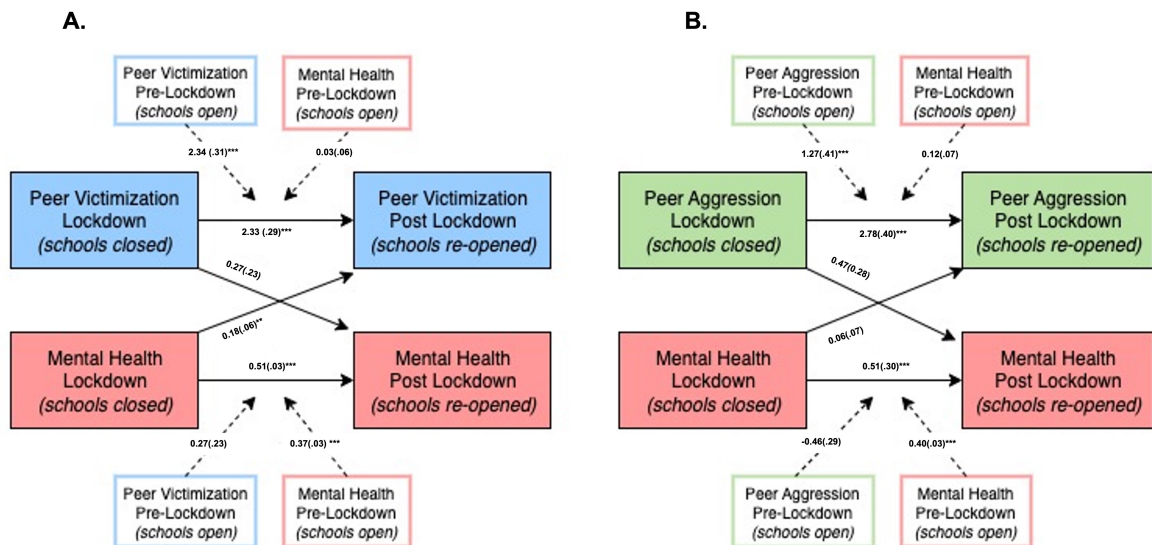
Note: participants had to complete a baseline survey (e.g. no missing data) and at least one other time point to be included in the study, thus there is no missing data at baseline.

Examining the reciprocal relationship between mental health and peer problems

The peer victimisation model is presented in Figure 3.2.A. In this model, mental health measures at T1 and T2 both individually predicted children’s mental health difficulties at T3. Similarly, peer victimisation measures at T1 and T2 both individually predicted peer victimisation at T3. Mental health at T2 was associated with increased risk of peer victimisation at T3, over and above mental health and victimisation at T1 (OR = 1.20, 95% CI:1.07-1.35). Peer victimisation at T2 did not predict mental health at T3. The

peer aggression model is presented in Figure 3.2.B. In this model, mental health at T1 and T2 individually predicted mental health at T3 and peer aggression at T1 and T2 individually predicted peer aggression at T3. Pathways between peer aggression and mental health were not significant. For all results see Table 3.4 and Table 3.5.

Figure 3.2. Pathways between A) mental health and peer victimisation and B) mental health and peer aggression



Note: Dotted lines are used to represent the effect of variables controlled for in the regression (peer victimisation or peer aggression and mental health before school closures), not moderation effects. Each pathway presents Beta (St. Error), $p < .001$ ***, $p < .05$ **.

Table 3.4. Generalised linear regression results for all pathways between peer victimisation and mental health

Model N=752	Means (SD)	B	S.E	p-value	OR	95% CI
peer victimisation (post- lockdown)	0.22 (0.42)					
mental health T1 (pre-lockdown)	9.43 (3.62)	0.03	.056	.538	1.04	0.93 – 1.16
mental health T2 (lockdown)	10.17 (3.69)	0.18	.058	.001	1.20	1.07 – 1.35
peer victimisation (pre-lockdown)	0.22 (0.41)	2.34	.309	<.001	10.41	5.70 – 19.23
peer victimisation (lockdown)	0.23 (0.42)	2.33	.294	<.001	10.27	5.78 – 18.37
$R^2 = 0.597$						
	Means (S.D)	B	S.E	p-value	t	95% CI
mental health (post-lockdown)	9.89 (3.66)					
mental health T1 (pre-lockdown)	9.43 (3.62)	0.37	.031	<.001	11.82	0.31 – 0.43
mental health T2 (lockdown)	10.17 (3.69)	0.51	.030	<.001	17.04	0.45 – 0.57
peer victimisation (pre-lockdown)	0.22 (0.41)	0.27	.229	.233	1.20	-0.17 – 0.72
peer victimisation (lockdown)	0.23 (0.42)	0.27	.226	.229	1.20	-0.17 – 0.72
$R^2 = 0.746$						

Note: OR is used for binary logistic regression (binary outcomes) and t-values for linear regression (continuous outcomes).

Table 3.5. *Generalised linear regression results for all pathways between peer aggression and mental health*

Model N=752	Means (S.D)	B	S.E	p-value	OR	95% CI
Peer aggression (post-lockdown)	0.09 (0.28)					
mental health T1 (pre-lockdown)	9.33 (3.52)	0.12	.070	.130	1.11	0.97 – 1.28
mental health T2 (lockdown)	10.07 (3.60)	0.06	.072	.400	1.06	0.92 – 1.22
peer aggression (pre-lockdown)	0.10 (0.30)	1.27	.408	.002	3.58	1.61 – 7.96
peer aggression (lockdown)	0.11 (0.31)	2.78	.401	<.001	16.14	7.35 – 35.43
R ² = .626						
	Means (S.D)	B	S.E	p-value	t	95% CI
Mental health (post-lockdown)	9.80 (3.57)					
mental health T1 (pre-lockdown)	9.33 (3.52)	0.40	.031	<.001	13.00	0.34 – 0.46
mental health T2 (lockdown)	10.07 (3.60)	0.51	.030	<.001	16.76	0.45 – 0.57
peer aggression (pre-lockdown)	0.10 (0.30)	-0.46	.287	.112	-1.59	-1.02 – 0.11
peer aggression (lockdown)	0.11 (0.31)	0.47	.279	.090	1.70	-0.07 – 1.02
R ² = 0.746						

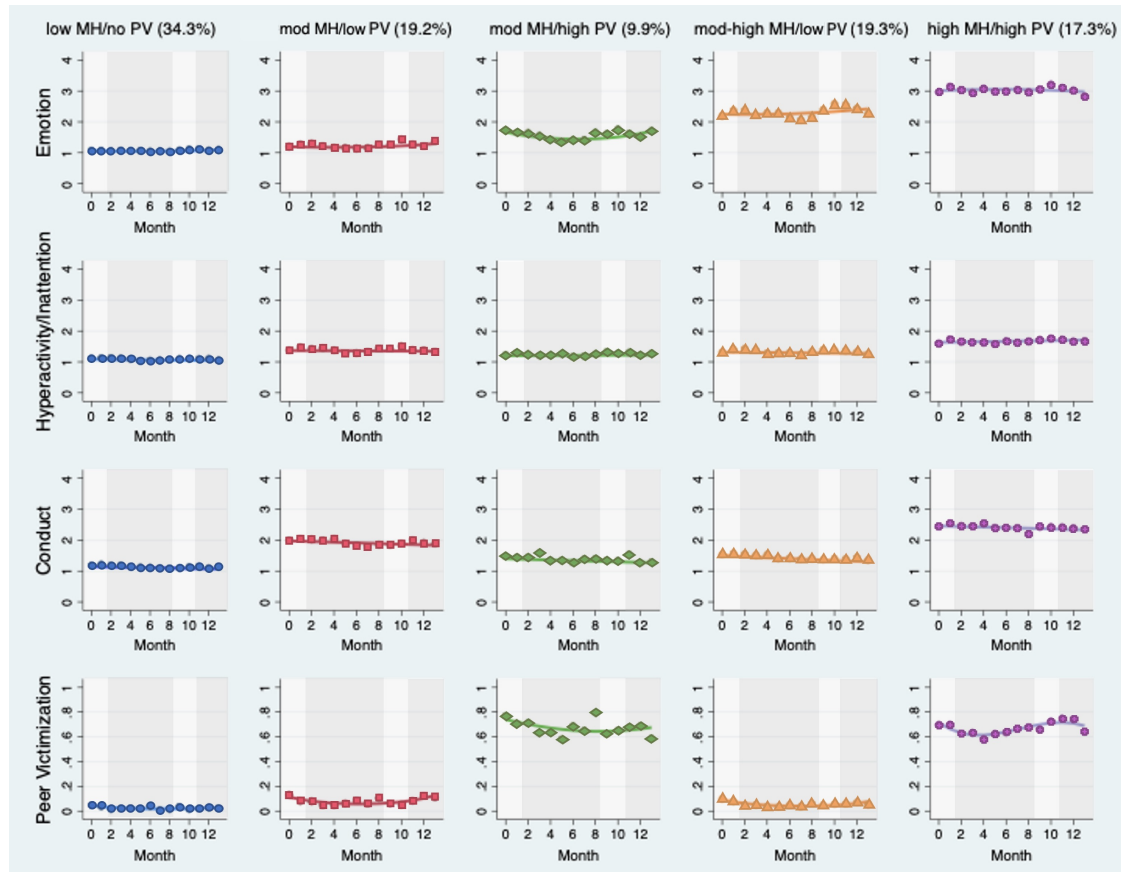
Note: OR is used for binary logistic regression (binary outcomes) and t-values for linear regression (continuous outcomes)

Joint trajectories of peer problems and mental health

Five trajectories were identified for our peer victimisation model (Figure 3.3). 34.3% (n=759) of children in our sample followed a trajectory characterised by low mental health difficulties and no peer victimisation (low stable or low MH and no PV). 19.2% (n=401) of children followed a trajectory of moderate mental health difficulties and low peer victimisation (mod MH and low PV). Another 19.3% (n=416) of children followed a trajectory of moderate to high mental health difficulties and low peer victimisation (mod MH and low PV). 17.3% (n=378) of children followed a trajectory of high mental health difficulties and high peer victimisation (high stable or high MH and high PV), whilst 9.9% (n=211) of children followed a trajectory of moderate mental health difficulties and high peer victimisation (mod MH and high PV). Overall, about 73% of children in our sample followed trajectory groups in which they were exposed to low levels of peer victimisation and almost three quarters of children in these groups experienced low to moderate mental health difficulties. In comparison, 27% of children followed trajectory groups in which

they experienced high peer victimisation and almost two thirds of children in these groups concurrently experienced high mental health difficulties.

Figure 3.3. *Peer victimisation and mental health trajectories*

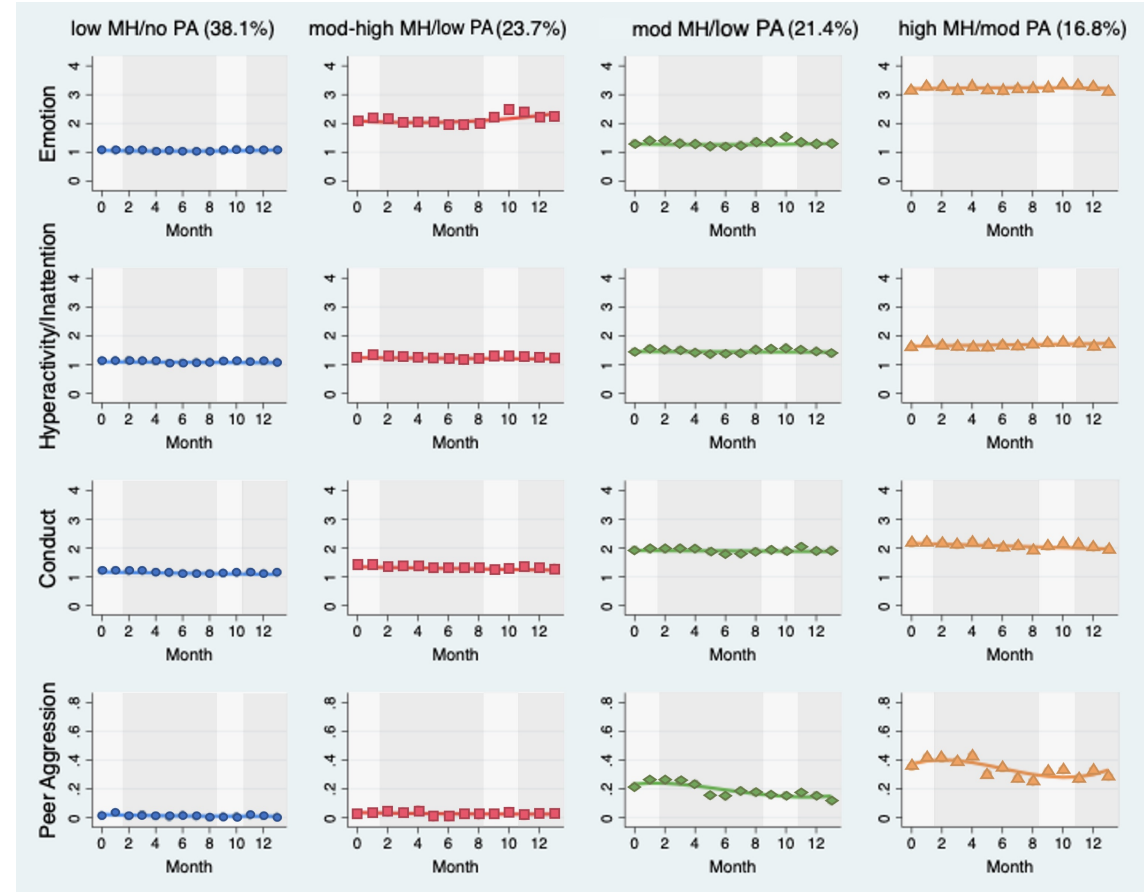


Note: Each colour represents a group of children following multiple exposures over time. The x-axis shows time in months and the y-axis shows each individual exposure. Label and size of each group (given in percentages) can be found at the top of each column. The light grey shading reflects periods of national lockdown, and the dark grey shading reflects periods when schools were open (including holiday periods at time points 4-5 and 7-8). MH = mental health; PV = peer victimisation.

Four trajectories were identified in our peer aggression model (Figure 3.4). A total of 38.1% (n=836) children followed a trajectory group characterised by low mental health difficulties and no peer aggression (low stable or low MH and no PA). 23.7% (n=511) of children followed a trajectory group characterised by moderate to high mental health difficulties and low peer aggression (high MH and low PA). 21.4% (n=455) of children followed a trajectory characterised by moderate mental health problems and low peer aggression (mod

MH and low PA). Lastly, 16.8% (n=358) of children followed a trajectory group characterised by high mental health difficulties and moderate peer aggression (high stable or high MH and mod PA). Overall, 61.8% of children followed trajectories in which they did not experience peer aggression and almost two thirds of children in these groups experienced low mental health difficulties. In comparison, 38.2% of children followed trajectories in which they experienced low to moderate levels of peer aggression, and almost half of the children in these groups experienced concurrent high mental health difficulties.

Figure 3.4. *Peer aggression and mental health trajectories*

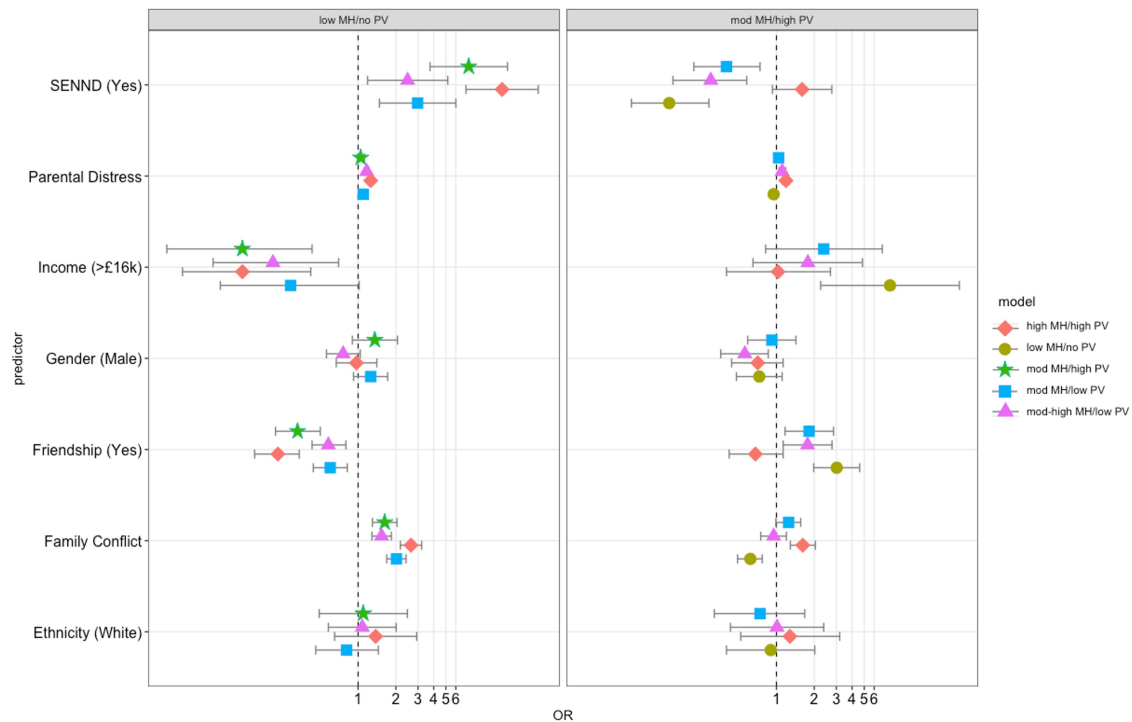


Note: Each colour represents a group of children following multiple exposures over time. The x-axis shows time in months and the y-axis shows each individual exposure. Label and size of each group (given in percentages) can be found at the top of each column. The light grey shading reflects periods of national lockdown, and the dark grey shading reflects periods when schools were open (including holiday periods at time points 4-5 and 7-8). MH = mental health; PA = peer aggression.

Factors associated with joint trajectories of peer problems and mental health

Peer victimisation (Figure 3.5): Compared to children in a trajectory group characterised by low levels of mental health difficulties and no peer victimisation (referred to as the low stable group or low MH/no PV), children in all other groups were significantly more likely to have a SEN/ND, experience high levels of family conflict, and were less likely to have at least one good friend to turn to for support. Children in most groups compared to the low stable group were significantly more likely to have parents reporting higher levels of psychological distress (except for those in the mod MH and high PV group) and more likely to come from low-income households (except for those in the mod MH and low PV group which were only marginally significant). Trajectory groups did not differ in terms of gender or ethnicity. In addition to my main analysis, I conducted one additional exploratory analysis using the trajectory with moderate mental health and high peer victimisation (mod MH and high PV) as a reference to tease out differences that may arise from groups with high victimisation and high mental health and high mental health only. Children in the group experiencing mod MH and high PV were more likely to have a SEN/ND and less likely to have a supportive friend compared to the mod-high MH and low PV. They were also less likely to have a parent reporting high levels of psychological distress and to have experienced lower levels of family conflict compared to the high MH & high PV group. For all regression results see [Appendix A](#), Table A2 and Table A3.

Figure 3.5. Factors associated with trajectory membership in the mental health and peer victimisation model – using high and low stable groups as a reference

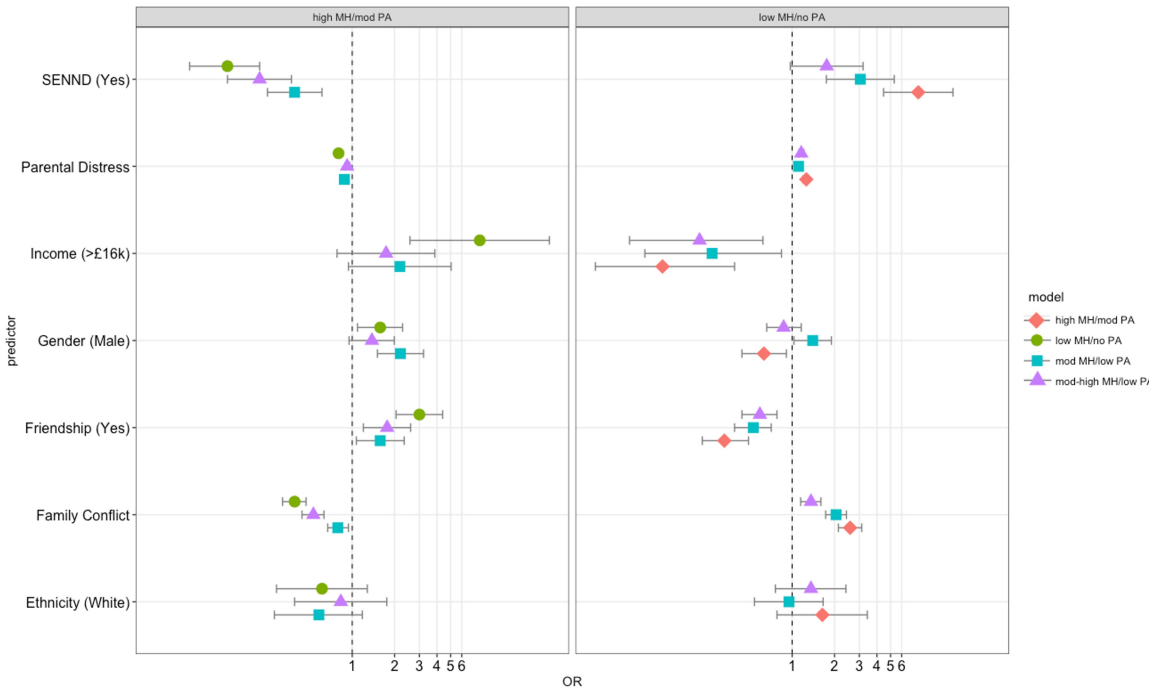


Note: This figure shows odds ratios (OR) with 95% confidence intervals (CI). CI's for parental distress are too narrow to be visualized. SENND = special educational needs or neurodevelopmental disorder. * Statistically significant OR at $p < .05$.

Peer aggression (Figure 3.6): Compared to children in a trajectory group experiencing low levels of mental health difficulties and no peer aggression (low stable group or low MH/no PA), children in all other groups were more likely to have parents reporting higher levels of psychological distress, experience higher levels of family conflict and were less likely come from a higher income family or have at least one good friend to turn to for support. Regardless of mental health, children in trajectory groups experiencing low and moderate peer aggression (but not children experiencing no peer aggression) were more likely to have a SEN/ND compared to children in low stable groups. Children in trajectory groups experiencing low peer aggression were more likely to be male while those experiencing moderate peer aggression were more likely to be female compared to low stable groups. Compared to children in trajectory groups experiencing high levels of mental

health difficulties and moderate levels of peer aggression (high stable group or high MH and mod PA), children in all other groups were less likely to have a SEN/ND, to have parents reporting higher levels of psychological distress, experience higher levels of family conflict and were more likely to have at least one good friend to turn to for support. Children in low stable and mod MH and low PA were more likely to be male than those in high stable groups. For all regression results see [Appendix A](#), Table A4 and Table A5.

Figure 3.6. *Factors associated with trajectory membership in the mental health and peer aggression model – using high and low stable groups as a reference*



Note: This figure shows odds ratios (OR) with 95% confidence intervals (CI). CI's for parental distress are too narrow to be visualized. SENND = special educational needs or neurodevelopmental disorder. * Statistically significant OR at $p < .05$.

Discussion

This study explored the bidirectional relationship between children's peer problems, including peer victimisation and peer aggression, and mental health in a natural experiment during the COVID-19 pandemic. I found that experiencing mental health

difficulties during school closures predicted peer victimisation when schools re-opened (but not the reciprocal path) and found no significant association for pathways between peer aggression and mental health. I also examined individual differences by analysing the joint development of mental health and peer problems over the first thirteen months of the pandemic. While most children followed trajectories of low peer problems and low/moderate mental health difficulties, over one fourth of the sample experienced moderate to chronic peer problems and high mental health difficulties. These groups were associated with more individual and family risk factors when compared to the low difficulties group.

My results support current theories and research findings showing that children at low risk of mental health problems are less likely to experience peer victimisation whilst those at high risk of mental health problems are more likely to be victimised (Guzman-Holst & Bowes, 2021). Even in the pandemic context, a previous cross-sectional study showed that children and young people who reported a perceived improvement in mental wellbeing also reported reduced bullying, less loneliness and exclusion compared to peers who reported no change or perceived deterioration in mental wellbeing (Soneson et al., 2022). We were able to build on these findings by examining pathways at key points in the pandemic whilst accounting for prior levels of peer problems and mental health. These results suggest that intervening or increasing support during periods of social restrictions to improve children's mental health might not only positively influence children's current and subsequent mental health but also their peer relationships. Whilst we don't know the exact mechanisms as to why or how this might happen, it is possible that improving mental health might influence emotions and cognitions related to feelings of loneliness or perceptions of isolation and encourage children to seek support or be more receptive to subsequent social experiences (Masi, Che, Hawkley & Cacioppo, 2011). Indeed, studies

have found that children who experience loneliness appear to have increased levels of depression and social anxiety (Loades et al., 2020) which could significantly impact their ability to form and maintain friendships when schools open. Digital interventions that enable remote support for child mental health problems or that enable children to apply and develop social and emotional skills could be beneficial in this context (Hill, Reardon, Taylor & Creswell, 2022; Bergin et al., 2020). Furthermore, these findings may have wider implications for children who are socially isolated due to life events, illness, or other circumstances.

As previously mentioned, many factors can influence the relationship between peer problems and mental health. The presence of other unaccounted factors in this model might explain why I did not find an association between being victimised and subsequent mental health. For example, specific pandemic-related factors such as parental stress, financial deprivation, or other factors not measured in this study such as bereavement, may very well influence and underestimate children's mental health above and beyond peer problems. Moreover, using average levels of mental health and peer problems might preclude us from understanding individual differences and identifying children that might follow distinct patterns over time. Thus, to examine the main aim of this study I used group-based trajectory modelling to avoid generalisations about average effects based on the 'majority' of children.

In this study, I identified five different trajectories for exposure to both peer victimisation and mental health (model 1) and four different trajectories for exposure to peer aggression and mental health (model 2). In both models, most children followed low stable trajectories, whilst a smaller portion followed high stable trajectories, indicating that children in this sample were able to adapt and cope both emotionally and socially to the different challenges imposed during the first year of the pandemic, including changes in

access to social experiences and support. Notably, similar individual trajectories have been reported for peer problems and mental health separately in other contexts (Oncioiu et al., 2020; Shore, Toumbourou, Lewis & Kremer, 2018). For both models, most of the variability in my trajectories came from differences in the severity of mental health. Indeed, moderate levels of mental health were mainly driven by conduct problems whilst high levels of mental health difficulties were mainly driven by emotional symptoms. Other studies examining trajectories of mental health during childhood have found similar trends emerging distinctly for internalising and externalising symptoms over a longer period (Healy et al., 2022). Ultimately my findings and that of other studies demonstrate that children exposed to stressful circumstances might benefit from different levels and types of support to deal with emotional and behavioural difficulties, rather than a ‘one size fits all’ approach. Lastly, I found one trajectory characterised by high levels of peer victimisation and moderate mental health difficulties. This trajectory was rather unexpected as we would assume that experiencing high peer victimisation would be associated with high levels rather than moderate levels of mental health (Arseneault, Bowes & Shakoor, 2010). It is likely that these children, as opposed to those experiencing high peer victimisation and high mental health had several protective factors in place, some of which might have buffered any negative impacts associated with persistent peer victimisation (Bowes, Maughan, Caspi, Moffitt & Arseneault, 2010).

Our results showed that known risk factors such as family conflict, parental psychological distress, lower income levels, and having a SEN/ND were associated with high levels of peer problems and mental health difficulties, whilst known protective factors such as having at least one supportive friend, higher family income levels, and experiencing less family conflict or parental psychological distress were associated with low stable levels of peer problems and mental health difficulties. These findings are consistent with other

studies during the pandemic showing that children with SEN/ND, low income, and limited parental support were more likely to experience mental health difficulties (Waite et al., 2021; Mansfield et al., 2021). Building on this, this study also found that peer relationships and quality friendships are just as important in protecting children from following high stable mental health and peer problem trajectories. Future research should examine the role of positive peer relationships during periods of social isolation and their impact on subsequent social functioning.

My results also suggest that family relationships played an important protective role for children who were highly victimised and followed trajectories of moderate rather than high mental health difficulties. This is in line with other studies that have reported on the protective effects of family relationships during the pandemic (Chung, Lanier & Wong, 2022; Bate, Pham & Borelli, 2021). In contrast, friendships provided a different type of support – they were more closely related to differences in peer victimisation than mental health. Independent of mental health severity, children in trajectories with low levels of peer victimisation were more likely to have at least one quality friend at baseline than those experiencing high levels of victimisation. Thus, having a quality friendship may play a role in preventing concurrent peer problems, and potentially, improving subsequent mental health. Indeed, one longitudinal study found that youth reporting lower levels of in person and online socialisation, greater isolation and less peer and parent support developed increased internalising and externalising difficulties during the pandemic, even after controlling for pre-pandemic symptoms (Rodman et al., 2022). Overall, these findings suggest that both family and peers are both important protective factors that can contribute in different capacities to children's social and emotional wellbeing. Identifying other factors and their mechanisms should be a focus for future research.

My findings should be understood in the context of some limitations. First and foremost, the lack of pre-pandemic data meant I was not able to comment on how peer relationships and mental health may have changed as a result of the pandemic. Second, it is important to highlight that this study population was not a representative sample as it was a convenience opportunistic sample biased towards middle and high-income families from White British backgrounds. Moreover, coronavirus restrictions were often changing across the UK at different times during the pandemic. Since my sample was distributed all over the UK, I did not have enough statistical power to analyse the impact of these restrictions on monthly evaluations and thus mainly focused on national restrictions. However, since the sample was spread out, it is unlikely that geographic restrictions had a significant impact on my findings. In terms of the measures used in this study, I did not use multiple informants to validate the peer victimisation and aggression items. Given the single-item questions and limited descriptions for bullying and peer aggression, I was not able to distinguish between different types of bullying (e.g. verbal, emotional, physical, cyber) and whether they varied at different points in the pandemic, or whether parental reports included sibling bullying occurring at home. Thus, it is important to acknowledge that single-item questions in this context may impact the interpretability of results as they may be capturing both irrelevant information (e.g. a single act of aggression that would not be considered bullying, based on researcher definitions) or information that is not relevant for this study (e.g. sibling bullying). Furthermore, they do not consider the impact of bullying, which both parents and children tend to consider when indicating whether bullying has occurred, and which may also provide key indicators of how problematic bullying might have been in the pandemic context. I was also not able to examine peer victimisation and peer aggression together (to capture bully-victims for example) as this model did not converge. Whilst parental reports of children's peer victimisation and mental

health have shown to be reliable (Shakoor et al., 2011), I did not control for parental mental health or other factors when deriving trajectories, thus is it possible that parents' perceptions of their child's mental health might be influenced by their own mental health (Najman et al., 2000; De Los Reyes & Kazdin, 2005) and that other pandemic and non-pandemic factors influenced trajectories. Similarly, parental reports of quality friendships might not be as reliable as self-reports, but I believe that being in prolonged contact with their child at home meant parents were more aware of their child's quality friendships during this time. In this particular context, a quality friendship (defined in this instance as having at least one friend to turn to for support) might have been underestimated as most of young children's friendships and social time revolve around face-to-face interactions. While it was still important to capture whether children were able to obtain support during this challenging time, in this context it would have been more informative to include other characteristics of a 'quality friendship' in the definition such as trust, affection and understanding, which are less context dependent. Another limitation is that I only examined covariates at baseline and thus do not consider any changes to these factors that might have occurred throughout the study period. In terms of missing data, it is important to acknowledge that there was a substantial amount of missing data as many parents did not fill out surveys every month. Even if I used well established methods to deal with missing data, my models might not fully represent all trajectories. Lastly, I generally caution against drawing any causal inferences about the direction of effects in this study due to unmeasured confounding in my models.

Conclusion

This study is unique in its ability to examine associations between joint trajectories of peer victimisation, peer aggression and mental health that emerged during the first

thirteen months of the pandemic and which were characterised by multiple changes in social restrictions. I found that mental health during lockdown predicted subsequent risk of victimisation once schools opened, suggesting that intervening on mental health during periods of limited social exposure can have positive implications for children's future wellbeing and peer relationships. This study also showed that during a time where children's lives were continuously disrupted, most children within this sample followed trajectories in which they did not experience victimisation, aggression or mental health difficulties - particularly those with less family conflict, distressed parents, more supportive peers, higher income and no complex needs. However, the majority of children who continued to be victimised or aggressive towards peers also struggled with high levels of mental health difficulties and were associated with even greater risks than children experiencing only high levels of mental health difficulties. These findings make three important contributions. First, they contribute to our understanding of the relationship between bullying and mental health. Whilst prior research suggests there is a bidirectional association, this study suggests that in some unique or non-normative contexts, unidirectional associations may carry more weight. To my knowledge, this is the only study in the bullying literature to have examined this bidirectional relationship in a 'natural' non-normative context. Second, this study contributed to children's social and emotional development literature by highlighting the importance of considering individual difference in children's experiences with limited social opportunities as these can help us make recommendations that reflect the level of support required by individuals. Third, this study contributes to our understanding of risk and protective factors when examining the joint trajectories of bullying and mental health in a natural experiment context. I found that supportive peer and family relationships can play an important role in protecting children from experiencing persistent negative social and mental health outcomes and that

additional resources are required to support children experiencing high levels of peer problems, even in circumstances where we don't expect these problems to happen. Overall, these findings highlight the importance of using a socio-ecological perspective to understand what factors influence the relationship between bullying and mental health in unique or non-normative contexts, and the potential influence of individual differences on intervention outcomes. Part 2 of this thesis will delve into the role and impact of anti-bullying interventions in reducing mental health problems, considering the effectiveness of different components, mechanisms, and the role of individual differences in determining intervention outcomes.

Part 2. The role and impact of anti-bullying interventions

Chapter 4. Do anti-bullying interventions reduce internalising symptoms? A systematic review, meta-analysis and meta-regression exploring intervention components, moderators and mechanisms.

Abstract

Background: Similar to natural experiments, evaluating change following anti-bullying interventions may also provide important causal insights into the association between bullying and mental health. Specifically, reducing bullying should reduce the impact of mental health problems. Nevertheless, little is known about the effectiveness of anti-bullying interventions in reducing internalising symptoms such as anxiety or depression, and what socio-ecological factors influence intervention effects. The aim of this systematic review, meta-analysis and meta-regression is to assess the effects of school-based anti-

bullying interventions on children's and adolescent's internalising symptoms. The secondary aims are to explore potential moderators, intervention components, and reductions in bullying as mediators of intervention effects on internalising symptoms.

Methods: I searched 9 databases: PsycINFO, Web of Science, ERIC, SCOPUS, CINAHL, Medline, Embase, ProQuest and Cochrane Library, and performed an author search of included studies in English from January 1983 to April 2021. I included studies that evaluated school-based anti-bullying interventions using controlled designs and reporting on both bullying and internalising outcomes. Random-effects and meta-regression models were used to derive Hedges *g* values with pooled 95% CIs as estimates of effect size and to test associations between moderator variables and effect size estimates. Path analysis was used to test potential mediation using effect size measures of victimisation, perpetration and internalising outcomes. Quality and risk of bias was assessed using Cochrane Collaboration tools.

Results: This review included 22 studies with 58,091 participants in the meta-analysis. Anti-bullying interventions had a very small effect in reducing overall internalising symptoms (ES, 0.06; 95% CI, 0.0284 to 0.1005), anxiety (ES, 0.08; 95% CI, 0.011 to 0.158) and depression (ES, 0.06; 95% CI, 0.014 to 0.107) at post-intervention. The reduction in internalising symptoms did not vary significantly across geographic location, grade level, program duration and intensity. The intervention component "working with peers" was associated with a significant reduction, and "using CBT techniques" was associated with a significant increase in internalising outcomes. Bullying victimisation and perpetration did not mediate the relationship between intervention condition and internalising outcomes.

Conclusions: Anti-bullying interventions have a small impact on reducing internalising symptoms. Moreover, intervention effects on bullying victimisation and perpetration are not responsible for reductions in internalising symptoms, suggesting that other factors or mechanisms might be influencing this relationship in school-based intervention contexts. Similar to other contexts explored in this thesis, this study also highlights the importance of peer involvement in interventions. Ongoing development of anti-bullying interventions should address how best to maximise their impact on internalising symptoms to safeguard young people from the damaging mental health outcomes of bullying. For example, by directly testing the risk of experiencing victimisation during an intervention and by taking into consideration individual differences such as pre-existing risk or protective factors.

Introduction

Depression and anxiety (internalising) disorders are among the most frequently diagnosed psychiatric conditions in childhood and are the leading causes of disability and burden in young people (Ghandour et al., 2019; Erskine et al., 2015). Longitudinal studies have shown continuity in internalising problems from childhood to adulthood (Hofstra et al., 2000) and higher lifetime prevalence rates compared to any other psychiatric disorder (Kessler et al., 2005) suggesting the need to identify modifiable risk factors that can be targeted in interventions during early life. Bullying victimisation appears to be one of the most tractable risk factors for internalising symptoms. Specifically, research has shown that over a quarter of cases of depression at age 18 might be attributable to bullying victimisation during early adolescence (Bowes et al., 2015). Studies suggest that young people with internalising difficulties are more likely to be bullied and young people who are bullied are more likely to develop internalising difficulties, even after adjusting for baseline internalising difficulties (Arseneault et al., 2008; Singham et al., 2017; Stapinski

et al., 2015). If this relationship is causal as it has been suggested, anti-bullying interventions offer an important way to safeguard young people's mental health.

In relation to its mental health impact, school-based bullying is recognized as a major public health issue. A study by UNESCO (2019) found that 32% of children globally had experienced bullying victimisation on one or more days over the past month and 7.3% of young people had experienced bullying on six or more days over the same time period (UNESCO, 2019). It is important to highlight that whilst most children experience low and stable trajectories of peer victimisation throughout the school years, other children experience chronic and increasing levels of peer victimisation (Barker et al., 2008; Biggs et al., 2010). Indeed, research has shown that this latter group is also the most at risk of prior and subsequent internalising problems (Sukhawathanakul & Leadbeater, 2020).

Bullying is characterised by a person repeatedly being exposed to aggressive or negative actions by another person intending to cause physical harm, psychological distress, or humiliation (Olweus, 1993). Different types of bullying include traditional forms such as physical, relational, emotional and verbal bullying, while other non-traditional forms such as cyber-bullying can take place at any time and context. In childhood, traditional bullying victimisation and perpetration predominantly occurs within the school context (Department for Education, 2018) and have been associated with higher mean prevalence rates (35%) than non-traditional bullying victimisation and perpetration (15%) across 80 studies (Modecki et al., 2014). This highlights the important role of schools as grounds for anti-bullying prevention.

Effectiveness of school anti-bullying interventions

Many school-based interventions have been devised and implemented to reduce school bullying. Gaffney, Farrington and Ttofi's (2019) meta-analysis showed that, on

average and when compared with school usual practice, these programs decreased bullying by 19-20% and victimisation by 15-16% (Gaffney et al., 2019). Yet, despite evidence showing an association between bullying victimisation and internalising symptoms (Reijntjes et al., 2010; Christina, Magson, Kakar & Rapee, 2021) not all interventions measure or report their intervention's effects on mental health. For those that do report them, findings have been mixed with some suggesting that interventions can reduce psychological distress while others find no such effects (Bonell et al., 2018; Williford et al., 2012; Dempsey and Waldron, 2009; Hoglund, Hosan and Leadbeater, 2012). Recently, Fraguas et al (2020) conducted a systematic review and meta-analysis assessing the effect of school anti-bullying interventions on mental health and found an overall effect size using Cohen's d of -0.205 (95%CI, -0.277 to -0.133). However, they only examined randomised controlled trials (RCTs) in published journal articles and used a broad definition of mental health including proxies such as mental health symptoms, quality of life, self-esteem, self-blame, and social skills. It is likely that such broad proxies for mental health resulted in larger effect sizes and more heterogeneity, but less specificity in identifying intervention effects on internalising difficulties. Further, they did not look at intervention components or whether reductions in victimisation mediated mental health outcomes. This information could aid in determining what specific components improve intervention effects on internalising and through what mechanisms they potentially operate. One of the overarching aims of this thesis is to quantify anti-bullying intervention effects' on internalising symptoms and address these limitations.

Moderating and mediating effects of anti-bullying interventions

Very little is known about the moderators and mechanisms that play a role in determining intervention effects on internalising symptoms. Several studies have shown

that type of intervention such as whole school vs targeted (Gaffney et al., 2019), age (Yeager et al., 2015; Fraguas et al., 2020), informant type (Shakoor et al., 2011), location (Gaffney et al., 2019), and number of components (Gaffney et al., 2021) may determine the effectiveness of interventions at reducing bullying. This has not been examined yet in the context of internalising symptoms and could provide important information about what type of anti-bullying interventions can improve mental health.

Understanding which specific intervention components are more effective at reducing children's internalising symptoms can also provide important recommendations on how to maximise the effectiveness of future anti-bullying programs. In a comprehensive Campbell review, Farrington and Ttofi (2009) found that increased teacher training, increased duration and intensity of the intervention, parental involvement, playground supervision, and using disciplinary methods were associated with a decrease in both bullying victimisation and perpetration. Working with peers was associated with an increase in victimisation, although this was recently found to not be the case in a follow-up review (Gaffney et al., 2021). This follow-up review found that interventions with a whole-school approach, anti-bullying policy, classroom rules, information for parents, informal peer involvement, work with victims, cooperative group work and mental health approaches were associated with larger reductions in bullying perpetration, and informal peer involvement and information for parents were associated with larger reductions in bullying victimisation. The *absence* of socio-emotional skills components was associated with significantly larger reductions in both perpetration and victimisation outcomes. Program richness (i.e. the number of intervention components used) was not significantly associated with changes in perpetration or victimisation (Gaffney et al., 2021). It is unclear whether these components would have similar effects on internalising outcomes.

In terms of mediating effects, a factor that may explain the difference in intervention's effects on internalising symptoms is the extent to which the interventions change the prevalence of bullying perpetration and victimisation (Palladino, Nocentini and Menesini, 2019). That is, if this relationship is causal as has been suggested (see Chapter 2), interventions that achieve greater reductions in bullying victimisation should theoretically lead to greater reductions in internalising symptoms. These mechanisms have not yet been examined across multiple anti-bullying programs, yet they could inform researchers and public health professionals of how these programs work and target mental health moving forward. Consequently, this study will address two aims of this thesis, which are to determine what mechanisms, factors and components are involved in anti-bullying intervention effects on mental health and what can be done to best maximise the impact of these interventions.

Study Aims

This review aims to answer the following questions:

1. Are school-based anti-bullying interventions associated with improvement or deterioration of internalising symptoms? Do effect sizes vary according to type of internalising symptom (anxiety or depression), type of intervention (targeted vs. whole-school), age group (children or adolescents) and study quality (low vs. high risk of bias)?
2. Do specific study and participant characteristics such as duration and intensity of intervention, type of informant for internalising measures, school grade level, location, and number of intervention components moderate the effect of anti-bullying interventions on internalising outcomes?
3. Do bullying victimisation and perpetration prevalence outcomes mediate the effect of anti-bullying interventions on internalising symptoms.

4. Are specific intervention components independently associated with improving or worsening internalising outcomes?

Methods

Protocol and Registration

This systematic review and meta-analysis was pre-registered with PROSPERO (CRD42020191857) and uses PRISMA reporting guidelines. Deviations from my pre-registration protocol are detailed in [Appendix B](#).

Search Strategy

For this review I searched 9 databases: PsycINFO, Web of Science, ERIC, SCOPUS, CINAHL, Medline, Embase, ProQuest and Cochrane Library from January 1983, as this is when bullying intervention notably emerged (Olweus, 1993), to May 2021. This search was complemented by an author search and a meta-analysis search to obtain as many evaluations of known intervention programs as possible. To decrease publication bias, I included theses and dissertations in addition to book chapters and journal articles written in English. The specific search strategy can be found below:

1. “intervention*” OR “program*” OR “anti-bullying” OR “anti-bullying”
2. “bulli*” OR “bully*” OR “victim*”
3. “internali#ing” OR “depress*” OR “anxi*” OR “somati*” OR “withdraw*” OR “emotional functioning” OR “emotional symptom*” OR “emotional problem*” OR “emotional difficult*”
4. “adolescen*” OR “child*” OR “school*” OR “youth”

For the author search, I used the same authors as Ttofi & Farrington (2011): Ken Rigby (Australia), Peter Smith (England), Christina Salmivalli (Finland), Rosario Ortega (Spain), Dan Olweus (Norway).

Eligibility Criteria

I included studies that evaluated an anti-bullying intervention delivered in schools to children and adolescents aged 4-19 years old. To meet eligibility criteria, the study stated a clear definition of bullying, measured bullying perpetration or victimisation as a primary outcome, and measured internalising symptoms as either a co-primary or secondary outcome post intervention. Studies reported effect sizes or relevant data that allowed for the computation of effect sizes for bullying and internalising. Bullying and internalising outcomes were measured using a validated, standardized, age-appropriate measure (internalising scales must have been completed by either child, parent or teacher, and show good internal consistency ($\alpha = 0.6$ or above), previous evidence of construct validity, ± 1 year within the suggested age range). The study design included an experimental group that received the intervention with a control group that did not. The experimental and control group could have been in the same school or in different schools. If there was more than one experimental group (e.g. two groups using different interventions) in the same study there must have been a control group not receiving any intervention. The types of designs included were: randomised experiments, experimental-control comparisons with pre and post measures of bullying and internalising symptoms between groups, and other experimental-control comparisons. For trials with multiple publications, the most relevant study was included after assessing them against all eligibility criteria. For studies that reported on two or more experimental intervention groups or one or more control groups I followed Cochrane recommended guidelines (Chapter 16.5.4) and either selected the most

relevant group/condition or split the shared group into two or more groups with smaller sample sizes to make independent comparisons.

Study Selection

A flow chart of the study selection process is shown in Figure 4.1. I identified 10,751 records (9,610 from the first search and 1,141 from the 2020-2011 search) from the electronic databases and an additional 478 records from reviews and author searches from the first search. A total of 5,454 records were retained after duplicates were removed following both searches. Two authors (CGH and MZ) used Raayan Software to independently screen titles and abstracts and identify records for full text-screening. Inter-rater reliability between the two review authors was calculated and classified as ‘almost perfect agreement’ ($k=.85$; Landis & Koch, 1977). Disagreements were resolved between two authors (CGH and MZ) and when consensus was not reached, a third review author (LB or CCr).

Data Extraction

Two authors (CGH and CCh) independently extracted study characteristics, outcome data, intervention components, and potential moderators from eligible articles. Intervention components were identified based on elements found during article screening in combination with Ttofi & Farrington’s (2009) element list. I consulted with the evaluators of the various programs by sending them our coding and description of the elements. I received author ratings for 18 out of the 22 evaluations included in the meta-analysis (see [Appendix B](#), Table B1). Missing information for key variables from included studies were also requested from authors.

Assessment of methodological quality (risk of bias)

This review used The Cochrane Collaboration's tools for assessing risk of bias for cluster randomised controlled trials (RoB-2 Cluster Randomised), individual cluster randomised controlled trial (RoB-2), and cross-over trials (RoB-2 Cross Over). Two reviewers (CGH and MZ) independently rated the quality of all included studies. Any discrepancies were initially discussed by the two reviewers and a third review author (LB or CCr) when consensus was not reached.

Effect Measures

Hedge's g effect sizes and 95% Confidence Intervals were considered the primary outcome of the meta-analysis. They were calculated using post-intervention sample size, means and standard deviation, or regression coefficients from each included study. As many studies involved clustered designs, we corrected the sample size for clustering using Cochrane Guidelines. When intra-cluster correlation coefficients (ICC) were not available, I used an average estimate from the literature ($ICC = 0.025$). For studies reporting multiple internalising outcomes, effect sizes and respective variances were averaged to obtain a single effect estimate using equations reported elsewhere (López-López, Page, Lipsey and Higgins, 2018).

Data synthesis and statistical analysis

For the meta-analysis, main results for overall internalising symptoms were examined using random-effect models with an inverse-variance approach and DerSimonian-Laird estimator and subgroups were examined using mixed-effect models. Subgroup analysis included type of internalising symptom (anxiety or depression), type of intervention (targeted vs. whole-school), age group (children or adolescents) and study

quality (low vs. high risk of bias). The Q and I² statistics were used to assess heterogeneity between study results. R packages *meta*, *metafor* and *dmetar* were used.

To assess moderation and intervention component effects, I performed meta-regression analysis for each moderator and intervention component determined a priori. Definitions for each component and moderator are presented in [Appendix B](#). For meta-regression it is recommended that each covariate contain at least ten studies (Borenstein et al., 2011) therefore type of informant was not examined as only 2 studies used a different type of informant that was not self-report.

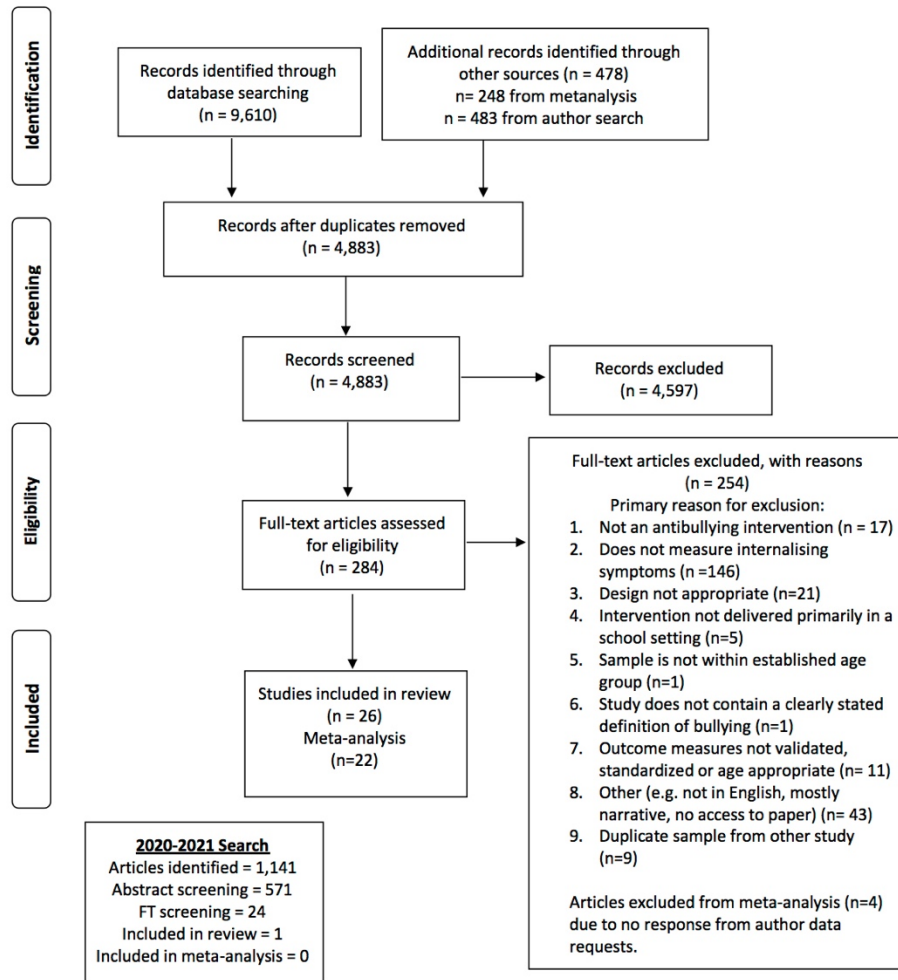
Lastly, to examine the extent bullying victimisation and perpetration prevalence outcomes mediate intervention effects on internalising symptoms, I used mean pre-post scores to calculate Hedges' g effect sizes in bullying and internalising outcomes for control and intervention groups, for each study, in a school-level mediation analysis. I calculated the direct effect "c" (effect of intervention condition on internalising), indirect effect "a*b" (effect of intervention on victimisation/perpetration and effect of victimisation/perpetration on internalising) and the total effect "c +(a*b)". To test the significance of the indirect effect we used bootstrapping procedures. Unstandardised indirect effects were computed for each of 1,000 bootstrapped samples. Two studies (Bonell et al., 2018 and Williford et al, 2012) were not included in the mediation analysis as they did not have baseline measures of internalising symptoms. These analyses were conducted using the *lavaan* package in R.

Results

Search Results

A total of 5,454 abstracts were reviewed. Of these, 27 articles were included for full-text review and 22 met criteria for the meta-analysis. The process of study selection is presented in Figure 4.1.

Figure 4.1 *Prisma Flow Chart*



Study Characteristics

Study characteristics are presented in [Appendix B](#), Table B2. In total, 27 studies conducted between 1999-2020 were included in the review. Studies ranged in sample size from 24 students in targeted interventions to 7741 students in whole school interventions. 48% of studies targeted grades 1-6, 52% of studies targeted grades 7-12. Participants' mean age was 10.5 years. 59% of studies had interventions delivered by school staff or teachers and all were based in schools. 70% of studies included whole-school interventions, 26% targeted interventions and 3.7% included both whole-school and targeted components. Most studies came from high-income countries, Australia (n = 7), USA (n = 5), England (n = 4), Canada (n = 3), Netherlands (n = 2), Finland (n = 1), Italy (n = 2), Germany (n = 1), with one study from a middle-income country (China), and one from a lower-middle

income country (Pakistan). Only one study (INCLUSIVE trial, Bonell et al., 2018) provided program costs and two others (KiVA, Huitsing et al., 2019; Williford et al., 2011) provided costs from the main trials of the study. Costs for these trials were estimated to be less than £100 per student per year, without including annual costs and once-only costs (Huitsing, Barends, Lokkerbol, 2019; Persson et al., 2018).

A summary of study design characteristics is shown in [Appendix B](#), Table B3. Studies varied in terms of study design characteristics, 51.9% (n = 14) of studies were cluster-randomised, 11.1% (n = 3) were individually randomised, 29.6% (n = 8) were not randomised, and 7.4% (n = 2) were cross-over trials. Interventions included in these studies varied considerably in their measure of internalising symptoms. 44.4% (n = 12) of studies had a specific measure of anxiety, 55.5% (n = 15) studies had a specific measure of depression, and 44.4% (n = 12) had a general measure of internalising symptoms (e.g. SDQ emotional problems subscale). More than half of the studies had more than one measure of internalising symptoms.

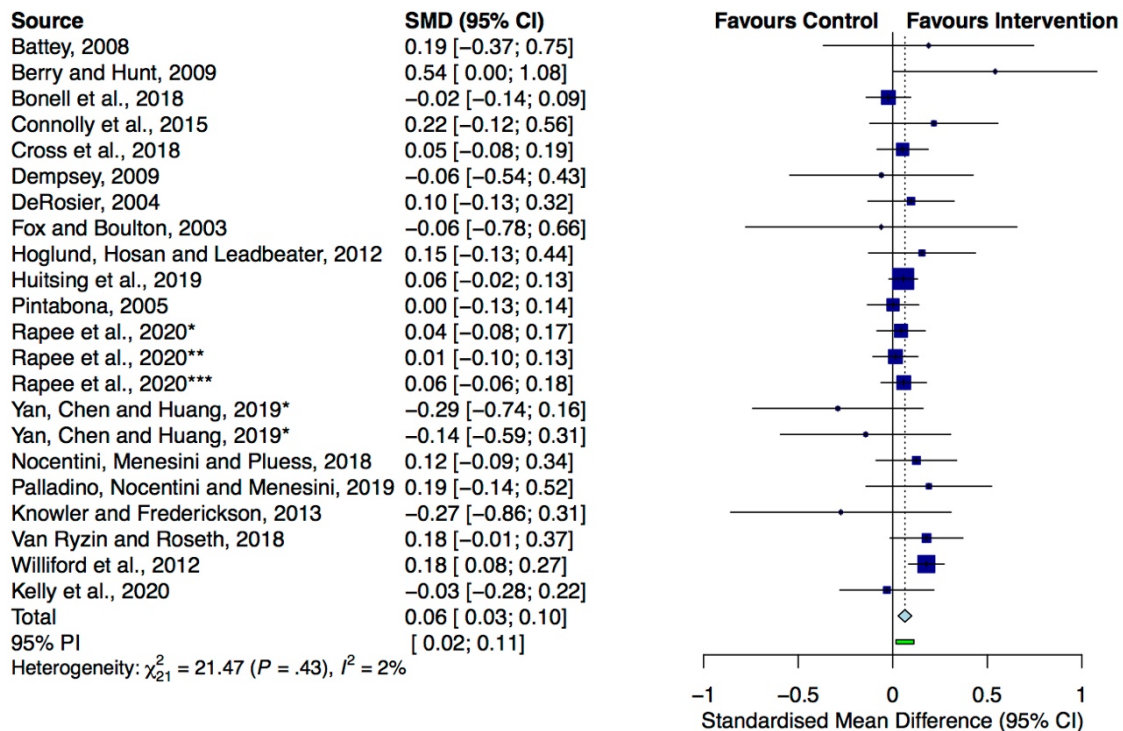
Quality Assessment and Risk of Bias in Included Studies

The quality of included studies varied considerably. Ten studies were rated as having a low risk of bias, 6 were rated as having some concerns for risk of bias, and 11 studies were rated as having a high risk of bias. For studies included in the meta-analysis, 8 were rated as having a low risk of bias, 4 were rated as having some concerns and 7 studies were rated as having a high risk of bias. A detailed quality assessment is shown in [Appendix B](#), Figure B1.

Meta-analysis and Sub-group Analysis

Fifteen of the 22 effects (68%) were larger than zero, indicating a reduction in overall internalising symptoms favouring the intervention. The overall mean effect on internalising symptoms was 0.06 (95% CI, 0.0284-0.1005; $z = 3.50$; $P < .001$), indicating that anti-bullying interventions had very little effect on overall internalising symptoms. The two heterogeneity measures indicated that there was low heterogeneity in our data ($Q = 21.47$, $df = 21$, $p = .4304$; $I^2 = 2.2\%$, 95% CI: 0% - 47.4%). Figure 4.2 shows the forest plot for the overall and individual effect sizes.

Figure 4.2. *Impact of school-based anti-bullying interventions on overall internalising symptoms*



Sub-group Analysis

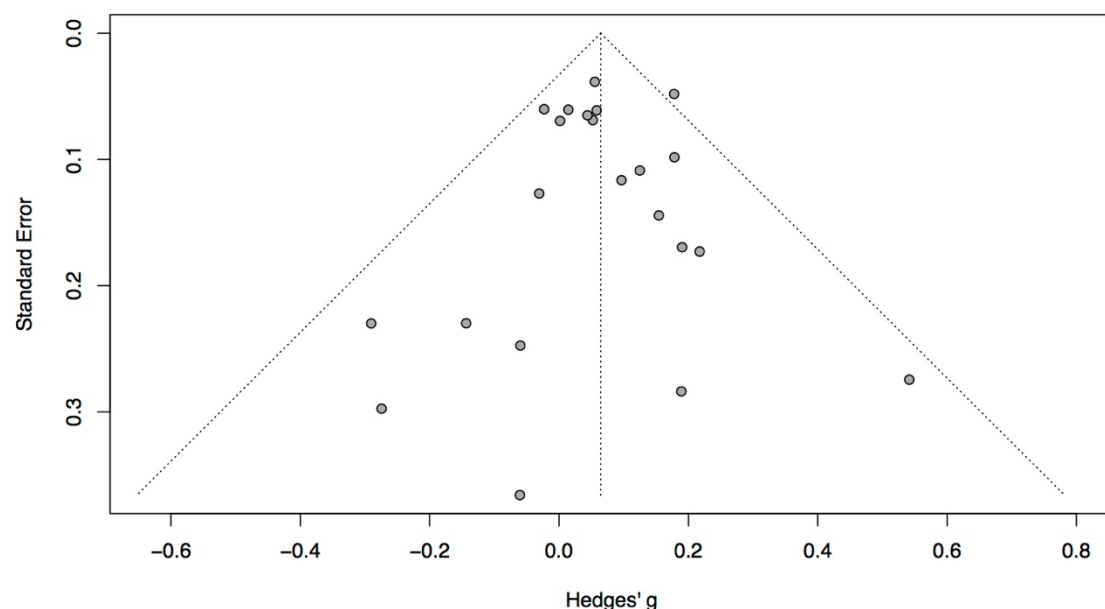
Subgroup analysis for specific internalising symptoms included 12 studies with measures of depression and 14 studies with measures of anxiety. Within-group effects were small but significant. The mean effect of depression was 0.06 (95% CI, 0.014 to 0.107; $P = .011$, $Q = 3.06$, $I^2 = 0\%$) and for anxiety it was 0.08 (95% CI, 0.11 to 0.158; $P = .024$, $Q = 23.39$, $I^2 = 44\%$). When directly comparing the effect of interventions on anxiety versus depression, between group differences were not significant ($Q = 0.31$, $df = 1$, $P = 0.578$). Subgroup analysis for type of intervention included 8 studies implementing targeted and 13 studies implementing whole-school interventions. Within-group effects were small and significant only for studies implementing whole-school interventions. The mean effect of targeted interventions was 0.01 (95% CI, -0.094 to 0.109; $P = .88$, $Q = 7.52$, $I^2 = 7\%$) and for whole-school interventions it was 0.08 (95% CI, 0.036 to 0.117; $P < .001$, $Q = 12.16$, $I^2 = 1\%$). However, when directly comparing the effect of targeted with whole-school interventions, between group differences were not significant ($Q = 1.53$, $df = 1$, $P = 0.215$). Subgroup analysis for age/grade level included 13 studies targeting primary school children and 9 studies targeting secondary school adolescents. Within-group effects were small and significant only for studies targeting primary schools. The mean effect of primary schools was 0.07 (95% CI, 0.023 to 0.109; $P = .002$, $Q = 12.61$, $I^2 = 5\%$) and for secondary schools it was .06 (95% CI, -0.014 to 0.144; $P = .107$, $Q = 8.81$, $I^2 = 9\%$). When directly comparing the effect of primary with secondary school interventions, between group differences were not significant ($Q = 0$, $df = 1$, $P = 0.979$). Lastly, I conducted an additional analysis to examine the effects of methodological quality. 10 studies reporting low risk of bias were compared with 12 studies reporting some to high risk of bias. The mean effect of studies with a low risk of bias was 0.06 (95% CI, 0.014 to 0.113, $P = 0.012$, $Q = 12.75$, $I^2 = 29\%$) and for studies with some to high concerns, 0.07 (95% CI, -0.015 to

0.148, $P = 0.110$, $Q = 8.72$, $I^2 = 0\%$). There was no statistically significant difference between low risk studies and higher risk studies ($Q = 0.005$, $df = 1$, $P = 0.946$).

Publication Bias

Overall, results were robust to sensitivity analysis examining heterogeneity and publication bias. No outliers were detected using leave-one out analysis and influence diagnostics. Eggers' test did not indicate presence of funnel plot asymmetry (intercept, 0.073; 95% CI, -0.88 – 0.73; $P = 0.861$). The SMDs adjusted for publication bias according to Duval and Tweedie trim-and-fill procedure barely changed (SMD, 0.067; 95% CI, 0.0282 – 0.1051; $P < 0.001$). The funnel plot is shown in Figure 4.3.

Figure 4.3. *Duval and Tweedie trim-and-fill Funnel Plot*



Meta-regression Analysis of Moderators

This study assessed the effect of several moderators separately (determined a priori) on internalising effect sizes using meta-regression analysis. Intervention intensity

($\beta = 0.05$; $P = .303$, $R^2 = 14.95\%$), duration ($\beta = 0.05$; $P = .312$, $R^2 = 5.23\%$), location ($\beta = -0.03$; $P = 0.439$, $R^2 = 0\%$) and number of intervention components ($\beta = 0.002$; $P = .701$, $R^2 = 0\%$), were not significantly related to nor did they account for significant variation in overall internalising effect sizes. Results of the meta-regression analysis are presented in Table 4.1.

Table 4.1. Meta-regression analysis of moderators

Moderator	B	SE	p	95% CI	R ²	I ²	Q _E	Q _M
Intensity	0.05	0.04	0.30	-0.04 – 0.13	14.95	2.76	Q _E (df=18) = 18.51, p= 0.42	Q _M (df=1) = 1.06, p=0.30
Intensity of intervention in less than 10 hours or more than/equal to 10 hours in total								
Duration	0.05	0.05	0.31	-0.05 – 0.14	5.23	2.04	Q _E (df=20) = 20.42, p= 0.43	Q _M (df=1) = 1.02, p=0.31
Duration of intervention is less than 12 months or more than/equal to 12 months								
Location	-0.03	0.04	0.44	-0.10 – 0.04	0	3.77	Q _E (df=20) = 20.78, p= 0.41	Q _M (df=1) = 0.60, p=0.44
By region: North America, Asia and the Pacific or Europe								
Number of components	0.0	0.01	0.70	-0.01 – 0.01	0	5.93	Q _E (df=20) = 21.26, p= 0.38	Q _M (df=1) = 0.15, p=0.70
Sum of all components implemented in the intervention, independent of fidelity.								

Note: Q_E = residual heterogeneity; Q_M = test for moderators; R² and I² are percentages

Meta-regression analysis of Intervention Components

Intervention components were tested separately using meta-regression analysis. Inclusion of the component, work with peers ($\beta = 0.087$; $P = .016$, $R^2 = 100\%$) was significantly associated with a greater reduction in internalising outcomes and the component cognitive-behavioural (CBT) elements ($\beta = -0.08$; $P = .029$, $R^2 = 100\%$) was significantly associated with an increase in internalising outcomes. No other components were significantly related to, nor did they account for significant variation in, overall internalising effect sizes. Results of the meta-regression analysis are presented in Table 4.2 and definitions for intervention components are presented in [Appendix B](#).

Table 4.2 *Intervention components meta-regression analysis*

Component	B	SE	p	95% CI	R ²	I ²	Q _E	Q _M
Whole-School Antibullying policy	-0.00	0.04	0.97	-0.09–0.08	0	6.86	Q _E (df = 20) = 21.47,	Q _M (df = 1) = 0.00,

Classroom rules	0.07	0.04	0.08	-0.01–0.14	100	0	p = 0.37 Q _E (df = 20) = 18.38, p = 0.56	p = 0.97 Q _M (df = 1) = 3.10, p = 0.08
School conference/assembly	0.09	0.08	0.27	-0.07–0.24	40.07	1.36	Q _E (df = 20) = 20.28, p = 0.44	Q _M (df = 1) = 1.20, p = 0.27
Curriculum materials	-0.02	0.07	0.76	-0.15–0.11	0	6.41	Q _E (df = 20) = 21.37, p = 0.38	Q _M (df = 1) = 0.10, p = 0.76
Cooperative groupwork	0.03	0.07	0.71	-0.11–0.16	0	6.34	Q _E (df = 20) = 21.35, p = 0.36	Q _M (df = 1) = 0.13, p = 0.71
Work with bully/victims	-0.07	0.06	0.25	-0.19–0.05	65.23	0.79	Q _E (df = 20) = 20.16, p = 0.45	Q _M (df = 1) = 1.31, p = 0.25
Work with peers	0.09	0.04	0.02	0.02–0.16	100	0	Q _E (df = 20) = 15.64, p = 0.74	Q _M (df = 1) = 5.83, p = 0.02
Information for parents/teachers	0.01	0.06	0.93	-0.12–0.13	0	6.82	Q _E (df = 20) = 21.46, p = 0.37	Q _M (df = 1) = 0.01, p = 0.93
Improved playground supervision	0.04	0.04	0.25	-0.03–0.12	68.34	0.68	Q _E (df = 20) = 20.14, p = 0.45	Q _M (df = 1) = 1.31, p = 0.25
Non-punitive methods	0.01	0.05	0.85	-0.08–0.10	0	6.61	Q _E (df = 20) = 21.42, p = 0.37	Q _M (df = 1) = 0.04, p = 0.85
Teacher training	0.04	0.05	0.47	-0.06–0.13	0	4.25	Q _E (df = 20) = 20.89, p = 0.40	Q _M (df = 1) = 0.52, p = 0.47
Parent training/methods	0.03	0.04	0.48	-0.05–0.12	0	4.22	Q _E (df = 20) = 20.88, p = 0.40	Q _M (df = 1) = 0.51, p = 0.48
Videos and VR computer games	0.04	0.04	0.26	-0.03–0.11	56.11	0.92	Q _E (df = 20) = 20.18, p = 0.45	Q _M (df = 1) = 1.25, p = 0.26
Internalising symptoms	-0.03	0.04	0.53	-0.11–0.06	0	4.80	Q _E (df = 20) = 21.01, p = 0.40	Q _M (df = 1) = 0.40, p = 0.53
Social skills training	-0.02	0.06	0.80	-0.12–0.10	0	6.52	Q _E (df = 20) = 21.40, p = 0.37	Q _M (df = 1) = 0.07, p = 0.80
Empathy training	0.00	0.05	0.99	-0.09–0.09	0	6.84	Q _E (df = 20) = 21.47, p = 0.37	Q _M (df = 1) = 0.00, p = 0.99
CBT elements	-0.08	0.04	0.03	-0.15–0.01	100	0	Q _E (df = 20) = 16.70, p = 0.67	Q _M (df = 1) = 4.78, p = 0.03

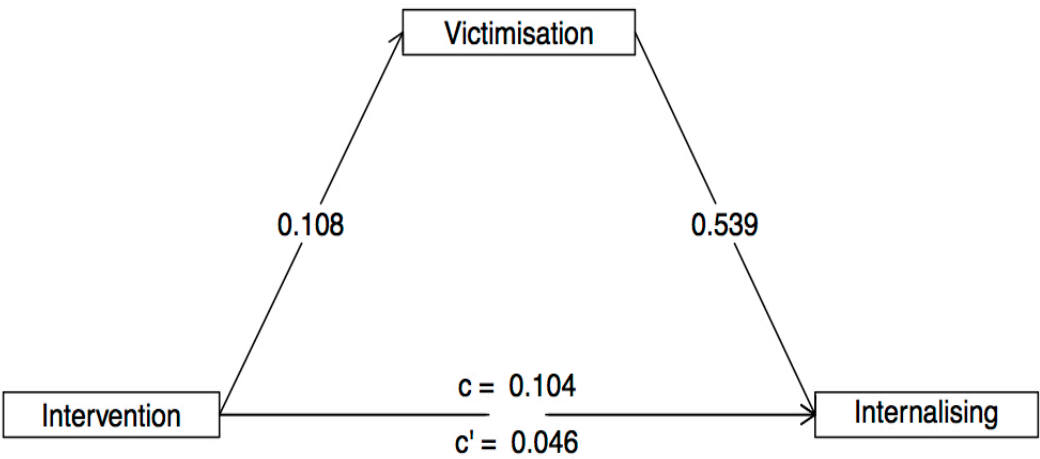
Note: B = unstandardised coefficients; SE = standard error; p = p-value; CI = confidence intervals; Q_E = residual heterogeneity; Q_M = test for moderators; CBT = cognitive behavioural therapy; R² and I² are percentages.

Mediation Analysis

Mediation using path analysis was conducted to examine whether reductions in bullying victimisation and perpetration mediated intervention effects on overall

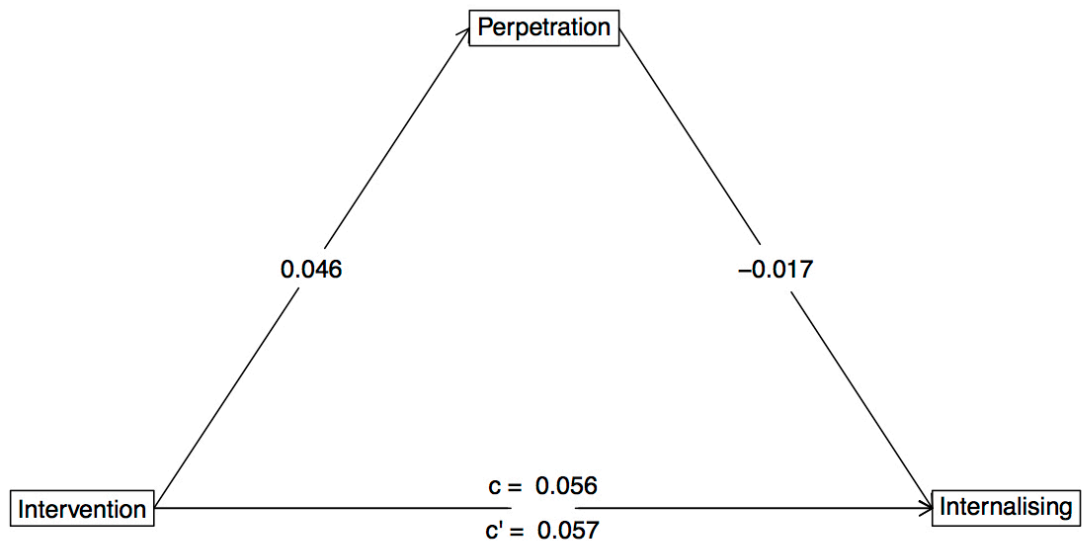
internalising symptoms. I found the indirect effect of victimisation mediating intervention status on internalising symptoms ($b=0.058$, $p = 0.314$), and the direct effect of intervention status on internalising symptoms ($b=0.046$, $p=.189$) to be insignificant, implying no mediation effects. I found similar effects with bullying perpetration; the indirect effect of perpetration mediating intervention status on internalising symptoms ($b=-0.001$, $p=.934$), and the direct effect of intervention status on internalising ($b=0.057$, $p=0.052$) were also insignificant. Diagrams for both path analyses can be found in Figures 4.4 and 4.5.

Figure 4.4. *Mediation Model for Bullying Victimisation*



Note: This figure shows that changes in pre-post bullying victimisation did not mediate intervention effects on overall internalising symptoms.

Figure 4.5. *Mediation Model for Bullying Perpetration*



Note: This figure shows that changes in pre-post bullying perpetration did not mediate intervention effects on overall internalising symptoms.

Discussion

This systematic review aimed to assess the impact of school-based anti-bullying interventions on internalising symptoms in children and adolescents. A meta-analysis with 22 studies found a very small but statistically significant effect on overall internalising symptoms, favouring interventions compared to controls. Sensitivity analyses and adjustments for quality of studies and bias demonstrated that the overall effect size was robust. Subgroup analyses exploring the effect of interventions on anxiety and depression also found a very small but significant effect. Similar results were found for interventions targeting children in primary vs adolescents in secondary school and for types of interventions using targeted vs whole-school approaches. Despite the effects being statistically significant, it is unclear whether the size of the effects can be considered to be clinically meaningful. Other universal school-based interventions have commonly powered their effect sizes on mental health outcomes being meaningful at around 0.2-0.3 (e.g. Ford et al., 2012; Stallard et al., 2014; Challen, Machin & Gillham, 2014; Gillham et al., 2007), whereas the mean effect across both universal and targeted bullying interventions on internalising symptoms found here was only 0.06. To ensure anti-bullying trials are maximising their effectiveness, we recommend researchers power their studies to detect meaningful effects on mental health outcomes.

My results partially concur with previous systematic reviews. Reviews looking at primary outcomes in anti-bullying interventions have shown small to modest reductions in bullying victimisation and perpetration (Ferguson et al., 2007; Merrell et al., 2008) making it likely that even smaller effects would be observed for secondary outcomes. Likewise, similar to my subgroup analysis, it appears that other meta-analyses have found inconclusive evidence supporting the effectiveness of other educational setting-based

interventions at preventing anxiety and depression in young people (Caldwell et al., 2021). It is likely that larger (yet still small) effects observed in a previous meta-analysis are the result of using broader definitions of mental health (Fraguas et al., 2020).

A rather surprising result came from the subgroup analysis examining differences between whole-school and targeted approaches. I found no difference between intervention types, however whole-school approaches were significantly more effective than usual school practice and had a larger effect size than targeted interventions, which were not significantly more effective than usual practice. I had expected targeted interventions to have a more substantial effect on internalising symptoms as they are typically more effective at managing anxiety and depression than universal interventions (Werner-Sidler et al., 2017; Caelear & Christensen, 2010) and most only include pupils with high internalising symptoms at baseline. It may be the case that whole-school interventions have an advantage because they reach more pupils and often target a wider range of pro-social behaviours and the school climate. Changes in these factors may ultimately help children deal with interpersonal conflicts, foster better relationships, feel safer at school, and thus reduce internalising symptoms. Indeed, some research suggests that whole-school interventions can have more successful outcomes when they are integrated into daily practice and school culture, engage all staff and students and are reinforced outside the classroom by parents and the community (Goldberg et al., 2019; Ttofi & Farrington, 2011). Evidence also suggests that a whole school approach compared to individual or classroom-based target interventions is more likely to result in “enduring positive changes” due to the duration and multi-component focus of these interventions (Weare and Nind, 2011). However, it has been suggested that embedding targeted interventions within whole-school approaches could be the most effective way to target bullying and potentially internalising symptoms as this combination would improve overall school climate but also focus on the

most vulnerable children and persistent cases of bullying (Garandeau & Salmivalli, 2019). Indeed, more research is needed to untangle the advantages and disadvantages of whole-school vs targeted approaches. It is clear from this systematic review that very few studies, particularly targeted interventions, applied consistent approaches and targeted similar mechanisms of action, thus potentially contributing to the lack of significant effects. Lastly, it is also possible that different types of interventions had symptom-specific effects which were not captured with overall internalising symptoms. Based on my findings, existing targeted anti-bullying interventions may not be sufficiently tailored to reduce internalising symptoms, and thus could benefit from re-examining program aims, content, and design or potentially embedding them in whole-school interventions to improve student's mental health outcomes.

I also found that interventions were equally effective at reducing internalising symptoms for children and for adolescents. Findings from previous literature have been inconsistent in relation to the moderating effects of age on the effectiveness of antibullying-interventions on reducing bullying outcomes (Smith et al., 2012; Ttofi and Farrington, 2009), however less is known about its moderating effect on internalising outcomes. A recent review showed that educational intervention effects on internalising symptoms were not significantly moderated by age (Werner-Sidler et al., 2017). To understand this relationship further, age should be examined in combination with program components, type of intervention, type of internalising outcome and bullying outcomes.

In terms of intervention components, my findings show that interventions that included a work with peers component were associated with larger effects on internalising symptoms than those that didn't use this component. Recent reviews show that work with peers is associated with a decrease in victimisation (Gaffney et al., 2021), however this is the first time it has been looked at in association with internalising outcomes. Working with

peers has been shown to increase student's perception and sense of safety at school (Cowie and Oztug, 2008; Cowie et al., 2008) which may ultimately lead to overall reductions in internalising symptoms. Some of the most effective interventions at reducing bullying such as KiVA (Salmivalli et al., 2013) and No Trap! (Palladino, Nocentini & Menesini, 2016) involve working with peers in different capacities (e.g. as mediators or by encouraging bystander behaviour) and further research should investigate which specific capacities are the most helpful at reducing internalising symptoms. For example, in a recent review by Gaffney et al. (2021) researchers explored the distinction between informal and formal peer involvement in addition to encouraging bystander behaviour for students witnessing bullying. Results showed that informal peer involvement was associated with significant reductions in bullying perpetration and victimisation, whilst formal peer involvement was associated with significant reductions in bullying perpetration only. Surprisingly, the *exclusion* of encouraging bystander behaviour was associated with significantly larger reductions in victimisation. The difference in results for each, albeit non-mutually exclusive, category shows the need to make these distinctions to try and understand what makes interventions work better. Notably, in past systematic reviews, work with peers had been found to be associated with an *increase* in victimisation (Ttofi and Farrington, 2009), and it has been suggested that this might be the case if peer leaders have high levels of externalising symptoms which might lead to deviancy training and negative outcomes (Dishion, McCord & Poulin, 1999). Therefore, future work examining baseline levels of internalising and externalising in peer leaders, and other potential moderators, should be considered when evaluating program effects on victimisation and mental health.

Contrary to expectations, given that some studies suggest that components targeting mental health (including CBT) can be effective at reducing bullying perpetration (Gaffney et al., 2021), the use of CBT components was significantly associated with *smaller* effects

on internalising symptoms compared to when CBT components were not used. This negative effect appeared to be carried by two of the seven interventions which used CBT. These were both targeted interventions: one delivered general counselling to children in care and the other taught emotional literacy to children identified as bullies by their peers. However, there was no clear pattern in outcomes based on study type or program duration and intensity. Also of note, most of the interventions that implemented CBT components were delivered by school staff; research on programs targeting internalising symptoms suggests that larger effect sizes are associated with programs delivered by mental health professionals than programs delivered by teachers (Werner-Seidler et al., 2017; Caele and Christensen, 2010; Stallard et al., 2014). These findings raise reasons to be cautious about the use of CBT for dealing with internalising symptoms in anti-bullying contexts and support other reviews showing similar trends from other school-based interventions (Mertens et al., 2020; Caldwell et al. 2019). Yet, future research should examine whether incorporating specific CBT techniques can potentially promote children's mental health in anti-bullying interventions, depending on study type, design, their use in combination with other components (e.g. work with peers), their frequency, and their mode of delivery.

I found no evidence that other components examined in this review were effective in reducing internalising symptoms, but this might reflect the small number of studies that applied consistent approaches and targeted similar mechanisms of action. For example, some universal interventions were based on restorative practice (Bonell et al., 2018) or adventure-based learning (Battey and Lundstedt, 2009), while targeted programs varied between CBT-based, personality-targeted approaches (Kelly et al., 2020), social skills training (Fox and Boulton, 2010), or art therapy (Yan et al., 2019). Going forwards it will be important to examine the specific impacts of components grounded in empirical knowledge and theory of change frameworks, both to maximise meaningful clinical

impacts but also to provide a deeper understanding of any causal pathways between bullying and internalising symptoms. Lastly, although we examined each intervention component individually, it is important to note that we did not assess for fidelity, and thus future studies should consider measuring adherence to interventions components. It is likely that factors such as the time required for preparation of lessons, duration of activities, and teacher's available time and enthusiasm for individual components throughout the intervention, among other factors, may influence program fidelity.

My last set of analyses examined the mediating effects of bullying with the aim of exploring a possible causal pathway for intervention effects. Reductions in bullying victimisation and perpetration did not account for intervention effects on internalising outcomes. It is possible that anti-bullying interventions may be acting in many other ways to reduce internalising, such as by promoting a positive school climate, encouraging bystanders to take action, fostering pro-social skills, through peer support or other types of social support, or possibly a combination of elements that work towards improving student's mental health. To my knowledge, this is the first study to investigate potential causal pathways in a meta-analysis of anti-bullying interventions and sets a framework for prospective research to explore other factors that might explain intervention mechanisms and target them in future interventions designed to decreased bullying and internalising symptoms. It is important to note that despite using pre-post changes for this analysis to account for baseline levels of bullying and internalising, small effects and low heterogeneity could have had an impact on this analysis. Furthermore, this analysis only reflects school-level and not student-level mediation effects.

Limitations and Future Directions

These findings should be interpreted in the context of several limitations. In terms of my included studies, quality and risk of bias varied widely. Studies typically scored high on risk of bias due to no randomization taking place, data handling being inadequate, or missing data and attrition not being described. Yet, subgroup analyses looking at overall study quality showed no difference between low and high risk of bias. In terms of statistical analysis, many studies did not report the necessary statistics to compute effect sizes and thus were excluded from the meta-analysis. Additionally, most of my outcomes were based on self-report which could inflate the risk of bias. Unfortunately, I was unable to test type of informant as a moderator due to a lack of studies with informants other than self-reports. In terms of intervention components, I did not pre-register or distinguish between specific types of the “work with peers” component (e.g. Gaffney et al., 2021) as this could lead to a loss of power and potentially biased results.

There are also other limitations to consider that are specific to this review. My objective was to examine interventions with a primary aim to reduce bullying in schools. As such, I excluded general conflict-resolution and aggression prevention interventions as well as general health promotion interventions which could have an impact on both bullying and internalising symptoms. This review focused on internalising symptoms as outcome measures as they are the leading cause of poor mental health in children (Ghandour et al., 2019; Erskine et al., 2015). I recognise that anti-bullying interventions may also have an impact on other outcomes such as externalising symptoms, and to a lesser extent general wellbeing. Although I tried to capture a range of internalising and emotional symptoms measured in a standardised and validated way, I excluded studies if they only presented measures of self-esteem, loneliness, or guilt as we did not consider them to be fully representative of internalising symptoms. Standardisation of measures should be

considered for future intervention studies to promote data synthesis and comparison of findings across studies.

In terms of statistical analysis, there were also some limitations. First and foremost, having to average effect sizes to obtain a single measure of internalising may have resulted in a loss of information for meta-regression analyses, particularly in cases where depression and anxiety had opposing effects, or if one outcome was significantly different than the other. Effects were computed at post-intervention only, however it is unlikely that results would drastically change over time as seen in previous reviews looking at intervention effects on anxiety and depression (Werner-Seidler et al., 2017). Other statistical limitations included having to control for clustering with studies that did not report intra-class correlation coefficients (ICC). In these cases, ICCs were drawn from the literature, but might not be fully representative of specific trials. Lastly, it is likely that the lack of heterogeneity, contributed to minimal effects in the secondary analysis.

Conclusion

Overall, I found insufficient evidence to conclude that anti-bullying interventions are effective at reducing internalising problems in children and adolescents. In reference to the main aims of this thesis, these findings suggest that there may not be a direct relationship between bullying and mental health. Instead, other indirect pathways or mechanisms may be driving associations and require further investigation. While most anti-bullying programs are effective at reducing the prevalence of bullying victimisation and perpetration in schools, this review suggests that more work needs to be done to maximise the mental health benefits of these interventions. Specifically, there is a need to select and measure internalising outcomes consistently, power studies to be able to detect clinically significant changes in internalising effect sizes, improve the quality of research designs,

and design anti-bullying interventions using evidence-based components that are likely to enhance positive impacts on mental health. Similar to previous chapters, this review suggests that including social or peer support components may be effective at reducing internalising symptoms and therefore could be a target for intervention. On the other hand, interventions should carefully re-evaluate how CBT components are being employed to optimise their effect. Moving forward, research should prioritise understanding the causal pathways between intervention effects and mental health outcomes to highlight the specific type of support needed in interventions. Furthermore, the role of bullying in relation to mental health outcomes should continue to be investigated, particularly for those vulnerable individuals who continue to be victimised despite an intervention taking place. Targeting internalising outcomes in schools offers the opportunity to alleviate many typical barriers to accessing treatment such as time, location and cost. Thus, future researchers, clinicians and public health care professionals should recognise the importance of internalising outcomes when designing school-based interventions to maximise their impact and safeguard young people from the damaging outcomes of bullying. In the next chapter, I will build upon the findings from this systematic review to examine the impact of the anti-bullying intervention, KiVa, on mental health for primary school-aged children - considering both potential benefits and intervention harms. This chapter will continue to examine the relationship between bullying and mental health, addressing some of the potential mechanisms and limitations discussed in this systematic review, in addition to considering the role of individual differences in intervention responsiveness.

Chapter 5. Investigating the healthy context paradox in the ‘Stand Together’ KiVa anti-bullying intervention trial in the UK

Abstract

Introduction: School-based anti-bullying interventions may be effective at reducing involvement in bullying but only have a very small impact on reducing mental health problems. Moreover, recently, studies have suggested that interventions may inadvertently increase mental health problems, most likely for vulnerable individuals. The aim of this study was to examine the ‘healthy context paradox’ or the potentially iatrogenic effects of school anti-bullying interventions on victims’ psychological adjustment, and potential moderators including pre-existing mental health and victimisation, and classroom-level victimisation. Understanding whether there are individual differences in intervention responsiveness, i.e. who is at risk of persistent victimisation and poor mental health outcomes and who benefits the most from an anti-bullying intervention, might be key to maximise the impact of interventions on mental health.

Methods: The ‘Stand Together’ trial in the UK was a multi-site, cluster randomised, controlled trial of the KiVa anti-bullying intervention in primary schools. This study focuses on a sample of 9,954 participants (control = 4741, intervention = 5213) with self-reported measures of bullying victimisation and teacher-reported measures of emotional and externalising problems at the 12-month follow-up. Linear mixed models with cross-level interactions were used to examine main effects and moderating effects.

Results: Students who were victimised at follow-up in the control condition had more externalising problems than those who were victimised at follow-up in the intervention condition, but this relationship was not significant nor found with emotional problems. Furthermore, whether classrooms were high or low in victimisation or whether a student had severe problems at baseline or not did not influence whether students victimised at follow-up had higher levels of psychological problems. Regardless of intervention condition and time, students who were victimised had more psychological problems than students who were not victimised and these problems deteriorated more in classrooms that continued to have high levels of victimisation at the 12-month follow-up. Furthermore, students with pre-existing problems at baseline and who were victimised at follow-up were more likely to have higher levels of psychological problems.

Conclusions: There is no evidence of the healthy context paradox in the Stand Together trial. However, pre-existing individual problems and classroom-level factors may still contribute to the risk of persistent bullying and mental health problems. Findings suggest that interventions should offer more support to vulnerable children with pre-existing difficulties and in classrooms with high levels of victimisation from the start, carefully incorporating components aimed at managing mental health whilst also enforcing whole-school anti-bullying practices. Overall, this study comes one step closer to providing an understanding of the relationship between victimisation and mental health in a school-based intervention setting by examining who is at risk and who benefits from anti-bullying interventions.

Introduction

Anti-bullying interventions have been successful at reducing bullying victimisation in schools across the world. Gaffney, Farrington and Ttofi's (2019) meta-analysis showed that, on average, and when compared with schools' usual practice, interventions decrease bullying perpetration by 19-20% and victimisation by 15-16%. While effects could be considered small to moderate based on statistical conventions, they are still meaningful and translate to thousands of children helped every year. While interventions seem to be effective for the majority of children, unfortunately some children are still victimised despite involvement in an intervention. For example, evaluations of the KiVa anti-bullying intervention showed that 8.9% of the intervention sample of children in Finland (Kärnä et al. 2011) and 19.8% of the intervention sample of children in Netherlands (Huitsing, 2020) were still victimised at least monthly, 1 year after the intervention started. Recently, it has been demonstrated that children who continue to be victimised in schools which deliver anti-bullying interventions, compared to schools following a 'care as usual approach' may develop more severe mental health symptoms including depression, social anxiety and being more disliked by their peers (Huitsing et al., 2012). This phenomenon has become known as the "healthy context paradox" (Salmivalli, 2018) and has been observed in prior evaluations of KiVa (Huitsing et al., 2019; Garandeau, Lee & Salmivalli, 2018). For example, in the Dutch evaluation of KiVa, children who remained or became victimised in intervention schools that were otherwise successful in reducing victimisation rates had more depressive symptoms compared to those who remained or became victimised in control schools (Huitsing et al., 2019). Similar findings have also been observed in longitudinal non-intervention studies where children who are victimised in classrooms with low rates of bullying have more depressive symptoms than children who are victimised in classrooms with higher rates of bullying (Laninga-Wijnen et al., in press; Pan et al., 2021).

These findings are particularly problematic as depression and anxiety are the leading causes of disability and burden in young people (Ghandour et al., 2019; Erskine et al., 2015) and have higher lifetime prevalence rates compared to any other psychiatric disorders (Kessler et al., 2005).

Several theories may explain why experiencing victimisation in schools that successfully reduce bullying may be particularly harmful for mental health. For example, if an intervention results in the discontinued victimisation of most children, it may reduce a child's opportunities to form friendships (Pan et al., 2021). Children who are bullied tend to befriend other children who are bullied (whilst children who are not bullied do not typically try to be friends with children who are bullied) thus it is more difficult for them to make friends in a social environment where fewer are victimised (Garandeau et al. 2018). Another reason persistent victims may have difficulties adjusting after an intervention is that those children who are victimised in classrooms with low rates of victimisation compare themselves to other children who are not victimised, and may perceive other children as better off. Children may feel more helpless and more negative about themselves and their environment, because these intervention efforts do not help them; comparisons that can affect self-regard, self-esteem and negatively affect mental health (Nishina & Juvonen, 2005). Similarly, victims are more likely to blame themselves when there is less bullying happening in their environment (Schacter & Juvonen, 2015). In turn, self-blaming tendencies can lead to more anxiety and other emotional difficulties.

While these theories may explain why classrooms with lower rates of victimisation may compound mental health problems for children who remain or become victimised, it is also important to consider that children with pre-existing mental health problems or experiences with persistent victimisation may also be more prone to being victimised in the first place (see Chapter 2). In other words, individual-level (e.g. psychological) factors

may be just as decisive as group-level factors in determining whether students get victimised in healthy contexts. For example, one study found that high baseline levels of internalising problems were associated with trajectories of persistent victimisation in intervention groups (Kaufman et al., 2018), however, another study found that benefits of the KiVa anti-bullying intervention on depressive symptoms and self-esteem were stronger for children who had high levels of victimisation at baseline (Juvonen, Schacter, Sainio & Salmivalli, 2016). In relation to the main aims of this thesis, these studies suggest that risk x intervention effects must be considered in intervention assessments to better understand who is most at risk from poor mental health outcome, even in healthy contexts and who is most likely to benefit from interventions.

Results from the Stand Together trial in the UK – the same trial reported in this study - revealed that students in the KiVA intervention condition reported a 13% decrease in relative risk of victimisation (adjusted OR = 0.87, 95%CI = 0.78-0.97) post-intervention (Bowes et al., *in preparation*). While the main effects suggest that the intervention had small but meaningful effects in reducing victimisation, the impact of the intervention on mental health outcomes and how they relate to experiencing persistent victimisation during the intervention must still be investigated.

Study Aims

Previous studies suggest that reductions in victimisation are moderate, while results from my systematic review and meta-analysis suggest that anti-bullying interventions have a very small impact on mental health problems. Thus, the impact of persistent victimisation and poor mental health outcomes is still a significant concern and must be investigated. This study builds upon my previous findings and addresses these concerns by investigating the “healthy context paradox” (HCP) or the potentially adverse effects of school anti-

bullying interventions on victims' psychological adjustment (Salmivalli et al., 2018). It is crucial to understand the possible negative consequences of victimisation, particularly mental health, in schools that strongly support the reduction of victimisation and assess for potential factors that might moderate their effects. This may also allow us to further understand the unexplored relationship between bullying and mental health in an intervention context. Investigating intervention harms, especially when they relate to specific subgroups or individuals with particular vulnerabilities, is an essential step in better understanding individual differences in intervention responsiveness or in other words, how interventions work and for whom. It is important to examine whether the factors responsible for driving intervention effects on mental health are doing so in a way that may cause harm. Indeed, understanding *who* continues to be victimised in intervention schools may help us tailor interventions to the needs of more vulnerable children and thus maximise the impact of anti-bullying efforts.

Research Questions and Hypothesis

1. Do children who remain or become victimised in intervention schools experience higher levels of emotional or externalising problems than children who remain or become victimised in control schools?
 - a. Does this vary depending on whether children who are victimised at follow-up are in control or intervention classrooms with low or high levels of victimisation?
 - b. Does this vary depending on whether children who are victimised at follow-up experienced i) high levels of victimisation and emotional problems at baseline or ii) high levels of victimisation and externalising problems at baseline?

In line with the healthy context paradox, I hypothesised that children who remain or become victimised in KiVa intervention schools will have a higher level of emotional and externalising problems at the 12-month follow-up compared to children in control schools. I hypothesised that these effects will be significantly greater in intervention classrooms where classroom victimisation was low at follow-up than in intervention classrooms where classroom victimisation was high at follow-up. I also hypothesised that effects will be significantly greater for children who have high levels of emotional and externalising problems and experienced high levels of victimisation at baseline compared to children with lower levels or none of these difficulties.

Methods

Design

The ‘Stand-Together Trial’ is a multi-site, cluster randomised controlled trial (RCT) of the KiVa anti-bullying intervention implemented in 118 mainstream primary schools across four geographic locations in the UK – North Wales, Birmingham, Oxfordshire and Devon. Pupil assessments were collected during class time, and teacher assessments were collected either during class or after class at baseline and start of the academic year (T1: May-July 2021) and after one year of the intervention, at the end of the academic year (T2: May-July 2022). Teacher assessments were completed by the class teacher or teaching assistant, thus reports were completed by different teachers at baseline and 12-month follow. Schools were randomly allocated to either the intervention (KiVa) or control condition (usual practice) either before or after the baseline assessment because of delays in data collection due to school closures during the pandemic. More details on the intervention, eligibility, recruitment, randomisation, and procedure can be found in the pre-registered protocol of the trial (ISRCTN 12300853). Ethical approval for the study was

provided by Bangor University Psychology Research Ethics and Governance Committee (2019–16592).

Participants

The current study focuses on Key Stage 2 (KS2) classes which correspond to years (grades) 3-6 in England and Wales, for children aged 7-11 years. Children provided baseline data while they were in years 3-5 and follow-up data 12-months later when they were in years 4-6. In the main trial, at baseline, the sample consisted of 5,167 children in 59 control schools and 5,944 children in 59 intervention schools. At the 12-month follow up the sample consisted of 4,660 (90%) children in control schools and 5,321 (90%) in intervention schools who completed both baseline and 12-month follow up assessments. There were 9,981 children with baseline and follow-up data and 465 children with 12-month follow-up data only across both arms, for a combined total of 11,576 child reports. In addition to that, we obtained teacher reported Strengths and Difficulties Questionnaire (TSDQ) for 10,425 children completed at both assessments across both arms, in addition to 171 completed only at the 12-month follow-up assessment, for a combined total of 10,596 teacher TSDQ reports. For this study I required matched pupil and teacher data at follow-up, thus my initial sample size consisted of 9,954 participants.

Intervention

KiVa is an evidence-based programme developed in Finland for children aged 7 to 15 years. KiVa is based on research demonstrating that ‘bystanders’ – children who are present during bullying but not actively involved – can contribute to the maintenance of bullying by assisting or reinforcing the perpetrator’s behaviour or defending the victim. By influencing the behaviour and norms of all students, the social rewards gained by

perpetrators are reduced and, consequently, their motivation to bully. The KiVa programme has two distinct components; universal and indicated actions. Universal actions at the class and school level to prevent bullying help students to recognise bullying, providing them with safe way of responding to incidents, and teaching them to empathise with, and support, victims.

The universal element of KiVa comprises of a curriculum that consists of ten structured 90-min lessons, typically delivered fortnightly as twenty 45-min lessons throughout the school year by class teachers. Lessons include watching film clips, engaging in group discussions, having students create oral presentations, role-play, group work and whole class activities. Additional universal elements include posters in the school building, and high-visibility vests for staff to wear in the playground during breaks to remind children they are in a KiVa school, and a parent's guide. The indicated element involves school staff applying a standard protocol to address confirmed cases of bullying. A member (or members) of the KiVa team meets with the student that has been victimised and the perpetrator(s) separately to discuss the bullying incident. Intervention delivery began at the start of the school year (September 2021) and lasted until the summer term. Training was provided in the summer term prior to this (June/July 2021) by accredited KiVa trainers. Two members of the teaching/management team from each school were required to attend the one-day training. Accredited KiVa trainers at each site delivered training courses for the intervention schools (approximately 8 schools per training) and offered additional support over the course of the implementation year.

Control

Control schools were asked to continue with their usual practices in line with their bullying policy. The mandatory curricula in Wales and England aims to develop students'

pro-social values and attitudes and empower participation in school and community life. Comparison schools were instructed to continue using these practices and address bullying in line with these methods. No other programme or strategies were allowed during the trial to maintain uniformity.

Measures

Global measure of victimisation. Children were provided with a definition of bullying and the self-report version of the Olweus Bullying and Victimisation Questionnaire (OBVQ; Olweus, 1996). The primary outcome for victimisation was derived from the global measure “*How often have you been bullied at school in the past couple of months?*” The questionnaire is rated on a five-point scale (1 = not at all, 2 = once or twice, 3 = two or three times a month, 4 = about once a week, 5 = several times a week), or an option of answering “I’d rather not say.” The variable was dichotomised where a score of 1 or 2 indicates no bullying victimisation and a score of 3-5 indicates bullying victimisation. In addition to the global measure, I conducted pre-registered supplementary sensitivity analysis using the average of 9-items related to different types of victimisation from the OBVQ including: name-calling, excluding from peer group or activities, rumour-spreading, taking money or damaging belongings, feeling threatened or forced to do things, racial bullying, cyberbullying, physical bullying, or any other form of bullying. I averaged the 9-items to create a continuous index of victimisation.

Classroom-level victimisation. To capture the rate or proportion of victimisation in classrooms (Aim 1a), individual scores for victimisation from the global item were aggregated within each classroom, with higher values indicating higher rates of victimisation. Classroom-level victimisation was further divided into three groups to aid interpretation: low proportion of victimisation = any value 1 standard deviation below the

mean proportion (-1 SD), average proportion of victimisation = values equal to the mean proportion, and high proportion of victimisation = any value 1 standard deviation above the mean proportion (+1 SD).

Internalising and externalising problems. Teachers completed the teacher-report version of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997, 2001) which is a widely used measure of mental health in children. This study used three of the five subscales that focus on internalising (emotional symptoms subscale), and externalising (conduct problems subscale and hyperactivity/inattention difficulties subscale). While the peer problems subscale is typically combined with the emotional subscale to derive internalising problems, it was deliberately removed to avoid confounding with our victimisation variable in the analysis, and thus refer to it as emotional problems only. Emotional and externalising problems were analysed separately. Each subscale consists of 5 items scored using a 3-point Likert scale (0 = not at all, 1 = somewhat true, 2 = certainly true), or the option of answering “I’d rather not say.” Item scores were summed and analysed continuously. Participants with missing information on outcome variables (SDQ subscales) had their scores pro-rated following SDQ guidance if they completed at least 3/5 items per subscale.

Baseline problems (victimisation and emotional or externalising problems): To examine the severity of baseline problems (Aim 1b) I created a variable with a higher global victimisation threshold where a score of 1-3 was considered low levels of victimisation and 4-5 was considered high levels of victimisation. I then created two variables to represent high vs low baseline scores for emotional and externalising problems following SDQ guidance on categorisation of scores (www.sdqinfo.org). A score of ‘high’ or ‘very high’ on the emotional subscale was coded as 1 or else 0 for the variable of emotional problems at baseline. A score of ‘high’ or ‘very high’ on at least one externalising subscale (conduct

or hyperactivity/ inattention) was coded as 1 or else 0 for the variable externalising problems at baseline. The variable for victimisation and emotional or victimisation and externalising problems were combined as a factor variable so that scores of 0 = none/low problems, 1 = high levels of victimisation only, 2 = high levels of emotional or externalising problems only, and 3 = both high levels of victimisation and high levels of emotional or externalising problems.

Child demographic information and control variables. I coded children's demographic information for age (whole years) and gender (girl = 0, boy = 1). In addition to age and gender I also included geographic location (North Wales = 1, West Midlands = 2, South East England = 3, South West England = 4), the proportion of children eligible for a free school meal (eFSM) as an indicator for school-level deprivation (low = 0, high = 1), and number of pupils per KS2 (KS2 size) as indicator of school size (low = 0, high = 1) as control variables in all analyses. eFSM and KS2 size cut-offs were based on the median of all eligible primary schools in each area (e.g. for Southeast England schools, data were collated and the median found and categorised as low/high).

Statistical Analysis

I used descriptive statistics to analyse participant demographic and baseline characteristics and missing data patterns. To assess for baseline differences between intervention and control arms I used the “CBCgrps” package in R. The main function compares differences in categorical and continuous variables between groups by judging the distribution of the variables and using appropriate tests (e.g. Wilcoxon rank sum test for non-normal data). I examined missing data patterns for demographic and baseline characteristics, for intervention and control groups, at baseline and at the 12-month follow up, for participants with complete data and those lost to follow-up at the 12-month

assessment. Missing data was handled using maximum likelihood (ML) for model comparisons and restricted maximum likelihood to obtain unbiased estimates in our final models (Tabachnick & Fidell, 2007). These methods produce less biased and more efficient results than other methods such as listwise deletion or imputation methods (Baraldi & Enders, 2010). This is also an appropriate choice as it takes into account that some students entered and left schools over the intervention period.

I used linear mixed models to address our research questions on whether children who remained or became victimised in intervention schools experienced higher levels of internalising and externalising problems at follow-up than children in control schools AND if this varied depending on classroom victimisation levels or severity of baseline problems. Multilevel analysis allows us to assess both within and between-level relations over time, as data is organised into nested levels. For this analysis I used a model with three levels: students (level 1), nested in classrooms (level 2), nested in schools (level 3). I used the classroom structure at follow-up as nesting for level 2. Students' emotional and externalising problems were the dependent variables and were modelled separately. For all models I included gender, age, eFSM, KS2 size and geographic location as controls. This analysis followed a series of steps recommended by Raudenbush and Bryk (2002): Step (1) computed an unconditional or 'null' intercept-only model with the dependent variable and random effects only to inspect how variance was distributed across all levels and calculate interclass correlation coefficients (ICC). This model was used as a reference to compare the variability in other models. Step (2) computed a series of conditional models adding predictors and interactions at each level as fixed effects and inspected how variance deviated from the null model. This was done using two common methods: the likelihood ratio test (LRT) and the Bayesian Information Criterion (BIC). The LRT is a statistical significance test that compares the fit of two nested models: A restricted model under the

null hypothesis is tested against a conditional model under the alternative hypothesis. The test statistic is a function of the ratio of the maximised likelihoods of these two models and follows a χ^2 distribution with degrees of freedom equal to the difference in the number of parameters between the two models. A significant outcome implies a decision for the conditional model (Lehmann & Romano, 2005). The BIC is amongst the most widely used information criteria; the model with the lowest BIC is selected to describe the data best (Konishi & Kitagawa, 2008). Results for both tests showed models including interaction terms were preferred over those including only predictors (for full model indices see [Appendix C](#), Table C1). Step (3) involved computing final models to evaluate main effects and interaction effects. I used emotional OR externalising problems as the dependent variable (modelled separately) and included the main effects of time, individual-level victimisation, school-level intervention condition and cross-level interactions between the three as predictors. Since I was interested in emotional and externalising problems at the 12-month follow up, the ‘time’ variable was dummy coded (0 = baseline, 1 = 12-month follow up) to allow us to examine cross-sectional associations at baseline and longitudinal associations (taking baseline into account) at follow-up. Regression estimates and bootstrapped confidence intervals (1,000 iterations) for both fixed and random effects were presented. I set the alpha level for statistical significance to $\alpha < .05$ a-priori in all analyses. I probed our significant cross-level interactions by conducting post-hoc tests adjusted for multiple comparisons using Bonferroni’s correction. Step (4) involved repeating step 3 and adding classroom-level victimisation as a predictor, and a cross-level interaction between time, individual-level victimisation, classroom-level victimisation, and school-level intervention condition. To help interpret significant interactions, post-hoc tests with Bonferroni’s correction were conducted using specific contrasts for time (follow-up) and individual-level victimisation (yes). This analysis would tell me if the association between

individual-level victimisation and emotional or externalising problems at follow-up was significantly stronger for individuals in intervention classrooms with lower levels of peer victimisation at follow-up than for students in intervention classrooms with higher levels of peer victimisation or control classrooms at follow-up. Step (5) involved using the same model as Step 3 and adding the variable for baseline problems. This variable was added to an interaction with individual-level victimisation, time and intervention condition. To interpret this interaction, I used post-hoc tests with Bonferroni's correction. This analysis examined whether being severely victimised and having high levels of emotional or externalising problems at baseline (i.e. baseline problems) influenced whether individuals who were victimised in the intervention condition at follow-up had more emotional or externalising outcomes, respectively, at the 12-month follow-up. Lastly, I performed a sensitivity analysis with the main model described in Step 3, using the average of the 9-item scale of the OBVQ for bullying victimisation. This variable was grand-mean centred to facilitate interpretation. All the analyses were conducted in R using the "lme4" and "lmerTest" packages for multilevel analysis and "EMMEANS" package for post-hoc analysis.

Results

Missing data and baseline characteristics

Missing data patterns at baseline and follow-up by trial arm can be found in [Appendix C](#), Table C2 for the entire sample with teacher and student data (N=11,548). Notably, missing data for teacher-reported emotion, conduct and hyperactivity/inattention scores at baseline and follow-up varied by intervention condition with significantly more missing data present in the intervention condition ($p < .001$). Missing data for child-reported bullying victimisation at follow-up was predicted by experiencing victimisation

at baseline (OR=1.25, 95% CI=1.07-1.47, $p = .006$), %FSM eligibility (OR =1.35, 95% CI=1.17-1.55, $p = <.001$), KS2 size (OR = 0.68, 95% CI= 0.59-0.78, $p = <.001$) and hyperactivity/inattention (OR = 1.05, 95% CI = 1.02-1.09, $p = .001$). Results for this analysis can be found in Table 5.1. We were also interested in what factors at baseline predicted the question ‘I’d rather not say’ on the global item of victimisation at 12-month follow-up. We found that children in the control condition, younger children, females and those with higher levels of emotional problems at baseline were more likely to not answer the global victimisation question. Results for this analysis can be found in [Appendix C](#), Table C3. Consequently, baseline victimisation, %FSM eligibility and KS2 size and gender were included as control variables in all our analyses.

Table 5.1. *Factors at baseline predicting missingness at 12-Month follow up*

<i>Predictors</i>	<i>Odds Ratios</i>	<i>95% Confidence Interval</i>	<i>Beta</i>	<i>std. SE</i>	<i>Statistic</i>	<i>p</i>
(Intercept)	0.10	0.08 – 0.13	0.11	0.01	-16.98	<0.001
Intervention Condition	1.09	0.95 – 1.25	1.05	0.08	1.27	0.203
Age	1.00	0.93 – 1.07	1.00	0.04	-0.12	0.901
Gender	0.89	0.77 – 1.03	0.94	0.07	-1.62	0.106
Victimisation BL	1.25	1.07 – 1.47	1.10	0.10	2.77	0.006
FSM	1.35	1.17 – 1.55	1.16	0.10	4.25	<0.001
KS2 size	0.68	0.59 – 0.78	0.83	0.05	-5.43	<0.001
Emotion BL	1.03	1.00 – 1.06	1.07	0.02	1.86	0.063
Conduct BL	1.02	0.97 – 1.08	1.03	0.03	0.77	0.439
Hyperactivity/ Inattention BL	1.05	1.02 – 1.09	1.16	0.02	3.43	0.001

Observations = 9133

R^2 Tjur = 0.010 / McFadden’s R^2 = 0.010

Note: std. SE = standard error, p = p-value; FSM = free school meal eligibility; KS2 = key stage 2; BL = baseline; FU = follow-up; significant differences are in bold

In total 9,954 participants had *both* self-reported measures of bullying and teacher reported measures of emotional and externalising problems *at follow-up* (control = 4741, intervention = 5213). Sample demographics and baseline characteristics by intervention

condition can be found in Table 5.2. At baseline, more schools with larger KS2 sizes were randomised into the intervention condition compared to the control condition ($p < .001$). Moreover, there was a significant increase in emotional ($p = .040$) and conduct ($p = .030$) problems in the intervention condition compared to the control condition. To account for these differences, KS2 size and baseline emotional and externalising problems (among other stratifying variables) were controlled for in our analysis.

Table 5.2. *Sample demographics and baseline characteristics*

Characteristics	Frequency (%)		p-value ^a
	Control (N = 4741)	Intervention (N = 5213)	
Child mean age (SD)	3.77 (0.93)	3.76 (0.93)	.826
6 years old	2 (0)	1 (0)	
7 years old	358 (8)	423 (8)	
8 years old	1442 (30)	1586 (30)	
9 years old	1502 (32)	1633 (31)	
10 years old	1150 (24)	1234 (24)	
11 years old	4 (0)	7 (0)	
Prefer not to say	74 (2)	77 (2)	
Missing	209 (4)	252 (5)	
Child gender			.511
Female participants	2230 (47)	2395 (46)	
Male participants	2229 (47)	2492 (48)	
Prefer not to say	72 (2)	75 (1)	
Missing	210 (4)	251 (5)	
Students per with % eligibility free school meal			.799
Low (below median)	2558 (54)	2827 (54)	
High (above median)	2183 (46)	2386 (46)	
Students per key stage 2 size			<.001
Smaller (below median)	1792 (38)	1703 (33)	
Larger (above median)	2949 (62)	3510 (67)	
OBVQ global			.124
Not Victimised	3063 (65)	3422 (66)	
Victimised	826 (17)	829 (16)	
Prefer not to say	636 (13)	703 (13)	
Missing	216 (5)	259 (5)	
OBVQ-9 M(SD) (scale 1-5)	1.65 (0.76)	1.64 (0.76)	.795
Missing	253 (5)	314 (6)	
Emotional problems M(SD) (scale 0-10)	1.48 (2.11)	1.53 (2.09)	.040
Missing	46 (1)	103 (2)	
Conduct problems M(SD) (scale 0-10)	0.73 (1.39)	0.80 (1.47)	.030
Missing	46 (1)	103 (2)	
Hyperactivity/Inattention problems M(SD) (scale 0-10)	2.61 (2.90)	2.58 (2.85)	.562

Missing	46 (1)	104 (2)	
Externalising problems MS(D) (scale 0-20)	3.34 (3.91)	3.37 (3.90)	.735
Missing	46 (1)	104 (2)	

Note: appropriate parametric and non-parametric tests were employed to determine baseline differences across trial arms. SD = Standard deviation; M = mean; OBVQ = Olweus Bullying Victimization Questionnaire.

Interclass correlation coefficients (ICC)

I calculated intraclass correlations (ICCs) for our null (empty) emotional outcomes model and externalising outcomes model, which provide estimates of the proportion of variance due to differences between students, classrooms, and schools (see Table 5.3). The ICCs indicate that most of the variability occurred between students. The student-level variance and total variance was highest in the externalising outcomes model, whilst the classroom-level and school-level variance were highest in the emotional outcomes model. I examined the variance between trial sites but it was negligible.

Table 5.3. *Intraclass Correlation Coefficients for Internalising and Externalising Models*

Level	Emotional Outcomes Model	Externalising Outcomes Model
	ICC	ICC
Participant (PID)	0.290	0.572
Classroom (TC)	0.037	0.035
School (SID)	0.045	0.031
Total	0.373	0.638

Note: ICCs were calculated using the ‘performance’ package in R. PID =pupil ID; TC =classroom ID; SID =school ID.

Do children who remain or become victimised in intervention schools experience higher levels of emotional or externalising problems than children who remain or become victimised in control schools?

The analytical sample consisted of 8,941 participants in 450 classrooms in 118 schools. Results from the linear mixed models can be found in Table 5.4. Results show that

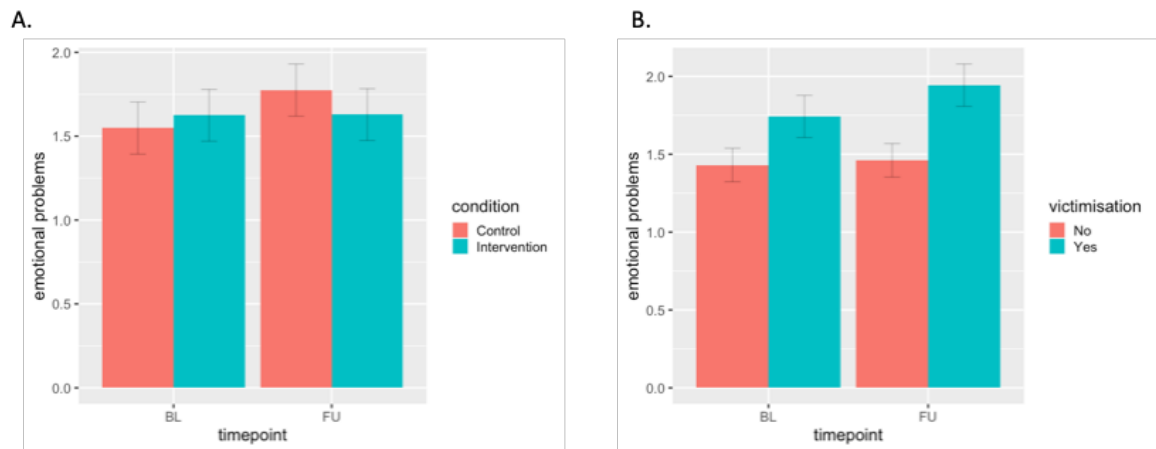
both the emotional outcomes model and externalising outcomes model had significant main effects for age, gender, time and individual-level victimisation. Older children had significantly less emotional ($b = -0.07$, $p = .003$) and externalising ($b = -0.26$, $p < .001$) problems than younger children. Male students had significantly less emotional ($b = -0.23$, $p < .001$) and more externalising ($b = 2.02$, $p < .001$) problems than female children. At follow-up children had more emotional problems ($b = 0.12$, $p = .007$) and less externalising problems ($b = -0.13$, $p = .040$) than at baseline. Children who were victimised had more emotional ($b = 0.32$, $p < .001$) and externalising ($b = 0.56$, $p < .001$) problems than children who were not victimised. Results also showed two significant interaction effects in the emotional outcomes model; the interactions of *time x intervention condition* ($b = -0.18$, $p = .003$) and *time x individual-level victimisation* ($b = 0.21$, $p = 0.042$, Figure 5.1). Post-hoc analysis for both interaction effect (Figure 5.1) can be found in Table C4 and Table C5 in [Appendix C](#). Finally, these models tested the *individual-level victimisation x intervention condition x time* cross-level interaction, indicative of the HCP, controlling for multiple control and stratifying variables. This interaction was not significant in the emotional outcomes model ($b = -0.08$, $p > .05$) but significant for the externalising outcomes model ($b = -0.48$, $p = 0.03$). Post-hoc analysis for the interaction of *time x intervention condition x individual-level victimisation* (Figure 5.2) showed that children who were victimised at follow-up in the control condition had more externalising problems than those who were victimised at follow-up in the intervention condition, but this relationship was NOT significant ($p > .05$). All post-hoc tests can be found in Table C6 in [Appendix C](#).

Table 5.4. Results for linear mixed models for emotional and externalising outcomes

Predictors	Emotional Model					Externalising Model				
	Est.	std. Error	95% CI (Bootstrap)	Statistic	p	Est.	std. Error	95% CI (Bootstrap)	Statistic	p
(Intercept)	1.94	0.16	1.63 – 2.24 (1.60 – 2.22)	12.34	<0.001	3.00	0.27	2.48 – 3.52 (2.47 – 3.53)	11.26	<0.001
Age	-0.07	0.02	-0.12 – -0.03 (-0.12 – -0.03)	-2.98	0.003	-0.26	0.05	-0.35 – -0.17 (-0.36 – -0.18)	-5.65	<0.001
Gender [male]	-0.23	0.04	-0.30 – -0.16 (-0.31 – -0.16)	-6.53	<0.001	2.02	0.07	1.88 – 2.15 (1.90 – 2.16)	29.39	<0.001
eFSM	0.03	0.10	-0.17 – 0.24 (-0.17 – -0.23)	0.31	0.756	0.18	0.17	-0.16 – 0.51 (-0.14 – 0.49)	1.04	0.296
KS2	-0.19	0.11	-0.41 – 0.03 (-0.40 – 0.05)	-1.67	0.096	-0.16	0.18	-0.52 – 0.20 (-0.51 – 0.19)	-0.87	0.384
Site	-0.09	0.05	-0.18 – 0.01 (-0.18 – 0.01)	-1.81	0.071	-0.07	0.08	-0.23 – 0.09 (-0.23 – 0.08)	-0.87	0.383
Time [FU]	0.12	0.04	0.03 – 0.21 (0.03 – 0.21)	2.71	0.007	-0.13	0.06	-0.26 – -0.01 (-0.26 – -0.01)	-2.06	0.040
Intervention Condition (IC)	0.09	0.11	-0.12 – 0.30 (-0.12 – 0.29)	0.82	0.415	0.01	0.18	-0.33 – 0.35 (-0.33 – 0.36)	0.06	0.955
Victimisation	0.32	0.08	0.17 – 0.47 (0.18 – 0.48)	4.20	<0.001	0.56	0.12	0.33 – 0.80 (0.34 – 0.79)	4.68	<0.001
Time × IC	-0.18	0.06	-0.30 – -0.06 (-0.30 – -0.05)	-2.97	0.003	-0.08	0.09	-0.25 – 0.09 (-0.26 – 0.10)	-0.93	0.351
Time × Victimisation	0.21	0.10	0.01 – 0.42 (0.01 – 0.42)	2.04	0.042	0.20	0.16	-0.11 – 0.51 (-0.10 – 0.52)	1.27	0.204
IC × Victimisation	-0.02	0.11	-0.24 – 0.19 (-0.24 – 0.20)	-0.22	0.829	0.16	0.17	-0.17 – 0.49 (-0.16 – 0.50)	0.94	0.346
Time × IC × Victimisation	-0.08	0.15	-0.37 – 0.21 (0.39 – 0.20)	-0.57	0.570	-0.48	0.22	-0.91 – -0.04 (-0.91 – -0.07)	-2.14	0.032
Random Effects										
σ^2	2.74					5.36				
τ_{00}	1.20 _{PID} 0.17 _{TC} 0.20 _{SID}					7.07 _{PID} 0.51 _{TC} 0.48 _{SID}				
ICC	0.36					0.60				
N	8941 _{PID} 450 _{TC} 118 _{SID}					8941 _{PID} 450 _{TC} 118 _{SID}				
Observations	16011					16010				
Marginal R ² / Conditional R ²	0.014 / 0.374					0.079 / 0.632				

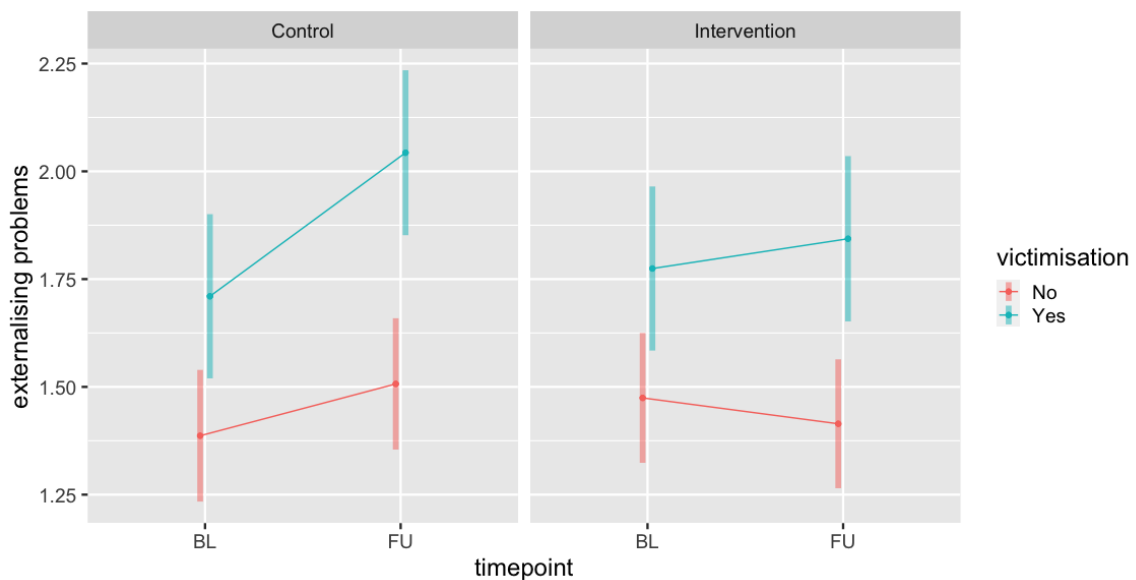
Note: eFSM = eligibility for free school meal; KS2 = key stage 2; IC = intervention condition; FU = follow-up; Est = unstandardised estimates; CI = confidence intervals.

Figure 5.1. Interaction effects for (A) time $\times$ intervention condition and (B) time $\times$ victimisation



Note: Post-hoc analysis revealed that for the time $\times$ intervention condition interaction the only significant difference occurred for the control condition between baseline ($M = 1.55$, $SE = .08$) and follow-up ($M = 1.62$, $SE = .08$, $p < .001$), indicating that children in the control condition at follow up had more emotional problems than children in the control condition at baseline. For the time $\times$ victimisation interaction, children who were victimised at follow-up ($M = 1.94$, $SE = .07$) had more emotional problems than children who were not victimised at follow-up ($M = 1.46$, $SE = .05$, $p < .001$) and who were either victimised at baseline ($M = 1.74$, $SE = .07$, $p = .012$) or not victimised at baseline ($M = 1.43$, $SE = .05$, $p < .001$).

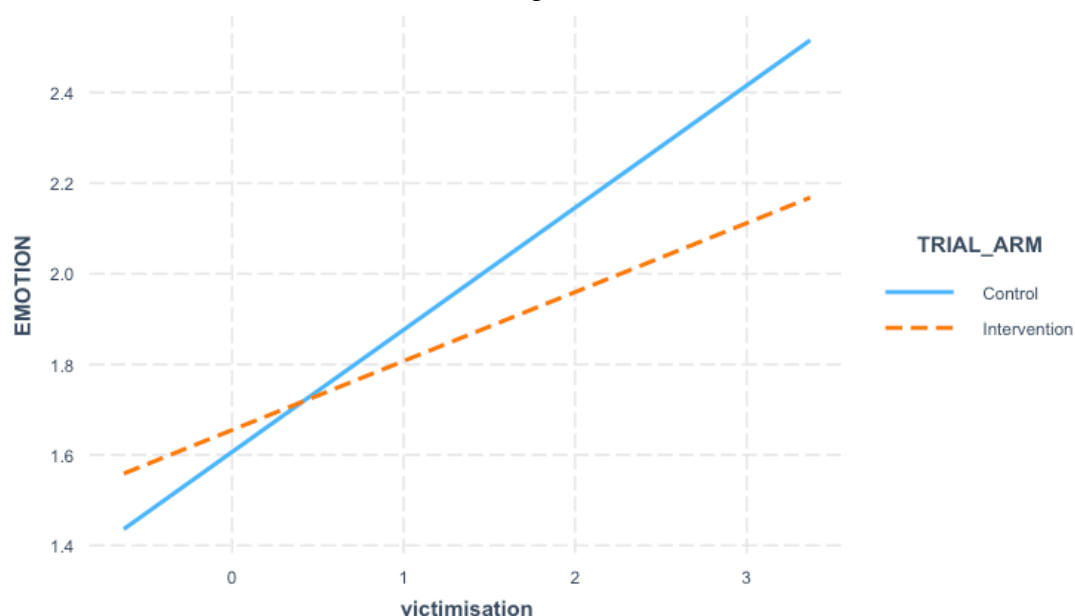
Figure 5.2. Interaction time $\times$ intervention condition $\times$ individual-level victimisation



Note: This figure shows the interaction indicative of the healthy context paradox. Children who were victimised at follow-up in the control condition had more externalising problems than those who were victimised at follow-up in the intervention condition, but this relationship was not significant ($p > .05$). BL = baseline; FU = follow-up.

In addition to using the global victimisation item in the OBVQ as a predictor, I also report our pre-registered sensitivity analysis using the 9-items of the OBVQ in Table C7 in [Appendix C](#). Notably, our results were almost identical. Main effects in the same direction were observed for age, gender, time, individual-level victimisation, and an interaction between *time x intervention condition* for the emotional outcomes model. The interaction for *time x individual-level victimisation* in the emotional outcomes model and for *time x intervention condition x individual-level victimisation* in the externalising outcomes model were not significant when using the OBVQ as a predictor. However, a new significant interaction for *intervention condition x individual-level victimisation* was observed for the emotional outcomes model ($b = -0.12, p = .033$). Simple slopes analysis show that increased victimisation was associated with increased emotional difficulties in both the control ($b = 0.27, p < .001$) and intervention ($b = 0.15, p < .001$) conditions (see Figure 5.3).

Figure 5.3. Simple slopes analysis for the interaction between intervention condition x individual-level victimisation on emotional problems



Note: increase in victimisation is associated with increase emotional difficulties for both intervention conditions.

Do children who remain or become victimised in intervention schools at follow-up experience higher psychological difficulties depending on whether classroom victimisation levels are low or high at follow-up in intervention versus control schools?

To examine the impact of classroom-level victimisation I present results from two linear mixed models testing the interaction between *individual-level victimisation*, *classroom-level victimisation*, *time and intervention condition* on emotional outcomes and externalising outcomes. The interaction was not significant in the emotional outcomes model ($b = 0.10$, $p < .726$) but significant in the externalising outcomes model ($b = 1.02$, $p = .025$). Post-hoc analysis with contrasts set for victimisation (yes) and timepoint (follow-up), showed that none of the 4 comparisons of interest (between treatment conditions and low/high classroom-level victimisation) were significant (all $p > .05$), indicating that students who were victimised at follow up in classrooms with low victimisation in the intervention condition did not have more externalising problems than children victimised in classrooms with high levels of victimisation in the intervention condition or classrooms with either levels in the control condition.

The addition of a classroom victimisation variable altered some of the main effects and interactions presented in the previous models with no classroom victimisation variable. In this section I present the results for the higher-order interactions only, but for all results see Table C8 in [Appendix C](#). In the emotional outcomes model, the three-way interaction for *classroom-level victimisation x time x intervention condition* ($b = -0.40$, $p = .002$) was significant. Post-hoc tests revealed that at follow-up, children in the control condition in classrooms with high levels of victimisation had more emotional problems ($M = 1.96$, $SE = 0.12$) than children in the intervention condition in classrooms with high levels of victimisation ($M = 1.53$, $SE = 0.12$, $p = 0.02$). For the externalising outcomes model, the

interaction effect of *classroom-level victimisation x time x intervention condition* ($b = -0.40$, $p = 0.04$), was also significant, however post-hoc tests revealed no significant effects.

Do children who remain or become victimised in intervention schools at follow-up experience higher psychological difficulties depending on whether internalising or externalising and victimisation levels are low or high at baseline?

To examine whether the impact of being victimised at follow-up in an intervention school compared to a control school was more detrimental for students who had been severely victimised (weekly or more) and simultaneously experienced high levels of emotional (for the emotional outcomes model) or externalising problems (for the externalising outcomes model) at baseline, I conducted a linear mixed model with an interaction effect for *baseline problems x individual-level victimisation x time x intervention condition*. This interaction was not significant in the emotional outcomes model ($b = -0.22$, $p = .20$) or the externalising outcomes model ($b = -0.16$, $p = 0.53$). Notably, in the emotional outcomes model the interaction between *baseline problems x individual-level victimisation x time* was significant ($b = 0.71$, $p < .001$), with post-hoc tests suggesting that students experiencing severe victimisation and emotional problems at baseline and who were victimised at follow-up had more emotional problems ($M = 3.27$, $SE = 0.15$, $p < .001$) than students with no baseline problems ($M = 1.63$, $SE = 0.06$), who experienced only emotional problems at baseline ($M = 2.72$, $SE = 0.10$, $p < .001$) or experienced only severe victimisation at baseline ($M = 2.18$, $SE = 0.06$, $p < .001$). All other results can be found in Table C9 in [Appendix C](#). For the externalising outcomes model the interaction between *baseline problems x individual-level victimisation x time* was also significant ($b = 0.98$, $p < .001$), with post-hoc suggesting that students experiencing severe victimisation and externalising problems at baseline and who were

also victimised at follow-up had more externalising problems at follow-up ($M = 8.55$, $SE = 0.22$, $p < .001$) than students with no baseline problems ($M = 2.69$, $SE = 0.11$), who experienced only externalising problems at baseline ($M = 6.60$, $SE = 0.15$, $p < .001$) or severe victimisation at baseline ($M = 4.64$, $SE = 0.10$, $p < .001$).

Discussion

This study investigated the “healthy context paradox” (HCP) or the potentially adverse effects of school anti-bullying intervention on victims’ psychological problems. This study also investigated whether the HCP was moderated by classroom victimisation levels or by having greater psychological problems and being severely victimised at baseline. By investigating the HCP, I addressed two of the overarching aims of this thesis which were to explore the relationship between bullying and mental health in a controlled intervention context, and to examine individual differences in responses to anti-bullying interventions. Specifically, this study examined what individual and peer/classroom level factors contributed to the risk of persistent mental health problems following an anti-bullying intervention and allowed us to explore who might be at risk or benefit the most from such interventions.

Overall, my findings did not support the presence of a healthy context paradox in the Stand Together Trial. Instead, I found that children in the *control* condition who were victimised at follow-up had *more* externalising problems than those in the intervention condition who were victimised at follow-up, but this relationship was not significant and not found in relation to emotional problems.

My findings differ from those in other trials of KiVa in the Netherlands (2012-2013) and Finland (2007-2008) which found that students who were persistently victimised in intervention schools versus control schools (Huitsing et al., 2019), and in classrooms

with low levels of victimisation rather than high levels of victimisation regardless of intervention condition (Garandeau, Lee & Salmivalli, 2018) had increased mental health problems at follow-up. There are three key factors that may explain the difference in our findings. First and foremost, all three trials employed different measures to assess psychological problems. While the Dutch and Finnish trials used measures of social anxiety and depression, our UK trial used a more general measure of emotional and externalising behaviours. Consequently, it is likely that this study captured a broader range of psychological problems, while the other trials provided a more precise representation of specific problems. Indeed, in the Dutch trial's evaluation of the HCP they found significant effects for depression but not for social anxiety; in the Finnish trial's evaluation of the HCP they found significant effects for both depression and social anxiety. Moreover, while the Dutch and Finnish trial used student reports of bullying and mental health, we used student reports of bullying and teacher reports of emotional and externalising problems. While having multiple informants in our trial may have mitigated shared-method variance, it may have had drawbacks. While teachers are typically adept at recognising internalising and externalising problems to the same extent as children (Reardon et al., 2018; van der Ende et al., 2012) sometimes their capacity is limited to the school context and their familiarity with children, which is why some studies find low correlations ($r = 0.20 - 0.29$) between teacher and child reports of internalising and externalising problems (De Los Reyes et al., 2015). In this study, the correlation between teacher's SDQ ratings over time ranged from $r = 0.37 - 0.62$ between subscales. Teacher ratings may have been particularly problematic at the first time point post-pandemic since they had not been in direct contact with children for an unusually long period of time. Furthermore, a child's unique perception of their own maladjustment and how their own victimisation experiences compare to others may play a crucial role in determining the healthy context paradox. Notably, a non-intervention study

in China examining the healthy context paradox found evidence of the paradox only when using self-reports, but not when using peer-nominations to measure victimisation (Xiong et al., 2022). A second reason my results may have varied from other trials is that the methods and sample varied across studies. While my analysis using linear mixed models and all participating children closely resembled the Dutch trials' evaluation of the healthy context paradox, the Finnish analysis used multiple regression analysis conducted on a subsample of 170 victimised children and the proportion of victims in their classroom. Although all studies examine the HCP, we defined the healthy context differently. For example, in the Finnish trial they focused their analysis on a subsample of 170 children who had been victimised and examined how reductions in the proportion of classroom victimisation impacted their psychological adjustment. For their analysis, classrooms were excluded from the sample when their composition had changed between the time points, or 2 or more children left the classroom. In the UK trial, we defined the healthy context in terms of receiving an intervention or not, and included all classrooms regardless of any change in composition as it was more representative of the changes that typically occur in schools. Consequently, it is likely my results varied because of different analytical choices, including difference in sample sizes, the use of multiple random effects to model non-independence of observations, and different predictors and variables controlled for in both studies. Third, and perhaps most important, the trial context may have played a key role. KiVa was originally adapted for UK schools based on the Finnish education system, however, there may have been some challenges with this adaptation. For example, in Finland and Netherlands students change teachers only a few times across their primary school years. Over time if the same teacher does not help a child who has been recurrently victimised, regardless of whether the school is participating in an intervention, it may worsen the psychological impact of bullying. Children with externalising problems may

then be more prone to conflicting interactions with their teacher which may lead to a cycle of conflict with teachers, increased psychological problems and consequently a higher likelihood of being victimised (Husby et al., 2023). In England and Wales, most students change teachers and classrooms in primary school every year, thus a change of context may be particularly welcomed by more vulnerable children as it may buffer both victimisation and psychological problems. Indeed, more mixing in classrooms in addition to more diverse schools may create more opportunities for children to make friends. Since one explanation for the healthy context paradox suggests that it might be harder for vulnerable children to make friends in a classroom with low levels of victimisation (Pan et al., 2021), this may explain why we did not find evidence for the HCP. In relation to this, it is possible that vulnerable children in more fluid and diverse school settings relate less to their peers at an individual level (e.g. they don't find other peers to be as 'similar'), which might prevent them from engaging in social comparisons (Festinger, 1954) or buffer any impact that comparisons may have on adjustment difficulties (Nishina & Juvonen, 2005). Indeed, future research on the HCP should examine these mechanisms.

Other aspects of the UK context may have also influenced my results. Notably, other evaluations of anti-bullying interventions in the UK, such as the INCLUSIVE trial (Bonell et al., 2018) did not find evidence for a healthy context paradox either, albeit with differences in methodology (Melendez-Torres et al., 2022). Although the Learning Together Intervention examined in the INCLUSIVE trial is based on restorative practices rather than bystander training, it is more similar in cultural and educational contexts. Thus, the wider socio-ecological context (e.g. school-level norms, national-level prevalence rates) may be equally as influential as individual, peer and classroom level factors in determining any paradoxical effects. Ultimately, comparing such findings may be difficult

when there is no standardised way of measuring the healthy context paradox. A multi-national KiVa consortium may be beneficial in putting such practices in place.

Although I did not find evidence for the healthy context paradox, my main analysis showed that independent of intervention condition and time, students who were victimised had more emotional and externalising problems than students who were not victimised. Moreover, those who were victimised at follow-up had more emotional problems than those not victimised at follow-up or victimised at baseline only. While these results suggest that there is a strong relationship between bullying victimisation and mental health, I cannot conclude that this relationship is causal as I did not observe whether changes in victimisation due to the intervention were followed by changes in mental health. Regardless, these results emphasise the need to consider the psychological impact of victimisation in interventions and maximise their impact at reducing both bullying and mental health problems (Guzman-Holst et al., 2022). Future research should consider investigating and applying ‘dark logic models’ to theorise about potential intervention harms or mechanism by which anti-bullying interventions may have iatrogenic effects, as this will allow us to best safeguard children (Melendez-Torres et al., 2022).

This is the first study to also examine two important moderators for the healthy context paradox in a trial setting – classroom-level victimisation and baseline problems (victimisation and emotional or victimisation and externalising problems). I found no moderator effects – whether a child’s classroom was high or low in victimisation levels or whether a student had severe problems at baseline or not did not influence whether children who were victimised in control schools had more psychological problems than those in intervention schools. Regarding classroom victimisation levels, studies have shown that victimisation is more strongly associated with maladjustment when classroom victimisation is highly centralised, meaning that only a few specific children are targeted

(Huitsing et al., 2012). It is possible that victimisation was less centralised in participating classrooms in my sample with more children being targeted “a little bit” rather than specific children being targeted most of the time. Indeed, at baseline about 17% of children in a classroom reported being victimised ‘at least once or twice a month’ across both intervention conditions. Future research should incorporate other methods such as social network analysis to examine such effects. Other aspects of the classroom that may explain why I did not find moderating effects for classroom-level victimisation may include the presence of anti-bullying norms or attitudes and the composition of bullying participant roles in a classroom. For example, children who are victimised but are also defended or supported by their classmates tend to be less depressed than children without defenders, even after the frequency of victimisation is controlled for (Sainio, Veenstra, Huitsing, & Salmivalli, 2011). Thus, the more defenders in a classroom regardless of whether victimisation levels are high or low may buffer any psychological problems associated with bullying. Future research should investigate the role of defenders within the HCP.

While my findings do not support previous studies suggesting that classroom victimisation levels moderate the relationship between victimisation and psychological problems (Bellmore et al., 2004; Nishina & Juvonen, 2005; Garandeau et al., 2018; Sentse et al., 2007), it is worth noting that these studies were conducted in the absence of an intervention, where classrooms were classified as having either high or low levels of victimisation. In this context, other confounding factors and mechanisms may be influencing the results. Indeed, in the only study which examined the role of classroom victimisation in an intervention context, children who were victimised reported feeling more depressed and anxious in classrooms where the proportion of victims decreased compared to children who were victimised in classrooms where it increased or remained the same – but these effects were not moderated by the intervention condition of the

classroom (Garandeau, Lee & Salmivalli, 2018). Regardless of intervention condition, this study found that students' emotional problems deteriorated in classrooms which were resistant to change (e.g. continued to have higher rather than lower levels of victimisation at follow-up), thus incorporating components that might manage emotional problems in classrooms with high levels of victimisation from the start could be helpful. If students are likely to move with the same class throughout primary school, it would be beneficial to have more intensive classroom lessons or activities involving peers that address any increase or high levels of bullying (Guzman-Holst et al., 2022) in addition to facilitating more parental involvement so that any behavioural issues outside of school are also monitored (Gaffney, Ttofi & Farrington, 2021). Furthermore, classrooms with persistent high levels of bullying should be closely supervised, so that any patterns or changes in participant roles and types of bullying can be identified and addressed.

Understanding *who* continues to be victimised in intervention schools may help us tailor interventions to the needs of more vulnerable children. Although my results suggest that being severely victimised and experiencing high levels of psychological difficulties at baseline can indeed contribute to continued victimisation and worsening emotional outcomes at follow-up, these effects were independent of intervention condition. In contrast to Kaufman and colleagues (2018) who found that students with high baseline levels of internalising problems were more likely to have trajectories of persistent victimisation in intervention groups, my study demonstrates that this might also happen regardless of whether an intervention was received or not. Thus, providing additional mental health support for vulnerable children should be embedded in any school and in any anti-bullying program. It is important to note that some components designed to reduce mental health problems such as cognitive-behavioural practices may not be helpful in some anti-bullying intervention contexts (Guzman-Holst et al., 2022), potentially if delivered in

short durations or by school staff and delivered alone and not in combination with whole school components. These practices may be harmful if they end up placing more responsibility or blame on the individual rather than the context, thus resulting in unwanted psychological effects. This is particularly relevant when dealing with group-processes such as bullying and in an anti-bullying intervention where the main focus should be on improving the school bullying environment. Thus, careful implementation of mental health components in a wider anti-bullying context or after bullying has ceased is warranted. One mechanism that might reduce mental health problems is to provide targeted support for children who are identified as being severely bullied at the start of the intervention. Indeed, other anti-bullying intervention trials have found the actual intervention to be more effective in students with higher baseline bullying experiences, with greater effects on bullying and psychological wellbeing (Bonell et al., 2018). Thus, the timing in which additional support is delivered (i.e. start of the intervention instead of weeks or months into the program) may drastically improve outcomes for children at risk and potentially reduce the risk of a healthy paradox effect. While these findings preclude us from concluding who is at risk or who might benefit from interventions, they suggest that not having any prior severe bullying experiences and/or mental health problems may still protect children who are newly victimised in a school year from experiencing difficulties with their mental health, whilst having pre-existing problems puts them at significant risk. Thus, combining anti-bullying and mental health approaches in schools appears to be an optimal approach, so long as the risk of any potential harm continues to be investigated.

My findings should be understood in the context of some limitations. First and foremost, the timing of the trial coincided with the end of the coronavirus pandemic, meaning that schools were still practicing social distancing and implementing measures reducing contact between classrooms such as smaller class groups referred to as ‘class

bubbles' or staggered break times. This means that the baseline level of victimisation may be an underestimation. Indeed, besides reduced contact with peers, the researchers also asked children to think back to the past few months, but in some cases, data was collected when children had only been back for 1-2 months and had not seen many peers prior to that. Because of school-closure delays, some schools were randomised one or two months prior to baseline data collection. The research team assumed that the intervention had not yet influenced any outcome by the baseline assessment. To avoid introducing any biases, several precautions were put in place. For example, school staff were requested to withhold any information regarding condition allocation to researchers visiting the school. In the event of school staff accidentally notifying a researcher of their school's condition allocation, the researcher was not allowed to collect data from that school. In terms of the measures used in this study, an obvious strength is that the OBVQ and TSDQ have been widely used in other anti-bullying intervention trials. However, the global item of the OBVQ (used to evaluate the main trial findings) may be more prone to missing data and thus underestimate victimisation levels. Additionally, since it was coded as a binary variable, in line with other trials, heterogeneity in responses may be lost. To account for this, I performed sensitivity analyses using the average of 9-items of the OBVQ, analysed continuously, which revealed almost identical results. While the global measure is routinely used in anti-bullying trials, researchers should acknowledge the potential loss of information and accuracy of the measure, lack of information regarding impact of bullying and biases that could be introduced due to missing data. As far as using the TSDQ, I did not validate any of the sub-scales using clinical interviews or questionnaires, or obtained information from other informants such as parents who might have better knowledge of their child's emotional problems. Indeed, the excess distribution of zeroes in the TSDQ reports may reflect both teacher's lack of knowledge or awareness about their student's

psychological difficulties leading to underreporting, as well as true zeroes reflecting a population with very little psychological problems. For pragmatic reasons, my classroom ID variable had to be imputed manually. Whilst I was able to match the data to the number of classes on record, I may have introduced sources of bias and error to the data. To account for some of these limitations (e.g. zero-inflated data, and entering manual classroom IDs) I bootstrapped the confidence intervals in the models for both fixed AND random effects. Lastly, there may be other moderating factors influencing the healthy context paradox over and above those included in this study such as school climate, attitudes about bullying, bystander roles and responses, and individual factors such as empathy or moral disengagement. These factors, in addition to other risk, protective and moderating factors should be considered in future trials investigating the healthy context paradox.

Conclusion

This study addressed the first and second overarching aims of this thesis which were to examine the relationship between bullying and mental health in a randomised, controlled trial context and to examine individual differences in who is at risk of persistent victimisation and poor mental health problems and who is at risk or benefits the most following an anti-bullying intervention. Moreover, this study explored which factors may moderate effects at the individual and peer or classroom-level. Internalising and externalising problems are considered high priority child mental health concerns. If anti-bullying interventions may inadvertently increase such psychological problems, this issue must be thoroughly investigated – particularly as we estimate that hundreds of interventions are currently taking place worldwide. In this study I examined the healthy context paradox and hypothesised that children who remained or became victimised in intervention schools

would experience higher levels of emotional or externalising problems than children who remained or became victimised in control schools. Overall, my findings did not support the presence of a healthy context paradox in the Stand Together Trial. Furthermore, whether classrooms were high or low in victimisation or whether a student has severe problems at baseline or not did not influence whether students victimised in intervention schools at follow-up had more psychological problems than those in control schools. However, regardless of intervention condition and time I found evidence that students who were victimised had more psychological problems than students who were not victimised and these problems deteriorated more in classrooms that continued to have high levels of victimisation at follow-up. Furthermore, those with more severe baseline problems were more likely to experience persistent victimisation and worse mental health outcomes at follow-up. While these findings suggest there is a strong association between bullying victimisation and mental health, above and beyond baseline levels of mental health, causality cannot be fully established as I did not test for the reverse pathway. This study also found that children in high-risk environments or with pre-existing problems were more likely to have worse mental health outcomes. Conversely, children with no prior mental health problems or victimisation experiences, and in low-risk environments were less likely to have mental health problems, even in the event that they became newly victimised. Indeed, this study was not able to determine whether children were more at risk, or whether they benefited more from the intervention as findings were independent of trial condition. Future research should explore what specific intervention components may be responsible for driving these effects. Regardless, these findings suggest that potentially offering more support to children in high-risk environments from the start of interventions, and incorporating components delivered by professionals aimed at managing mental health whilst also enforcing whole-school practices in anti-bullying interventions may lead to

more positive intervention effects on mental health. Ultimately to maximise the impact of interventions we need to design and test components that reflect the strong link between bullying and mental health.

Chapter 6. Discussion

The primary focus of this thesis is to explore the relationship between bullying and mental health in children and young people (CYP), including understanding risk, resilience, and the role of anti-bullying interventions through a socio-ecological lens. There is an extensive body of research attesting to a strong association between bullying and mental health. However, practical and methodological limitations in studying bullying make it difficult to draw causal assumptions and establish what mechanisms and factors influence this relationship (Guzman-Holst & Bowes, 2021). This thesis uses multiple methods to address some of these challenges. [Chapter 2](#) sets out the theoretical framework for investigating the relationship between bullying and mental health, including all hypothetical pathways or hypotheses. This chapter highlights the methodological challenges in the literature, the risk and protective factors that might moderate and mediate this relationship. [Chapter 3](#) illustrates the application of theoretically driven and novel methodologies presented in the literature review. I used opportunistic longitudinal data collected over the course of 13 months during the Covid-19 pandemic to study the relationship between bullying and mental health and their joint trajectories in a ‘natural experiment’. Part 2 of this thesis then focuses on anti-bullying interventions. [Chapter 4](#) presents a systematic review and meta-analysis examining the impact of school-based antibullying interventions on mental health, including intervention components, moderators, and mechanisms. Then, to assess the impact of anti-bullying interventions on mental health in [Chapter 5](#), I used data from a randomised controlled trial (RCT) of an antibullying intervention trial in the UK to examine who is at risk of poor mental health outcomes and who is more likely to benefit from an intervention. In this final chapter I

discuss the main findings, linking results from each of my empirical chapters to future research, and then explore the implications, applications, and limitations of this research.

What have we learned from the relationship between bullying and mental health across different contexts and using different methods?

This thesis found strong evidence to suggest that research methods, environmental context and socio-ecological factors in each context may be important factors in determining the direction of effects in the relationship between bullying and mental health. In contrast to prior literature on this relationship which suggests that there is a bidirectional association (Christina, Magson, Kakar & Rapee, 2021), this thesis found evidence for unilateral relationships, both while testing bidirectional associations in a longitudinal natural experiment and in a randomised controlled trial. Specifically, I found that experiencing mental health difficulties during periods of school closures (i.e. restricted social interactions) predicted an increase in peer victimisation when schools re-opened (i.e. unrestricted social interactions), but not the reciprocal path, and there was not a significant association for pathways between peer aggression and mental health. As discussed in the literature review in **Chapter 2**, these results support a symptom-driven model, whereby internalising symptoms may a) interfere with social skills functioning and elicit disliking or aggressive responses from peers, or b) lead CYP to engage in internalising behaviours such as withdrawing or isolating, crying or appearing fearful, causing a CYP to be viewed unfavourably by peers and signalling vulnerability, making them an easy target for victimisation (Veenstra et al. 2007). These results would suggest that intervening or increasing socio-emotional support during periods of social restrictions to improve CYP's mental health might not only positively influence CYP's current and subsequent mental

health but also their peer relationships. Future research should investigate whether digital mental health interventions may enable remote access and support for CYP in this context and examine whether this may be associated with less subsequent peer victimisation. Notably, this study took place in a non-normative natural setting where globally, individuals were experiencing out of the ordinary changes and challenges to their daily routine. Hence, it is not surprising that my findings may differ from earlier research predominantly conducted in normative contexts (i.e. highly probable or typically occurring contexts), and in which common socio-ecological factors may be present. Indeed, it is well known that non-normative life events typically reduce the size of a social network (Wrzus, Hänel, Wagner and Neyer, 2013) which can have a direct impact on mental health as well as other areas of life and functioning. These effects may be particularly enhanced if events happen during periods of development, such as childhood and adolescence, when an individual's social network should be expanding. Therefore, non-normative events and context-specific socio-ecological factors may be influencing peer relationships, mental health and thus weighing heavily on the direction of effects. Thus, the context in which we study bullying and mental health, and changes to the broader socio-ecological model should always be taken into account.

In contrast to a natural experiment, a randomised controlled trial can help ensure that any differences observed between intervention and control groups are not due to pre-existing differences, thus reducing confounding. If an anti-bullying intervention is successful and leads to reductions in victimisation, then we should see improved mental health outcomes for the intervention compared to the control group. Findings from a meta-analysis of intervention studies in **Chapter 4** found a very small impact of anti-bullying interventions on internalising symptoms. Moreover, it found that reductions in bullying victimisation and perpetration did not mediate intervention effects on internalising

outcomes. Thus, I concluded that interventions may be acting in other ways and through other mechanisms to reduce - albeit slightly- mental health outcomes, and found limited support that changes in victimisation precede changes in mental health outcomes in the short-term. These findings were further supported by evidence from a RCT of an anti-bullying intervention in **Chapter 5**, which showed that victimisation at baseline was associated with increased mental health problems at follow-up, however, this association occurred independently of intervention condition. Thus, I cannot conclude there is a causal relationship without knowing whether manipulating reductions in bullying victimisation would have the same effect on mental health. As discussed in **Chapter 2**, these findings support an interpersonal risk model, suggesting that being victimised constitutes a significant stressor that may diminish sense of belonging or connectedness to others and possibly lead to mental health problems (Baumeister & Leary, 1995).

Overall, findings from this thesis suggest that bidirectional associations should not always be generalised across contexts. While bidirectional effects may dominate findings in normative contexts, the same is not necessarily true for non-normative or across diverse contexts in which other socio-ecological factors may be influencing the relationships and thus weighing strongly on unidirectional relationships. Using different methods to address the nature of this relationship yielded different findings and presented new difficulties in understanding causal mechanisms. It is possible that the context plays an important role such that the factors and mechanisms driving the association between bullying victimisation and mental health in a normative natural setting (e.g. longitudinal study or twin design study), are not the same as those observed either in a stressful or non-normative natural setting (e.g. the pandemic) or a school-based RCT. Thus, future research should aim to examine both the direction of the relationships and associated mechanisms in different contexts and using at least two different methods. The findings of this thesis

suggest that future studies evaluating this relationship, particularly meta-analysis should test for interactions involving research design, context and socio-ecological factors.

What can these studies tell us about individual differences in the joint development of bullying and mental health and in their responsiveness to anti-bullying interventions?

One of the overarching aims of this thesis was to move away from average trends and explore individual differences in the joint development of mental health and peer problems (**Chapter 3**) and understand how individual differences play a role in how CYP respond to anti-bullying interventions (**Chapter 5**). Overall, results relating to the joint development of mental health and peer problems during periods of limited and unlimited social restrictions found that most children followed trajectories of low peer problems and low/moderate mental health difficulties. However, over one fourth of the sample experienced moderate to chronic peer problems and high mental health difficulties. Thus, these findings indicated that while most of the children in our sample were able to adapt and cope both emotionally and socially to the different challenges imposed during social restrictions, some children really struggled to cope during restrictions and on return to schools. Similarly, results from an RCT (**Chapter 5**) showed that individual differences play a key role in the individual development of mental health outcomes, but do not necessarily determine responses to an anti-bullying intervention (e.g. whether they benefited or not). Indeed, I found that whether classrooms were high or low in victimisation or whether a student had been severely victimised or experienced high levels of emotional or externalising problems at baseline, did not influence whether students victimised at follow-up in an intervention condition had more psychological difficulties. Conversely,

students who had not been victimised or who had no pre-existing psychological difficulties did not benefit more in the intervention condition. Thus, individual differences, as measured in this thesis, do not seem to explain why some children might do better or worse in an intervention context. However, children with pre-existing problems, and those in classrooms with high levels of victimisation were more likely to have higher levels of emotional problems at follow-up than children with no pre-existing problems and children in classrooms with low levels of victimisation. These findings occurred independently of intervention condition, meaning that a) interventions may not be sensitive enough to account for pre-existing individual differences and different environments or b) pre-existing individual differences and different environments are not enough to explain differences in intervention outcomes. Ultimately the combined findings from both chapters demonstrate that children exposed to stressful or non-normative circumstances or environments might benefit from different levels and types of support to deal with emotional and behavioural difficulties, rather than a ‘one size fits all’ approach and that children considered vulnerable may benefit from additional support in schools beyond anti-bullying interventions. When using person-centred methods or accounting for pre-existing problems in our methods, we reduce the likelihood of ignoring a particularly vulnerable group and come closer to understanding a group’s full range of bullying behaviours, responses or mental health outcomes. Thus, when possible, person-centred methods such as trajectory analysis should be preferred over standard variable-centred methods such as regression analysis, which only describe average trends. Furthermore, when exploring individual differences, it is important to consider how different subgroups, such as CYP with Autism, ADHD, SEN or other complex needs (neurodivergent), might respond to an intervention. Since they are more likely to be bullied and have high levels of comorbid internalising problems, it is likely that their trajectories and response to interventions might

look different than those from a normative or an average sample of CYP, or that they may be driving the effects for high-risk trajectory groups. Moreover, CYP identifying as neurodivergent may have more difficulty understanding why they are being bullied in a context where bullying has decreased (i.e. classrooms with low levels of victimisation), thus worsen their mental health. Considering how these individual differences may impact findings is an important avenue for future studies. Future research should continue to investigate the role of individual differences both in their development and in anti-bullying interventions.

What factors are associated with the individual and joint development of bullying and mental health, and what role do they play in determining anti-bullying intervention outcomes?

Findings across all empirical chapters revealed that several known risk and protective factors are associated with the relationship between bullying and mental health – both in their individual and joint development, as well as in determining intervention outcomes. Specifically, I found that children with worse mental health outcomes (**Chapter 5**) and children experiencing chronic mental health and peer victimisation problems over time (**Chapter 3**) were associated with more individual, environmental, and family risk factors than children with better outcomes or experiencing lower difficulties over time. Notably, pre-existing problems and high-risk school environments (i.e. classrooms with high levels of victimisation) were associated with worse mental health outcomes, while family conflict, parental psychological distress, lower income levels, having a SEN/ND and the absence of at least one close and supportive friend were associated with joint trajectories characterized by high levels of mental health and peer problems. In contrast, having fewer

or no pre-existing problems and being in low-risk school environments were associated with better mental health outcomes and having at least one supportive friend, higher family income levels, and experiencing less family conflict or parental psychological distress were associated with low stable levels of peer problems and mental health difficulties. It is clear that adopting a socio-ecological perspective is necessary to understand what factors are associated with the relationship between bullying and mental health. In particular, individual, family and school environmental factors seem to be key in determining outcomes, while the accumulation of these different risk and protective factors may play an important role in the severity of outcomes.

In terms of anti-bullying interventions, **Chapter 4** examined what factors and program components in anti-bullying interventions were associated with a reduction in mental health problems. Results showed that a reduction in internalising symptoms did not vary significantly across geographic location, grade level, program duration and intensity and number of intervention components used. Regarding intervention components, inclusion of the component, work with peers was significantly associated with a greater reduction in internalising outcomes and the component cognitive-behavioural (CBT) elements was significantly associated with an increase in internalising outcomes.

Across all studies, the importance of peers emerged as a protective factor for children's peer problems and mental health. Independent of mental health severity, children in trajectories with low levels of peer victimisation were more likely to have at least one quality friendship at baseline than those experiencing high levels of victimisation. Thus, having at least one supportive friendship may play a role in preventing concurrent peer problems, and potentially, improving subsequent mental health. In interventions, focusing on building peer relationships or working with peers may increase CYP's perception and sense of safety at school which may lead to a decrease in mental health problems. Further

research should investigate which specific peer capacities are the most helpful at reducing internalising symptoms.

Our findings also suggest we should be cautious about the use of CBT for dealing with internalising symptoms in anti-bullying contexts. Noticeably, CBT might be employed as a targeted component for CYPs with pre-existing problems, however this component may be harmful if it ends up placing more responsibility or blame on the individual to improve their situation rather than addressing the peer and school context, thus resulting in unwanted psychological effects. While the main focus of interventions should be on improving the school bullying environment, future research should examine how implementing mental health components in a wider anti-bullying context affects mental health outcomes. Moreover, they should examine their use in combination with other components (e.g. work with peers), their frequency, and their mode of delivery.

Furthermore, there is also a clear need to consider how risk and protective factors, and intervention components may be influencing other highly prevalent subgroups, such as neurodivergent CYP (CYP with Autism, ADHD, SEN, among other complex needs). Indeed, it is important to understand whether these groups are benefiting or experiencing potential harms from universal intervention components. For example, they may experience trouble having to deal with peers that don't understand their circumstances or difficulty understanding and applying CBT as it involves complex language and concepts. On the other hand, they may benefit more from other components such as awareness at the school-level for all pupils to understand neurodiversity, or anti-bullying activities involving visual aid (e.g. art, music, videos). Thus, future research should prioritise investigating how different risk and protective factors and intervention components may impact subgroups of children with more complex needs.

Going forwards it will be important to examine the specific impacts of components grounded in empirical knowledge and theory of change frameworks, both to maximise meaningful clinical impacts but also to provide a deeper understanding of any causal pathways between bullying and internalising symptoms.

Wider implications

The main findings discussed above have wider implications for our understanding, study, and management of bullying and young people's mental health problems. In the following three subsections, I detail the theoretical, clinical and research implications of the present research.

Theoretical

Overall, this thesis contributes to our theoretical understanding of the relationship between bullying and mental health. Specifically, within studies it appears the context may play an important role in determining the direction of effects. In this thesis I found evidence supporting different unidirectional relationships, in contrast to the bidirectional relationship proposed in the existing literature. Moreover, many different factors may influence these associations depending on the context and methods used. For example, findings from the longitudinal analysis in **Chapter 3** supported symptom driven models in which mental health predicted victimisation, but not the reciprocal path. While I expected our findings to show a bidirectional relationship, it may be that such transactional models are too simplified for unprecedented and non-normative contexts such as the pandemic, where too many unaccounted factors may be influencing the relationship between bullying and mental health. In contrast, results from the RCT in **Chapter 5** supported an interpersonal

risk model, where baseline levels of victimisation (the stressor) predicted emotional and externalising problems at 12-month follow-up, above and beyond baseline psychological problems. In line with the interpersonal risk model, I expected that if bullying perpetration and victimisation levels decreased in the intervention condition (i.e. the stressor reduced), mental health problems would decrease as well, in comparison to controls. However, I found no intervention condition effects in the RCT or in the systematic review to support this. Thus, the evidence from across this thesis in relation to an interpersonal risk model suggests that other socio-ecological factors might be influencing this relationship in intervention contexts. Overall, these research findings suggest that the context in which this relationship is being studied (e.g. controlled intervention environments vs natural environments), the different research methods being used (e.g. RCT study, longitudinal observational study), and the differences in socio-ecological factors in each context may help determine the nature of this relationship and potentially account for variability in what previous literature has determined to be a bidirectional relationship.

The finding from this thesis also lend support to the social-ecological theory of bullying (Swearer & Espelage, 2010) as it views bullying as a social phenomenon that can be understood within the larger social context in which it occurs. A CYP is at the center of the system and surrounded by different layers of the environment that influence their development. It encompasses individual-level, family-level, peer-level, school-level and neighborhood-level influences followed by a broader macrosystem. Findings from this thesis suggest that experiencing victimisation, having pre-existing psychological problems or a SEN/ND, experiencing family conflict and having parents with higher levels of psychological distress, not having adequate peer support, and being exposed to classrooms with high levels of bullying are more likely to put CYPs at risk of negative mental health outcomes, peer problems or both. Thus, it appears that most factors coming from inner

levels such as individual, family and peer influences are particularly important in shaping an individual's environment. Furthermore, the findings from this thesis suggest that it is imperative to adopt a socio-ecological framework for designing interventions so that they can target all systems that contribute to negative outcomes.

Clinical and Practical

The insights gained from this thesis can inform the development of interventions, policies, and practices that are more aligned with the complexities currently faced by CYP. Notably, findings from my empirical chapters highlight the importance of considering individual differences in CYP development and experiences of peer problems and mental health problems as these can help us make recommendations that reflect the level and type of support required by individuals. Investing in digital interventions may be beneficial for this purpose as they leverage technology to address various issues and support children in different domains. For example, they may increase reach and accessibility, cost-effectiveness, real-time support for immediate problems and more importantly, be tailored to individual needs and preferences. Thus, children with pre-existing needs or those living in remote areas, or who lack social support might benefit from these types of interventions. Furthermore, data can be collected remotely and continuously to examine any real-time patterns that may emerge between bullying and mental health.

Across chapters I found that peers play an important role in children and young people's lives. Quality friendships, which may refer to relationships that provide emotional support, trust, companionship, or affection may be particularly important in supporting victims of bullying as opposed to other peer relationships that provide play or temporary companionship. It is important to make this distinction in observational studies by using more thorough definitions of 'peers' or 'friends' to understand who we are capturing. In

the context of school interventions, peers can take on different roles. Although deviant peers can be a source of risk (i.e. bullying), supportive peer relationships can play an important role in protecting children and young people from experiencing persistent peer problems and negative mental health outcomes. Incorporating peer components in anti-bullying interventions such as peer training, peer anti-bullying awareness presentations or peer mediation, in addition to components aimed at building supportive peer relationships, may be effective at maximising their impact on mental health. Children and young people who have supportive relationships may be better equipped to cope with peer problems and mental health problems and they will have more opportunities to build socio-emotional skills. Furthermore, incorporating peer mediation, or buddy systems in an intervention may help expose children to different perspectives and help them feel more integrated in the school environment. Notably, in this case, we might want to promote the use of prosocial and empathetic peers, rather than deviant peers. It is important that these distinctions are made in anti-bullying context to avoid any potential side effects. Lastly, incorporating components that help CYP build supportive, empathetic, and prosocial relationships may be key in buffering against the negative effects of peer problems and mental health.

This thesis also has clinical and practical implications for anti-bullying interventions. This chapter contributes specific knowledge about components that may be used in anti-bullying interventions to target mental health problem, such as working with peers (as described above), and warns about using CBT components without further investigation as to how or why they might be harmful in this context. CBT is a well-researched and evidence-based technique for addressing mental health problems – including those related to bullying – which may equip children and young people with coping and problem-solving skills to manage bullying experiences, build resilience and help individuals regulate their emotions and response to stress and conflict. However, it

may also inadvertently place more responsibility or blame on the individual to improve their situation rather than addressing the peer and school context. This may result in unwanted psychological effects as an individual may feel they are responsible for the bullying happening to them and also for managing the situations themselves. Any targeted components that puts the focus on the individuals' maladjustment may serve to reinforce their outsider status and worsen their victimisation and maladjustment. In the context of anti-bullying interventions, delivering CBT components only after CYP who have been victimised are removed from the bullying context may prevent them from developing internalising problems. Delivering CBT components to everyone in the class may also help address concerns related to unintendedly targeting vulnerable children. However it should be noted that delivering CBT at a classroom-level as part of a general school-based mental health interventions that is not focused on group dynamics, might not be beneficial for everyone, particularly for the most vulnerable children (Foulkes & Stringaris, 2023). Furthermore, having professionals equipped to deliver CBT and sufficient time to deliver it properly might also make a difference. Indeed, it is imperative that future research should examine how implementing mental health components in a wider anti-bullying context may affect mental health outcomes.

Research and Methodological

This thesis makes several contributions to the future study of bullying and mental health. First, it compiles information from over 40 years of anti-bullying interventions to examine their impact on mental health. Furthermore, it was the first study to investigate potential causal pathways in a meta-analysis of anti-bullying interventions. Thus, I developed a framework for prospective research to test the effects of bullying on mental health in future antibullying interventions and explore other factors that might explain

intervention mechanisms on mental health. This is important as it can help us gain a deeper understanding of why and how interventions work and what components may be key in producing positive outcomes. Furthermore, knowing which aspects of anti-bullying interventions may lead to positive outcomes can allow us to target modifications or enhancements that may improve and optimise the overall effectiveness of an intervention.

Similarly, this thesis sets a framework for future evaluations of antibullying-interventions to consider different moderators and mechanisms of the healthy context paradox. This thesis made the novel contribution of examining risk x intervention effects in relation to the healthy context paradox, as pre-existing problems may increase the risk of victimisation and mental health problems during an intervention. Thus, understanding how individual differences may play a role in intervention outcomes is key to preventing any harmful intervention effects.

Lastly, this thesis sets an example of using person-centred approaches (e.g. group-based trajectory modelling) rather than variable-centred approaches (e.g. multiple regression) in antibullying research to examine individual differences in the joint development of both bullying and mental health outcomes. This is important as it recognises that children and young people may have different patterns or trajectories across different outcomes and may reveal meaningful subgroups or clusters that are typically masked in average trajectories or variable-centred analysis. Notably, person-centred approaches can also help identify unique groups of children and young people that may deviate from general or expected trends in a population. Thus, they can help uncover who is more vulnerable or at risk of peer and mental health problems and who is doing better than expected despite experiencing such problems. Ultimately this approach can be very valuable for promoting resilient outcomes and tailoring interventions to address the unique characteristics or needs of a subgroup.

Overall, this thesis used different methodologies to explore the relationship between bullying and mental health. While I arrived at different conclusions using longitudinal data from a natural experiment, data from an RCT and data from a systematic review and meta-analysis, each study provided unique and important information to help us understand causality, individual differences, risk and protective factors, mechanisms and the role of anti-bullying interventions.

Limitations

Despite its contributions, the research reported should be considered in the context of several limitations. Specific strengths and limitations for each study are described in the discussion of each empirical chapter. This section describes the broader methodological challenges that remain and how those may be addressed in the future.

In Chapter 2, I gave a general overview of the methodological challenges in studying the relationship between bullying and mental health. These involved the use of cross-sectional and retrospective designs, which preclude inferences about causality and may introduce biases from memory recall; shared method variance which may inflate effect sizes; an individual's social circumstances and psychological characteristics which may predispose someone to behave a certain way or perceives other's social intent as hostile; the presence of multiple confounders from individual characteristics to family and the wider environment that can influence this relationship. Lastly, many studies only examine one competing hypothesis at a time (e.g. bullying leads to mental health problems) thus making it impossible to establish temporal priority. Ultimately, the greatest strength of this thesis was that it addressed most of these limitations when applicable, by using prospective, longitudinal designs, controlling for multiple factors known to influence bullying and

mental health, and studied all competing hypothesis (i.e. bidirectional relationships). Despite these strengths there were other limitations which will be discussed next.

How are we conceptualising bullying?

Across all my empirical chapters I was faced with the question of how to conceptualise bullying. In the systematic review, the main objective was to examine interventions with a primary aim to reduce bullying in schools. As such, I excluded general conflict-resolution and aggression prevention interventions as these might focus on other aspects of aggression such as dating violence or gang violence. As such I may have excluded interventions that may have indirect effects on bullying as they are still designed to tackle aggression. In my longitudinal trajectories analysis (Chapter 3), I conceptualised bullying or peer problems as ‘peer aggression’ and ‘peer victimisation’. This occurred because the item for bullying perpetration included other forms of aggression in addition to ‘bullying others’, which don’t fit with standardised definitions. In this study, parents may have based their answer on talking with their child or their teacher, or their own observations of their child’s social interactions. However, there is always a possibility that a parent might mistake bullying for another form of aggression if they only witness or hear about it once regardless of how often it truly happens. Consequently, the way everyone conceptualises bullying (and believes its bullying and not typical aggression in the first place) plays a large part in reporting. In the RCT, children were given a thorough definition of bullying prior to administering the OBVQ. This definition was read aloud and read by all pupils with a chance for them to ask questions. Based on the questions, it was clear that some children struggled with defining a line between what was considered bullying or not. Surprisingly, little is known about young people’s perceptions of what constitutes bullying, particularly amongst those aged 13 and under. Some studies suggest that young people’s

perceptions are not in line with widely accepted research definitions and hold little weight in how bullying is defined (Bryne et al., 2015). For example, young people may consider a single incident as bullying, which is at odds with the field's defining feature of repetitiveness (Hellstrom, Persson & Hagquist, 2015). Moving forward, it is important that young people's perceptions of bullying are prioritised to ensure that researchers and clinicians alike are better informed about its impact on wellbeing and what support is required to best safeguard young people. Indeed, bringing the experiences and voices of children and young people into this work, either by co-production or focus groups, would be ideal to come up with a definition of bullying that fits youth's perceptions of what it means to be bullied or bully someone and examine whether it fits with standard research definitions. From prior work it appears that adding an element of impact or functioning to typical measures of frequency and severity would better capture experiences of bullying. Overall, this approach of incorporating children and youth voices, could also help shape what areas need to be prioritised in interventions, for example, regarding what components work and don't work at preventing bullying or improving mental health. This information could have been extremely valuable for my systematic review. Future work could obtain this information by potentially meta-analysing qualitative work conducted in interventions (if available) or by designing a mixed-methods approach study that interviews CYPs undergoing anti-bullying programmes in their school.

The use of different mental health and bullying measures

Different measures were used in all the studies to capture both bullying behaviours and mental health. In the systematic review (Chapter 4) I extracted all the measures that were typically employed in anti-bullying interventions to measure internalising and related symptoms, which included specific measures of depression, anxiety or somatic symptoms,

as well as other general measures of mental health difficulties such as the emotional subscales from the Strengths and Difficulties Questionnaire (SDQ). Whilst this extraction was based on a definition of internalising symptoms it excluded constructs that may have been highly correlated such as self-esteem, loneliness, and guilt. Additionally, for pragmatic and theoretical reasons explained in Chapter 2 - including how most interventions do not assess externalising problems and most observational studies have found mixed evidence for their association with bullying - I excluded externalising symptoms. Thus, results from this review do not reflect the impact of antibullying interventions on all aspects of mental health. In my longitudinal analysis (Chapter 3) and RCT analysis (Chapter 5) I included both the internalising and externalising subscales from the SDQ to capture a wider range of problems. Although this is a commonly used and well-validated scale for school-aged children I did not validate the SDQ/TSDQ using other clinical interviews or questionnaires in the samples. Another problem is that it became difficult to compare findings with those of other trials, which had used specific measures of depression and social anxiety, and no measures of externalising problems. Moreover, by using the SDQ some information about specific problems (e.g. low mood or excessive worries) which are imperative for a diagnosis may be lost as the SDQ tends to capture more general symptomatology. Moving forward, researchers should present standardised measures in intervention studies to promote data synthesis and comparison of findings across studies and aim to incorporate (and potentially prioritise) more clinically relevant measures alongside generalised measures of mental health. Researchers should also aim to test for the same outcome using similar measures when delivering the same intervention (e.g. KiVa).

In terms of bullying outcomes, I used single-item measures for bullying victimisation and perpetration from the SDQ in Chapter 3 and the global (single) item of

the Olweus Bullying Victimization Questionnaire (OBVQ) in Chapter 5. There are three main limitations that follow. First, given the single-item questions and limited descriptions for bullying and peer aggression, I was not able to distinguish between different types of bullying (e.g. verbal, emotional, physical, cyber) or whether they included sibling bullying occurring at home (particularly for parent reported bullying in Chapter 3). It is important to acknowledge that single-item questions in this context may impact the interpretability of results as they may be capturing both irrelevant information (e.g. a single act of aggression that would not be considered bullying, based on researcher definitions) or information that is not relevant for this study (e.g. sibling bullying). Furthermore, they do not consider the impact of bullying, which both parents and children tend to consider when indicating whether bullying has occurred, and which may also provide key indicators of how problematic bullying might have been in the pandemic context.

Second, single-item measures may be more prone to missing data and thus underestimate victimisation and perpetration levels. Whilst the decision to use single-item measures in Chapters 3 were pragmatic (based on availability) and the decision to use a binary version of the global item in Chapter 5 deliberate (decided by the KiVa Team to go in line with previous KiVa trials), there is a possibility that I may have lost heterogeneity or diversity in responses. Whenever possible, I suggest researchers a) give a thorough definition and examples of bullying prior to administering a questionnaire, b) acknowledge the potential loss of information and accuracy of measures when using global items, c) use multi-item scales or full questionnaires when possible to avoid missing data and obtain more information about the type and severity of bullying, d) analyse data continuously rather than using binary outcomes to avoid losing information or perform sensitivity analysis using another validated questionnaire.

Thirdly, the impact of bullying is not considered in any of these measures as it is not in line with research definitions of bullying. This may constitute a potential loss of accuracy from the perspective of young people as they might consider this when reporting an instance of bullying (see section above). Yet, impact may also be subjective and perceived differently across countries, cultures, and even schools depending on their anti-bullying awareness, attitudes, and other priority problems. For example, students in a school with a higher prevalence of bullying might rate their experience as less impactful than those in a school with lower prevalence of bullying. Thus, measuring impact is a complicated task that might require in-depth knowledge of the context and target population. One potential way to address some of these issues might be to use multiple informants (e.g. self, teacher, parents) to respond to this question or use peer nomination data that might capture different areas of social functioning (e.g. likeability, popularity, rejection).

Type of informant

For pragmatic reasons, I did not have multi-informants reporting on the same outcome or predictor measure in any of the studies. Chapter 3 used parental report of their child's internalising, externalising and bullying measures using the PSDQ and Chapter 5 used child (self) reports of bullying using the OBVQ and teacher reports of internalising and externalising problems using the TSDQ. The use of other informants to report on a child's social relationships and mental health may not be ideal for many reasons. First, parents and teachers may not be fully aware of their child's mental health problems, particularly if they are sub-clinical. Second, while parents may be reliable at reporting on emotional problems (Ford et al., 2005), teachers are typically more reliable at reporting externalising but not internalising problems for adolescents (Loades & Mastroyannopoulou,

2010). Teachers may be more adept at recognising internalising problems for children (Reardon et al., 2018). Third, we don't know to what extent parents' own mental health can influence their reports about their child (De Los Reyes & Kazdin, 2005), thus controlling for parental mental health, where possible, should be the standard practice. Whilst parental reports may not be the most accurate at reporting bullying, they have been used to assess peer problems in the past (Sakyi et al., 2015), including the widely used parent reported version of the SDQ peer problems subscale. Moving forward, researchers should prioritise self-reports for both bullying and mental health outcomes and include a second informant to report on mental health outcomes. This way, we reduce shared-method variance and can assess the reliability of results.

Additional confounders

It is well known that in psychological research controlling for all possible confounding variables is nearly impossible. Yet, some factors such as gender and age should be controlled for in analyses when these are known to influence predictors and exposures. For Chapter 3 and Chapter 5 I made every possible effort to control for as many confounding variables as possible, including baseline levels of the exposure, gender, age, and proxy measures for inequality. However, there might have been other pandemic and non-pandemic factors (e.g. bereavement or financial deprivation) that may have influenced trajectories (Chapter 3), and other class and school related factors (e.g. school climate, fidelity of intervention) that may have impacted intervention effects or acted as moderators of the healthy context paradox. Cognitive processes such as perceptions of threat or hostile attribution biases may have also influenced my results. This happens when anxious or depressed individuals are predisposed to negative affective and memory biases which can influence how they are likely to remember and/or report experiences with bullying. That

is, they may be more likely to perceive and attribute hostile intent to neutral peer interactions and inflate associations compared to other informant reports (such as parent or teacher reports) or CYP without any pre-existing difficulties. These processes could have affected reporting in targeted interventions included in the meta-analysis (e.g. studies looking at the effectiveness of anti-bullying interventions on CYP with depression) and/or for pupils reporting on bullying and mental health during the KiVa intervention. Indeed, such cognitive biases may partly explain why I found that pre-existing difficulties predicted more emotional and externalising problems for children that continued to be victimised during the intervention (regardless of intervention condition). While these cognitive processes can be quite difficult to objectively measure, they should be acknowledged as a potential issue when studying individuals with pre-existing difficulties. Finally, I must caution against drawing causal inferences about the direction of effects in these studies due to unmeasured confounding. However, adjusting for confounders when it's not necessary may introduce conditional associations and selection biases rather than minimise them. Moving forward, an approach to deal with confounding during the stage of study design is to use directed acyclic graphics (DAGs) to draw out all possible sources of confounding between variables. This method has been shown to be effective at illustrating whether a particular subset of covariates potentially reduces or increases bias in a particular context (Shrier & Platt, 2008).

Missing data

In terms of missing data, it is important to acknowledge that there was a substantial amount of missing data in Chapter 3 as many parents did not fill out surveys every month. Even if I used well established methods to deal with the missing data, my models might not fully represent all trajectories. Similarly, in Chapter 5, cases that did not have both

student and teacher data were excluded from the analysis, as were those that only completed the assessment at baseline. While attrition is a common problem in longitudinal studies and randomised controlled trials with multiple time assessments, there are certain things that can be done to minimise and deal with data loss. From experience, these are the things that I believe might have worked: First, maintaining open communication about study expectations and possible benefits with participants. Second, maintaining flexibility in the study so that if measures are not collected at a certain time, they can be collected at an appropriate later date. Third, providing clear and simple instructions with definitions or clarifications to avoid misunderstandings, confusion or ‘I’d rather not say’ answers. Fourth, providing support during the study. For example, when we were in classrooms collecting data for the anti-bullying trial we had a ‘lead’ leading the session, while a ‘support’ helped children that required clarification or who had lower reading abilities. To deal with missing data it is also possible to use multiple imputation methods, which require more statistical expertise and computational demands or bootstrapping techniques which resample the data multiple times to derive more accurate confidence intervals. Implementing these strategies may be helpful in minimising data loss and dealing with attrition in future studies.

Mental health as a “secondary” outcome

A limitation very specific to this thesis is the fact that mental health outcomes are always considered secondary outcomes in relation to antibullying interventions, thus limiting the power to conduct secondary analysis and potentially underestimate any effects – as was the case in Chapter 3 with the meta-analyses and in Chapter 5 with moderator analysis. I argue throughout this thesis and with a vast body of previous research to support it, that mental health should be considered a co-primary outcome in anti-bullying

interventions. That is so that studies are sufficiently powered, and so that the relationship between bullying and mental health is taken into account.

Summary of limitations

The limitations described in this section are important to consider when reading and interpreting the results of this thesis. Overall, the biggest strength of this thesis is the use of multiple methods, which allowed me to examine the relationship between bullying and mental health through several socio-ecological lenses using the strongest methodologies. In contrast, several limitations were also present in my studies, including how we continue to conceptualize bullying, different measures, different informants, confounding factors, and missing data. All of the empirical studies in this thesis made an original contribution to the existing literature and offer intriguing findings upon which the future studies can expand.

Conclusions

The primary focus of this thesis was to explore the intricate relationship between bullying and mental health in young people, including understanding risk, resilience, and the role of anti-bullying interventions through a socio-ecological lens. The goal was to fill gaps in the field and provide recommendations for future research and development of anti-bullying interventions. By embracing a mixed method approach, including a systematic review, longitudinal natural experiment and randomised controlled trial of an anti-bullying intervention, this thesis addresses some of the methodological challenges in the field of bullying, and childhood and adolescent mental health. My work highlighted the impact of individual, family, peer and environmental risk and protective factors, the role and

effectiveness of antibullying interventions in tackling mental health, the importance of peer-relationships in development and intervention contexts, and the importance of taking an individualised approach to studying trends in bullying and mental health. Ultimately to understand the relationship between bullying and mental health we need to comprehend what is happening in our broader environment. This relationship is not static over time, it is dynamic and influenced by an evolving context shaped by a wide range of socio-ecological factors. Thus, findings from this thesis create a comprehensive framework in which this interrelationship should be studied, and school-based anti-bullying interventions should be designed – grounded in strong research designs, and acutely attuned to the environmental context and wider socio-ecological factors. Despite some common limitations, this work presents several wider implications for theory, practice, and future research, serving as a guide to interpret contemporary models of bullying and mental health and steer forthcoming school-based anti-bullying interventions towards maximising their outcomes.

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Appendices

Appendix A. Chapter 3

Notes on deviations from the protocol:

1. In our protocol we stated our second aim would examine whether children's pre-existing mental health problems, other pre-existing developmental disorders, family conflict and sibling conflict relate to specific trajectories. After careful consideration of previous research (Anonymous et al., in press) we found that parental psychological distress and friendship quality were significant predictors of mental health trajectories, thus we decided to include these variables in our analysis.
2. In our protocol we stated we would use continuous scores for peer-victimization and peer-aggression. However, problems with model convergence led us to create binary variables. Responses were dichotomized by "*not at all*" coded as 0 and "somewhat true" or "certainly true" coded as 1.
3. In our protocol we stated we would combine the SDQ subscale scores in "internalizing" and "externalizing", however we decided to look at each scale (emotional, conduct and hyperactivity/inattention problems) separately to obtain a more accurate depiction of mental health difficulties.
4. In our protocol we stated we would combine three measures for a variable of intrafamilial conflict. We re-named this variable family conflict and only included two items ("*My child has arguments with siblings*" and "*My child and I argue a lot*") as these were the only two items available. An item for partner conflict was not available.

Note on SDQ Scoring:

The scoring used for the SDQ bands can be found here:

[https://www.sdqinfo.org/py/sdqinfo/b3.py?language=Englishqz\(UK\)](https://www.sdqinfo.org/py/sdqinfo/b3.py?language=Englishqz(UK)). See the For Scoring section. Scores were coded based on the 4-categorisation band for the parent-rated SDQ and examined continuously (close to average = low, slightly raised = moderate, high and very high). Scores of 9 and 10 were excluded from the conduct subscale in the peer aggression model. The SDQ item in the conduct subscale "*Often fights with other children or bullies them*" was used to calculate the total score for the conduct subscale in the peer victimization model. This item was excluded from the total score for the conduct subscale in the peer aggression model (as it is used as an outcome). As a result the following SDQ bands were used to account for this changes (in bold):

Conduct subscale without peer aggression item (total score of 8): "0" = 1, "1" = 1, "2" = 1, "3" = 2, "4" = 3, "5" = 3, "6" = 4, "7" = 4, "8" = 4.

Conduct subscale with the peer aggression item (total score of 10): "0" = 1, "1" = 1, "2" = 1, "3" = 2, "4" = 3, "5" = 3, "6" = 4, "7" = 4, "8" = 4, "9" = 4, "10" = 4.

The total score for the emotional subscale and hyperactivity/inattention was calculated based on all items:

Emotional symptoms subscale: "0" = 1, "1" = 1, "2" = 1, "3" = 1, "4" = 2, "5" = 3, "6" = 3, "7" = 4, "8" = 4, "9" = 4, "10" = 4

Hyperactivity/Inattention subscale: "0" = 1, "1" = 1, "2" = 1, "3" = 1, "4" = 1, "5" = 1, "6" = 2, "7" = 2, "8" = 3, "9" = 4, "10" = 4)

Table A1. *Sensitivity analysis for family conflict variable*

Predictor	Odds Ratios 95% CI	P value
Peer Victimization		
Low Reference		
family conflict 2 * mod MH/low PV	1.75 (1.52 – 2.00)	<.001
Family conflict 2 * mod MH/high PV	1.37 (1.16 – 1.63)	<.001
family conflict 2 * mod-high MH/low PV	1.39 (1.21 – 1.59)	<.001
family conflict 2 * high MH/high PV	2.13 (1.84 – 2.48)	<.001
High Reference		
family conflict 2 * low MH/no PV	0.47 (0.40 – 0.54)	<.001
family conflict 2 * mod MH/low PV	0.82 (0.71 – 0.94)	.006
Family conflict 2 * mod MH/high PV	0.64 (0.54 – 0.77)	<.001
family conflict 2 * mod-high MH/low PV	0.65 (0.56 – 0.75)	<.001
Peer Aggression		
Low Reference		
family conflict 2 * mod-high MH/low PA	1.27 (1.12 – 1.45)	<.001
family conflict 2 * mod MH/low PA	1.68 (1.48 – 1.91)	<.001
family conflict 2 * high MH/mod PA	2.10 (1.82 – 2.43)	<.001
High Reference		
family conflict 2 * low MH/no PA	0.48 (0.41 – 0.55)	<.001
family conflict 2 * mod-high MH/low PA	0.61 (0.53 – 0.70)	<.001
family conflict 2 * mod MH/low PA	0.80 (0.70 – 0.91)	.001

Note: the family conflict variable in this analysis includes scores from children with and without siblings. When compared to the family conflict variable in the main analysis (that only includes scores from children with sibling) the results are the same.

Table A2. *MNRA peer victimization – low mental health / low peer victimisation (reference)*

Predictors	Odds Ratios 95% CI	P value
(Intercept) * MOD MH/LOW PV	0.40 (0.10 – 1.63)	.199
(Intercept) * MOD MH/HIGH PV	0.68 (0.15 – 3.20)	.628
(Intercept) * MOD-HIGH MH/LOW PV	0.69 (0.18 – 2.70)	.596
(Intercept) * HIGH MH/HIGH PV	0.13 (0.03 – 0.59)	.008
child gender [M] * MOD MH/LOW PV	1.26 (0.92 – 1.72)	.146
child gender [M] * MOD MH/HIGH PV	1.36 (0.90 – 2.06)	.147
child gender [M] * MOD-HIGH MH/LOW PV	0.76 (0.56 – 1.04)	.085
child gender [M] * HIGH MH/HIGH PV	0.97 (0.67 – 1.41)	.893
child ethnicity [White] * MOD MH/LOW PV	0.81 (0.46 – 1.45)	.480
child ethnicity [White] * MOD MH/HIGH PV	1.10 (0.49 – 2.47)	.816
child ethnicity [White] * MOD-HIGH MH/LOW PV	1.08 (0.58 – 2.01)	.799
child ethnicity [White] * HIGH MH/HIGH PV	1.38 (0.65 – 2.93)	.398
income2 [>£16k] * MOD MH/LOW PV	0.29 (0.08 – 1.02)	.053
income2 [>£16k] * MOD MH/HIGH PV	0.12 (0.03 – 0.43)	.001
income2 [>£16k] * MOD-HIGH MH/LOW PV	0.21 (0.07 – 0.70)	.011
income2 [>£16k] * HIGH MH/HIGH PV	0.12 (0.04 – 0.42)	.001
SENND [Yes] * MOD MH/LOW PV	2.98 (1.48 – 6.01)	.002
SENND [Yes] * MOD MH/HIGH PV	7.61 (3.74 – 15.49)	<.001
SENND [Yes] * MOD-HIGH MH/LOW PV	2.48 (1.19 – 5.18)	.016
SENND [Yes] * HIGH MH/HIGH PV	14.02 (7.23 – 27.19)	<.001
dass 9item * MOD MH/LOW PV	1.10 (1.05 – 1.15)	<.001
dass 9item * MOD MH/HIGH PV	1.05 (0.99 – 1.12)	.084
dass 9item * MOD-HIGH MH/LOW PV	1.17 (1.13 – 1.22)	<.001
dass 9item * HIGH MH/HIGH PV	1.26 (1.20 – 1.31)	<.001
family conflict * MOD MH/LOW PV	2.02 (1.69 – 2.41)	<.001
family conflict * MOD MH/HIGH PV	1.63 (1.30 – 2.04)	<.001
family conflict * MOD-HIGH MH/LOW PV	1.54 (1.29 – 1.84)	<.001
family conflict * HIGH MH/HIGH PV	2.64 (2.17 – 3.21)	<.001
One friend [Yes] * MOD MH/LOW PV	0.60 (0.44 – 0.82)	.001
One friend [Yes] * MOD MH/HIGH PV	0.33 (0.22 – 0.50)	<.001
One friend [Yes] * MOD-HIGH MH/LOW PV	0.58 (0.43 – 0.80)	.001
One friend [Yes] * HIGH MH/HIGH PV	0.23 (0.15 – 0.34)	<.001

Table A3. *MNRA peer victimization – moderate mental health/ high peer victimisation (reference)*

Predictors	Odds Ratios 95% CI	P value
(Intercept) * LOW MH/NO PV	1.52 (0.32 – 7.15)	.597
(Intercept) * MOD MH/LOW PV	0.58 (0.14 – 2.44)	.458
(Intercept) * MOD-HIGH MH/LOW PV	0.96 (0.24 – 3.92)	.959
(Intercept) * HIGH MH/HIGH PV	0.18 (0.04 – 0.76)	.020
child gender [M] * LOW MH/NO PV	0.73 (0.48 – 1.11)	.143
child gender [M] * MOD MH/LOW PV	0.92 (0.59 – 1.43)	.716
child gender [M] * MOD-HIGH MH/LOW PV	0.56 (0.36 – 0.86)	.009
child gender [M] * HIGH MH/HIGH PV	0.71 (0.44 – 1.13)	.144
child ethnicity [White] * LOW MH/NO PV	0.90 (0.40 – 2.02)	.796
child ethnicity [White] * MOD MH/LOW PV	0.74 (0.32 – 1.68)	.468
child ethnicity [White] * MOD-HIGH MH/LOW PV	1.01 (0.43 – 2.38)	.990

child ethnicity [White] * HIGH MH/HIGH PV	1.28 (0.52 – 3.19)	.591
child MH [Yes] * LOW MH/NO PV	0.00 (0.00 – Inf)	.996
child MH [Yes] * MOD MH/LOW PV	0.35 (0.03 – 3.86)	.394
child MH [Yes] * MOD-HIGH MH/LOW PV	2.97 (0.58 – 15.27)	.193
child MH [Yes] * HIGH MH/HIGH PV	4.67 (1.03 – 21.19)	.046
income [>£16k] * LOW MH/NO PV	8.02 (2.25 – 28.60)	.001
income [>£16k] * MOD MH/LOW PV	2.38 (0.82 – 6.96)	.112
income [>£16k] * MOD-HIGH MH/LOW PV	1.78 (0.65 – 4.84)	.260
income [>£16k] * HIGH MH/HIGH PV	1.03 (0.40 – 2.69)	.948
SENND [Yes] * LOW MH/NO PV	0.14 (0.07 – 0.29)	<.001
SENND [Yes] * MOD MH/LOW PV	0.40 (0.22 – 0.74)	.003
SENND [Yes] * MOD-HIGH MH/LOW PV	0.30 (0.15 – 0.58)	<.001
SENND [Yes] * HIGH MH/HIGH PV	1.60 (0.93 – 2.76)	.091
dass 9item * LOW MH/NO PV	0.95 (0.89 – 1.01)	.082
dass 9item * MOD MH/LOW PV	1.04 (0.98 – 1.11)	.158
dass 9item * MOD-HIGH MH/LOW PV	1.11 (1.05 – 1.18)	<.001
dass 9item * HIGH MH/HIGH PV	1.19 (1.12 – 1.26)	<.001
family conflict * LOW MH/NO PV	0.62 (0.49 – 0.77)	<.001
family conflict * MOD MH/LOW PV	1.25 (0.99 – 1.56)	.055
family conflict * MOD-HIGH MH/LOW PV	0.95 (0.75 – 1.20)	.658
family conflict * HIGH MH/HIGH PV	1.62 (1.29 – 2.04)	<.001
One friend [Yes] * LOW MH/NO PV	3.02 (1.98 – 4.60)	.001
One friend [Yes] * MOD MH/LOW PV	1.82 (1.17 – 2.85)	.008
One friend [Yes] * MOD-HIGH MH/LOW PV	1.77 (1.13 – 2.77)	.013
One friend [Yes] * HIGH MH/HIGH PV	0.68 (0.42 – 1.13)	.137

Table A4. *MNRA peer aggression – low mental health / low peer aggression (reference)*

Predictors	Odds Ratios 95% CI	P value
(Intercept) * MOD-HIGH MH/LOW PA	0.79 (0.23 – 2.70)	.706
(Intercept) * MOD MH/LOW PA	0.31 (0.08 – 1.13)	.076
(Intercept) * HIGH MH/MOD PA	0.11 (0.03 – 0.46)	.002
child gender [M] * MOD-HIGH MH/LOW PA	0.87 (0.66 – 1.16)	.340
child gender [M] * MOD MH/LOW PA	1.40 (1.03 – 1.90)	.032
child gender [M] * HIGH MH/MOD PA	0.63 (0.44 – 0.91)	.015
child ethnicity [White] * MOD-HIGH MH/LOW PA	1.36 (0.76 – 2.41)	.302
child ethnicity [White] * MOD MH/LOW PA	0.95 (0.54 – 1.66)	.845
child ethnicity [White] * HIGH MH/MOD PA	1.64 (0.78 – 3.42)	.190
income [>£16k] * MOD-HIGH MH/LOW PA	0.22 (0.07 – 0.62)	.005
income [>£16k] * MOD MH/LOW PA	0.27 (0.09 – 0.84)	.024
income [>£16k] * HIGH MH/MOD PA	0.12 (0.04 – 0.39)	<.001
SENND [Yes] * MOD-HIGH MH/LOW PA	1.76 (0.97 – 3.19)	.063
SENND [Yes] * MOD MH/LOW PA	3.05 (1.75 – 5.31)	<.001
SENND [Yes] * HIGH MH/MOD PA	7.87 (4.46 – 13.88)	<.001
dass 9item * MOD-HIGH MH/LOW PA	1.16 (1.12 – 1.21)	<.001
dass 9item * MOD MH/LOW PA	1.11 (1.07 – 1.16)	<.001
dass 9item * HIGH MH/MOD PA	1.26 (1.20 – 1.31)	<.001
family conflict * MOD-HIGH MH/LOW PA	1.36 (1.15 – 1.60)	<.001
family conflict * MOD MH/LOW PA	2.05 (1.73 – 2.43)	<.001
family conflict * HIGH MH/MOD PA	2.58 (2.13 – 3.12)	<.001

one friend [Yes] * MOD-HIGH MH/LOW PA	0.59 (0.44 – 0.78)	<.001
one friend [Yes] * MOD MH/LOW PA	0.53 (0.39 – 0.71)	<.001
one friend [Yes] * HIGH MH/MOD PA	0.33 (0.23 – 0.49)	<.001

Table A5. *MNRA peer aggression – high mental health / moderate peer aggression (reference)*

Predictors	Odds Ratio 95% CI	P value
(Intercept) * LOW MH/NO PA	8.92 (2.17 – 36.71)	.002
(Intercept) * MOD-HIGH MH/LOW PA	7.04 (2.15 – 23.09)	.001
(Intercept) * MOD MH/LOW PA	2.74 (0.83 – 9.01)	.097
child gender [M] * LOW MH/NO PA	1.58 (1.09 – 2.28)	.015
child gender [M] * MOD-HIGH MH/LOW PA	1.38 (0.95 – 1.99)	.090
child gender [M] * MOD MH/LOW PA	2.20 (1.51 – 3.21)	<.001
child ethnicity [White] * LOW MH/NO PA	0.61 (0.29 – 1.28)	.190
child ethnicity [White] * MOD-HIGH MH/LOW PA	0.83 (0.39 – 1.76)	.624
child ethnicity [White] * MOD MH/LOW PA	0.58 (0.28 – 1.18)	.131
income [>£16k] * LOW MH/NO PA	8.05 (2.57 – 25.15)	<.001
income [>£16k] * MOD-HIGH MH/LOW PA	1.74 (0.78 – 3.86)	.176
income [>£16k] * MOD MH/LOW PA	2.18 (0.94 – 5.04)	.069
SENND [Yes] * LOW MH/NO PA	0.13 (0.07 – 0.22)	<.001
SENND [Yes] * MOD-HIGH MH/LOW PA	0.22 (0.13 – 0.37)	<.001
SENND [Yes] * MOD MH/LOW PA	0.39 (0.25 – 0.61)	<.001
dass 9item * LOW MH/NO PA	0.80 (0.76 – 0.83)	<.001
dass 9item * MOD-HIGH MH/LOW PA	0.92 (0.89 – 0.96)	<.001
dass 9item * MOD MH/LOW PA	0.88 (0.85 – 0.92)	<.001
family conflict * LOW MH/NO PA	0.39 (0.32 – 0.47)	<.001
family conflict * MOD-HIGH MH/LOW PA	0.53 (0.44 – 0.63)	<.001
family conflict * MOD MH/LOW PA	0.79 (0.67 – 0.94)	.007
One friend [Yes] * LOW MH/NO PA	3.00 (2.05 – 4.39)	<.001
One friend [Yes] * MOD-HIGH MH/LOW PA	1.77 (1.20 – 2.60)	.004
One friend [Yes] * MOD MH/LOW PA	1.58 (1.07 – 2.34)	.022

Appendix B. Chapter 4

Note on deviations from the protocol

1. I made the decision to use Hedge's g instead of Cohen's d to control for overestimation biases in small sample sizes (Hedges, 1981).
2. It was my intention to use internalising post-scores for moderation and mediation analysis, before realizing that it would be impossible to standardize the measures as there was substantial variability in the measures used in each study. As a result, I opted to use effect size measures (Hedge's g) as the outcome measure.
3. For mediation analysis, I used mean pre-post effect sizes for internalizing and bullying outcomes. Additionally, I opted to include 2 further exploratory subgroup analysis: type of intervention (targeted vs. whole-school) and quality of study (low bias vs. some/high risk of bias) as I believed it would yield valuable information.

Despite deviations to our protocol, the changes made were carefully considered and determined to improve the quality of the study and reduce biases.

Intervention Component Definitions

Whole-school anti-bullying policy: Incorporates or amends a formal anti-bullying policy/constitution in the school.

Classroom rules: rules set out by a class against bullying that they are expected to follow.

School conference/assembly: school assemblies talks or conferences where the program is explained and children are informed about bullying.

Curriculum materials: the use of anti-bullying material or lessons incorporated into a new or pre-existing curriculum.

Interactive activities/games: games included in the intervention such as role-play aimed at demonstrating concepts of bullying

Cooperative group work among experts: Working in groups to implement the intervention including different professionals (teachers, psychologists, health care professionals, researchers, etc...)

Work with bullies and victims: Individualized work (not at the classroom level) with children involved in bullying as victims or perpetrators. This may include counselling.

Work with peers: this involves engaging peers in specific roles such as mentors (e.g. peer training) or mediators (e.g. peer mediators) for bullying situations. This can also involve bystander training.

Information for parents and teachers: this would include program manuals or guides that teachers or parents could consult to implement the program, or newsletters to parents about the program.

Improved playground supervision

Designating school staff to recess and playground supervision or monitor identified ‘hot-spots’ of bullying.

Disciplinary methods

Including any punitive method in dealing with bullying situations

Non-punitive methods

Including any non-punitive method in dealing with a bullying situation (e.g. restorative approaches)

Teacher training: Any formal workshop, lesson, course or type of training (of any duration and intensity) administered to teachers or school staff about how to implement the program or deal with bullying situations.

Parent involvement: involving parents to complete parts of the intervention (e.g. homework assignments) or requesting their presence in organized “information nights” or presentations about the intervention.

Video/VR/computer games: Using technology to implement intervention materials or lessons, raise awareness, etc..

Internalizing symptoms: Any feature of the program that may be specifically designed to target and improve internalizing symptoms such as anxiety or depression.

Social skills training: some programs specifically aim to improve social skills or train children how to cope with bullying through social-emotional learning.

Empathy training: some programs specifically teach or raise awareness of empathy (in lessons or games)

Cognitive-behavioural elements: Programs that include CBT-type components, typically incorporating a psychologist or trained counsellor.

Other: Any other intervention component.

Table B1. Rating of Intervention Components

Author	Component Number																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bathey, 2008	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Berry and Hunt, 2009	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	Y	Y	N	Y	N
Bonell et al., 2018	Y	N	N	Y	Y	Y	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Y	N
Connolly et al., 2015	N	N	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
Cross et al., 2018	Y	N	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y
Dempsey, 2009	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	N	N	N	N	N	N
DeRosier, 2004	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	N	Y	N
Fox and Boulton, 2003	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
Hoglund et al., 2012	N	N	Y	Y	Y	N	N	Y	Y	N	Y	N	Y	N	N	N	Y	N	N	N
Huitsing et al., 2019	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	N	Y	Y	N	N
Pintabona, 2005	Y	N	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	N	Y	Y	Y	Y
Rapee et al., 2020* FS	Y	N	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	N	Y	Y	Y	N
Rapee et al., 2020** CKTC	N	N	N	Y	Y	Y	N	Y	N	N	N	N	N	Y	Y	Y	Y	N	Y	N
Rapee et al., 2020*** COMB	Y	N	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	N
Yan, Chen and Huang, 2019*	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Yan, Chen and Huang, 2019**	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	Y	N
Nocentini et al., 2018	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	N	N	Y	N	N
Palladino et al., 2019	Y	N	Y	N	Y	N	Y	N	N	N	N	N	Y	N	Y	N	Y	Y	Y	N
Knowler & Frederickson, 2013	N	N	N	Y	N	Y	N	N	N	N	N	N	Y	N	N	Y	Y	Y	Y	N
Van Ryzin and Roeth, 2018	N	N	N	N	N	N	Y	Y	N	N	N	N	Y	N	N	N	N	N	N	N
Williford et al., 2012	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	N	Y	Y	N	N
Kelly et al., 2020	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	Y

Y = yes; N = no; 1 = whole school policy; 2 = classroom rules; 3 = school conference or assembly; 4 = curriculum materials; 5 = cooperative work among experts; 6 = work with bullies and victims; 7 = work with peers; 8 = information for teachers; 9 = playground supervision; 10 = disciplinary methods; 11 = non-punitive methods; 12 = school tribunals or courts; 13 = teacher training; 14 = parent training or meetings; 15 = video or VR computer games; 16 = internalising symptoms; 17 = social skills training; 18 = empathy training; 19 = CBT; 20 = other.

Table B2. *Study and participant characteristics*

Study	Country	Intervention Year	Subjects	Grade level (age range or M)	Name of Intervention	Type of Intervention	Duration /Intensity of Intervention	Mode of delivery	Program Costs
Batthey (2009)*	USA	2007	107 students in 2 schools **	7 th (M=12 years)	Bully Prevention Challenge Course Curriculum (BPCCC)	Whole-school (adventure based learning)	1-2, 45 min classes, 4x per week for 1 week	School staff (e.g. physical education /health teacher)	Not stated
Berry and Hunt (2009)*	Australia	2004	46 students in 7 schools **	7 th to 10 th (12-15 years)	Confident Kids Program	Targeted (cognitive behavioural group intervention for anxious boys)	1 hr 8x per week	Intern clinical psychologists	Not stated
Bonell et al. (2018)*	England	2014 - 2017	7154 students in 40 schools ***	7 th to 10 th (11-12 years)	Learning Together (INCLUSIVE) Intervention	Whole-school (focuses on changing school environment)	5-10hrs of lessons per year	Trained teachers	£116 per pupil in the control group compared to £163 per pupil in the intervention group over the first 2 years or £58 and £82 per student per year.
Connolly et al. (2015)*	Canada	Not given	447 students in 4 schools	7 th and 8 th (11-14 years)	Respect in Schools Everywhere (RISE)	Whole-school (youth-led aggression prevention program)	Leaders give two 45 min classes (90 min). UP schools had three adult-led programs lasting 90 min.	Trained high school youth in YLP or adults (teacher or councillor) in UP	Not stated
Cross et al. (2018)*	Australia	2006 - 2007	2690 students in 20 schools **	8 th and became 9 th for post (M=14 years)	Friendly Schools Project	Whole-school (socio-ecological approach with parent component)	6 hours for Grade 8 students and 3.5 hours for Grade 9 students.	Teachers and school staff	Not stated
Dempsey and Waldron (2009)*	USA	2007 - 2008	283 students in 4 schools **	6 th to 8 th	The Aggressors, Victims and Bystanders (AVB) curriculum	Whole-school (curriculum based using 4-step conflict resolution model)	Curriculum delivered over 12 weekly sessions from October to January	Teachers	Not stated
DeRosier (2004)*	USA	Not given	381 students in 11 schools ***	3 rd to 5 th (7-11 years)	S.S. Grin	Targeted (social learning and cognitive-behavioural techniques for	Group sessions lasted 50 to 60 min and took place	School councillor and undergraduate intern	Not stated

						anxious children with peer difficulties)	once weekly for 8 weeks.		
Fekkes, Pijpers and Verloove-Vanhorick (2006)	Netherlands	1999 - 2001	1591 students from 33 schools **	“upper 3 grades” (9-12 years)	Antibullying school program in the Netherlands	Whole-school (involves teacher training, parental component and development of anti-bullying curriculum)	Not specified; lasting one year	Teachers	Not stated
Finger (2018)	Australia	2006 - 2007	681(W3), 685(W4), 673(W5) students in 6 schools	5 th to 6 th	Beyond Bullying Primary School Program	Whole-school (ecological model targeting “school culture, antibullying policy, teacher management, student action and parental involvement”)	Intensity not specified but lasted 10 weeks	Researchers (PhD student)	Not stated
Fite et al. (2019)	USA	2015 - 2016	24 students in 1 school **	2 nd to 4 th grade at baseline and 3 rd to 5 th for intervention (7-11 years)	Taking Action	Targeted (focuses on problem solving, coping skills, cognitive restructuring for bullied children)	21–24 group sessions held for approximately 30 min each, twice a week	Researchers	Not stated
Fox and Boulton (2003)*	England	1999 - 2000	28 students in 4 schools **	4 th to 6 th (aged 9-11 years)	The Social Skills Training Programme	Targeted (social-emotional learning approach for bullied children)	1 hr/week x 8 weeks	Teachers and school staff	Not stated
Hoglund, Hosan and Leadbeater (2012)*	Canada	2000 - 2003	432 students in 17 schools ***	1 st to 3 rd (M=6 years)	The WITS Primary Program	Whole-school Intervention (curriculum based)	Duration or intensity not specified but lasting 3 years	Teachers	Not stated but WITS materials are available for free.
Huitsing et al. (2019)*	Netherlands	2012 - 2013	4356 students in 99 schools ***	3 rd and 4 th (dutch grades 5 th and 6 th), (M=9 years at FU)	KiVa	Whole-school intervention (curriculum based, raising empathy and altering bystander behaviour) – based on a target sample	Not specified	Teachers	Not stated, but other papers suggest the cost for implementing KiVa is about €21 or £18 per student per year, not including annual and once-only costs.

Karmaliani et al. (2020)	Pakistan	2015 - 2018	1598 students in 40 schools ***	6 th to 8 th grade (9-15 years)	Right to Play Intervention	Whole school intervention (structured play-based intervention)	120 sessions (2 35 min sessions per week) for 2 years	Collaborative Coaches employed by NGO and junior leaders	Not stated
Kelly et al. (2020)*	Australia	2012	2190 students in 26 schools ***	7 th to 10 th (M=13 years)	Climate and Preventure	Combines a universal 'Climate' and targeted 'Preventure' program - a brief CBT-based personality-targeted intervention)	Two 90-minute group sessions, 1 week apart. 162 sessions were completed between March and November 2012.	Psychologist and other trained facilitators	Not stated
Knowler and Frederickson (2013)*	England	Not given	50 students in 4 schools	3 rd to 5 th (8-9 years)	Social and Emotional Aspects of Learning (SEAL)/	Targeted (for children engaging in bullying behaviours, based on teaching emotional literacy)	12 weekly 45-60 min sessions	Teachers	Not stated
Nocentini, Menesini and Pluess (2018)*	Italy	2013 - 2014	2042 students in 13 schools ***	4 th to 6 th (M=10 years)	KiVa	Whole-school (curriculum based, raising empathy and altering bystander behaviour)	Not specified but lasting less than a year	Teachers	Not stated
Palladino, Benedetta, Nocentini & Menesini (2019)*	Italy	2011 - 2012	622 students in 8 schools **	9 th (M=15 years)	No Trap!	Whole-school (revise antibullying policy, teach awareness, nominate peer-educators to deliver activities and moderate online social media)	Two 2hrs classes of awareness; two 2hr meetings where face to face peer educators did activities with their own class	Teachers and peers	Not stated
Parada, Craven and Marsh (2008)	Australia	Not given	5204 students in 6 schools **	7 th to 11 th	Beyond Bullying Secondary Program	Whole-school (building antibullying school policy)	Not specified but lasting 2 years	Teachers	Not stated
Pintabona (2005)*	Australia	2000 - 2001	296 students in 29 schools **	4 th (M=8 years)	Friendly Schools Project	Whole-school (curriculum-based with family component)	9 hours of lessons (three units of 3 x 60 min activities presented across 3 school terms).	Teachers and school staff	Not stated
Pryce and Frederickson (2013)	England	Not given	338 students in 14 schools	4 th to 6 th (8-11 years)	Antibullying Pledge Scheme (ABPS)	Whole-school (curriculum-based, universal)	Not specified	Teachers and educational	Not stated

						prevention program)		psychologist	
Rahey and Craig (2002)	Canada	Not given	491 students in 2 schools	1 st to 8 th grade	Bully Proofing your school	Whole school program	12 weeks (individual sessions 45 min each week, 3 teacher sessions)	Teachers and researcher graduate students	Not stated
Rapee et al (2020)*	Australia	2015 - 2016	7701 students in 135 schools **	3 rd and 4 th (7-12 years)	Friendly Schools (FS); Cool Kids Taking Control (CCTK); Combination	Whole-school (FS) with Targeted (CCTK) for children who are currently being victimised and have high symptoms of anxiety	FS includes 15 activities (~40 min). CKTP parents were given lesson weekly for 8 weeks.	Teachers and school staff; parents (for targeted intervention)	Not stated
Van Ryzin and Roseth (2018)*	USA	2016	1460 students in 15 schools ***	7 th	Johnson's Cooperative Learning Approach	Whole-school (uses cooperative learning and peer-led activities)	Not specified	Teachers	Not stated
Williford et al. (2012)*	Finland	2007 - 2008	7741 students in 78 schools ***	3 rd to 5 th at baseline, 4 th to 6 th during intervention (M=11 years)	KiVa	Whole-school (curriculum based, raising empathy and altering bystander behaviour)	20 hrs of curriculum	Teachers and school staff	Not stated, but other papers suggest the cost for implementing KiVa €43 or £37 per student per year, not including annual and once-only costs.
Yan, Chen and Huang (2019)*	China	2017 - 2018	169 students in 6 schools **	5 th (M=11 years)	Art Intervention vs. general counselling	Targeted (art therapy vs. general counselling for LBC victims of bullying)	Art therapy and counselling conducted in 6 sessions over 3 months.	Teachers	Not stated
Zagorscak et al. (2019)	Germany	2011	722 students in 5 schools **	7 th to 10 th (11-17 years)	Media Heroes	Whole-school (short and long format – curriculum based)	IG-L (90 min session per week for 10 weeks); IG-S (4 sessions of 90 min in one day)	Teachers	Not stated

Note: *Author = included in meta-analysis; **Sample at last time point; ***Analysed sample

Table B3. *Characteristics associated with study design*

Study	Study Design	Measure of Internalizing	Time between assessments	Quality rating (risk of bias)
Battey (2009)	Quasi-experimental, non-randomised, pre-post with control	CES-DC (depression)	Post: after each class FU: 3mo	High
Berry and Hunt (2009)	CRCT	CES-DC (depression) SCARED (anxiety)	Post: 8weeks FU: 3mo	Low
Bonell et al. (2018)	CRCT	SDQ (emotional problems subscale)	Post: 24months FU: 36 months	Low
Connolly et al. (2015)	CRCS	SCARED (anxiety)	Pre: October Post: 7mo	Some concern
Cross et al. (2018)	CRCT	DASS (depression and anxiety)	Pre: start of grade 8 Post: end of grade 8 FU: end of grade 9	Some concern
Dempsey and Waldron (2009)	Quasi-experimental, non-randomised, pre-post with control	CES-DC (depression) SASA (social anxiety)	Pre: 4-weeks after classes started (Sept) and 1-weeks before curriculum delivery Post: 4mo (Feb)	High
DeRosier (2004)	IRCS	MFQ (depression) SASC-R (social anxiety)	Pre: October Post: 6mo (April) FU: 1yr (April)	Low
Fekkes, Pijpers and Verloove-Vanhorick (2006)	CRCS	SDI-C (depression) Psychosomatic complaints (not a scale)	Pre: Nov 1999 Post: 6mo (May 2000) FU: 12mo (May 2001)	Low
Finger (2018)	Quasi-experimental, non-randomised, cross-over with control	SDQ-IE (emotional stability subscale) CDI (depression)	Baseline: w1 (Feb); w2 (Aug) Experimental: w3 (Feb), w4 (Aug), w5 (Nov)	High
Fite et al. (2019)	Quasi-experimental, non-randomised, pre-post with control	SMFQ (depression) Teacher Report Form (withdraw/depressed) PROMIS (anxiety)	Pre: Fall 2016 Post: Spring 2017	High
Fox and Boulton (2003)	Quasi-experimental, non-randomised, pre-post with control	RCMAI (anxiety) CDI (depression)	Post: 3mo FU: 6mo	High
Hoglund, Hosan and Leadbeater (2012)	Quasi-experimental, non-randomised, pre-post with control	ESBS (internalising, used W1-4) BAS-C (internalising used W 5-6)	Pre: Fall of grade 1 Post & FU: Springs of grade 2,3,5 and 6 (WITS was implemented grades 1-3)	High
Huitsing et al. (2019)	CRCT	9-item scale derived from an MDD scale (depression) SPQ (social anxiety)	Pre: May 2012 or in T2 (Oct 2013) if measurement not available Post: Oct 2012 FU: 1yr (May 2013)	Low
Karmalani et al. (2020)	CRCT	CDI-2 (depression)	Pre: 2015 Post: 2 years (2017-18)	Low

Kelly et al. (2020)	CRCT	SDQ (emotional problems subscale)	Post: 12mo FU: 24mo, 36mo	High
Knowler and Frederickson (2013)	IRCS	SDQ (emotional problem subscale)	Post: 12weeks	High
Nocentini, Menesini and Pluess (2018)	CRCT	YSR (internalising behaviours)	Pre: Sept to Oct 2013 Post: May to June 2014	Low
Palladino, Benedetta, Nocentini & Menesini (2019)	Quasi-experimental, non-randomised, pre-post with control	YSR (internalising behaviours)	Pre: Nov 2011 Mid: Feb 2012 (only adult-led not peer-led) Post: May-June 2012	High
Parada, Craven and Marsh (2008)	Quasi-experimental, non-randomised, cross-over with control	SDQ-II (emotional stability subscale) CDI (depression)	Baseline: T1 (March), T2 (July), T3 (Dec) Pre (BL collection): T4 (April YR 2) Post: T5 (Aug), T6 (Dec)	Some concern
Pintabona (2005)	CRCT	CDI (depression) RCMAS (anxiety) BASC-PR (depression, anxiety and somatic symptoms)	Post: 12mo FU: 16mo, 32mo	Low
Pryce and Frederickson (2013)	Quasi-experimental, non-randomised, pre-post with control	SDQ (emotional problems subscale)	Post: 2-3mo	High
Rahey and Craig (2002)	Quasi-experimental, non-randomised, pre-post with control	CBC (internalising subscales)	Post = 12 weeks	Some concern
Rapee et al (2020)	CRCT	SCAS (anxiety) MFQ (depression)	Post: 12mo FU: 24 mo (from baseline)	Low
Van Ryzin and Roseth (2018)	CRCT	SDQ (emotional problems subscale)	Pre: Sept/Oct 2016 Post: 5.5mo (March 2017)	Some concern
Williford et al. (2012)	CRCT	BDI (depression) FNE (social anxiety) SADS (social anxiety)	Pre: May 2007 Post: Dec 07/Jan 08 May: 2008	Low
Yan, Chen and Huang (2019)	IRCS	SASC-R (social anxiety)	Pre: June 2017 – April 2018 Post: not specified	Some concern
Zagorscak et al. (2019)	CRCT	Bern Wellbeing Questionnaire for Adolescents (somatic complaint scale)	Pre: Jan 2011 Post: 9mo (6mo after intervention, Nov/Dec 2011)	High

Note: CRCT/s = Cluster Randomised Controlled Trial/Study; IRCT/s = Individual Randomised Controlled Trial/Study; CES-DC = The Center for Epidemiological Studies Depression Scale for Children; SCARED = Screen for Child and Anxiety Related Disorders; DASS = Depression Anxiety Stress Scale; CDI = Child Depression Inventory; RCMAS = Revised Children's Manifest Anxiety Scale; RCMAI = Revised Children's Manifest Anxiety Inventory; BASC-PR = Behaviour Assessment System for Children Parent Rated; YSR = Youth Self-Report Scale; SPQ = Social Phobia Questionnaire; SCAS = Spence Children's Anxiety Scale; MFQ = Mood and Feelings Questionnaire; SMFQ = Short Mood and Feelings Questionnaire; PROMIS = Patient-Reported Outcomes Measurement Information System; SDQ =

Figure B1. Risk of Bias Assessment Plot

	Risk of bias domains						Overall
	D1	D1b	D2	D3	D4	D5	
Batley 2008	⊗	⊕	⊕	⊕	⊕	⊕	⊗
Berry and Hunt 2009	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Fox and Boulton 2003	⊗	⊖	⊕	⊕	⊕	⊕	⊗
Hoglund et al. 2012	⊗	⊕	⊕	⊕	⊗	⊕	⊗
Huitsing et al. 2019	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Pintabona 2005	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Rapee et al. 2020	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Pryce 2013	⊖	⊕	⊕	⊖	⊕	⊕	⊗
Rahey and Craig 2002	⊖	⊕	⊕	⊕	⊕	⊕	⊖
Van Ryzin 2018	⊖	⊕	⊕	⊕	⊕	⊕	⊖
Williford 2012	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Yan et al. 2019	⊖	?	⊕	⊕	⊕	⊕	⊖
Zagorscak et al. 2019	⊗	⊕	⊕	⊖	⊕	⊕	⊗
Bonell et al. 2018	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Palladino et al. 2019	⊗	⊗	⊕	⊖	⊕	⊕	⊗
Connolly et al. 2015	⊖	⊕	⊕	⊕	⊕	⊕	⊖
Cross et al. 2018	⊖	⊕	⊕	⊕	⊕	⊕	⊖
Dempsey and Waldron 2009	⊗	⊕	⊕	⊖	⊕	⊕	⊗
Kelly et al. 2020	⊕	⊕	⊗	⊕	⊕	⊖	⊗
Fekkes et al. 2006	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Nocentini et al. 2018	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Knowler and Frederickson 2013	⊖	?	⊕	⊕	⊖	⊕	⊗
DeRosier 2004	⊕	?	⊕	⊕	⊕	⊕	⊕
Fite et al. 2019	⊖	?	⊕	⊕	⊖	⊕	⊗
Karmalani et al. 2020	⊕	?	⊕	⊕	⊕	⊕	⊕
Parada et al. 2008	⊖	?	⊕	⊕	⊕	⊕	⊖
Finger 2018	⊖	?	⊕	⊕	⊕	⊖	⊗

Domains:
D1 : Bias arising from the randomization process.
D1b: Bias arising from the timing of identification and recruitment of individual participants in relation to timing of randomization.
D2 : Bias due to deviations from intended intervention.
D3 : Bias due to missing outcome data.
D4 : Bias in measurement of the outcome.
D5 : Bias in selection of the reported result.

Judgement
⊗ High
⊖ Some concerns
⊕ Low
? No information

Risk of bias assessment for all included studies

Citation:

McGuinness, LA, Higgins, JPT. (2020). Risk-of-bias VISualization (robvis): An R package and Shiny web app for visualizing risk-of-bias assessments. Res Syn Meth, 1- 7.
<https://doi.org/10.1002/jrsm.1411>

Appendix C. Chapter 5

Table C1. Model fit and indices

Model	Fixed and Random Effects	AIC	BIC	Dev	LRT (p)
Emotion Model					
EMOTION ~ 1 + age + gender + FSM + KS2 + site + (1 PID) + (1 TC) + (1 SID)	control FE and random intercepts	77360.6	77438.8	77340.6	----
EMOTION ~ 1 + age + gender + FSM + KS2 + site + timepoint + IC + VICT + (1 PID) + (1 TC) + (1 SID)	control FE, variables of interest FE and random intercepts	67234.7	67334.6	67208.7	-----
EMOTION ~ 1 + age + gender + FSM + KS2 + site + timepoint*IC *VICT + (1 PID) + (1 TC) + (1 SID)	control FE, variables of interest FE & interactions FE and random intercepts	67222.5	67353.1	67188.5	$\chi^2 = 20.27$ df=4 p= <.001 ***
EMOTION ~ 1 + age + gender + FSM + KS2 + site + timepoint*IC* VICT* ClassVICT + (1 PID) + (1 TC) + (1 SID)	control FE, variables of interest FE & interactions with Class VICT FE and random intercepts	67216.8	67408.8	67166.8	$\chi^2 = 21.68$ df=8 p= 0.01 **
Externalizing Model					
EXTERNALIZING ~ 1 + age + gender + FSM + KS2 + site + (1 PID) + (1 TC) + (1 SID)	control FE and random intercepts	95466.0	95544.1	95446.0	-----
EXTERNALIZING ~ 1 + age + gender + FSM + KS2 + site + timepoint + IC+ VICT + (1 PID) + (1 TC) + (1 SID)	control FE, variables of interest FE and random intercepts	83466.7	83566.5	83440.7	*did not converge *
EXTERNALIZING ~ 1 + age + gender + FSM + KS2 + site + timepoint*IC *VICT + (1 PID) + (1 TC) + (1 SID)	control FE, variables of interest FE & interactions FE and random intercepts	83464.5	83595.1	83430.5	$\chi^2 = 10.17$ df=4 p= 0.04 *
EXTERNALIZING ~ 1 + age + gender + FSM + KS2 + site + timepoint*IC *VICT* Class VICT + (1 PID) + (1 TC) + (1 SID)	control FE, variables of interest FE & interactions with Class VICT FE and random intercepts	83471.3	83663.3	83421.3	$\chi^2 = 9.20$ df=8 p= 0.33

Note: dev = deviance; FE = fixed effects; FSM = free school meal eligibility; KS2 = key stage 2 size; site = trial site; IC = intervention condition (control or intervention); VICT = individual-level victimisation; PID = pupil ID; TC = class ID; SID = school ID; Class Vict = class victimisation.

Table C2. *Missing data by intervention condition*

Variable	Intervention Condition	Count (%) missing	p-value
Age	Control	213 (3.97)	0.19
	Intervention	276 (4.46)	
Gender	Control	214 (3.99)	0.23
	Intervention	275 (4.44)	
FSM	Control	0	---
	Intervention	0	---
KS2 Size	Control	0	---
	Intervention	0	---
Global Item BL	Control	224 (4.18)	0.28
	Intervention	284 (4.59)	
Global Item FU	Control	525 (9.79)	0.45
	Intervention	632 (10.21)	
OBVQ-9 BL	Control	265 (4.94)	0.10
	Intervention	349 (5.64)	
OBVQ-9 FU	Control	571 (10.65)	0.82
	Intervention	667 (10.78)	
Emotion BL	Control	50 (0.93)	< .001
	Intervention	116 (1.87)	
Conduct BL	Control	50 (0.93)	< .001
	Intervention	116 (1.87)	
Hyperactivity BL	Control	50 (0.93)	< .001
	Intervention	117 (1.89)	
Externalising BL	Control	50 (0.93)	< .001
	Intervention	117 (1.89)	
Emotion FU	Control	372 (6.94)	< .001
	Intervention	666 (10.76)	
Conduct FU	Control	372 (6.94)	< .001
	Intervention	666 (10.76)	
Hyperactivity FU	Control	373 (6.96)	< .001
	Intervention	666 (10.76)	
Externalising FU	Control	373 (6.96)	< .001
	Intervention	666 (10.76)	

Note: FSM = free school meal eligibility; KS2 = key stage 2, BL = baseline, FU = follow-up; OBVQ = Olweus Bullying Victimization Questionnaire. P-values in bold are statistically significant at $p < .05$.

Table C3. Factors predicting “I’d rather not say” on the global item at 12-months follow-up

Predictors	Odds Ratios	95% Confidence Intervals	p
(Intercept)	0.20	0.15 – 0.26	< 0.001
Intervention Condition	0.75	0.65 – 0.87	< 0.001
Age	0.78	0.72 – 0.84	< 0.001
Gender	0.67	0.57 – 0.79	< 0.001
FSM	1.05	0.90 – 1.22	0.549
KS2 size	1.16	0.99 – 1.37	0.066
Victimisation BL	1.14	0.95 – 1.36	0.153
Emotion BL	1.04	1.01 – 1.08	0.022
Conduct BL	1.00	0.94 – 1.06	0.994
Hyperactivity/ Inattention BL	1.06	1.03 – 1.10	< 0.001
Observations	8204		
R ² Tjur	0.014		

Note: FSM = free school meal eligibility; KS2 = key stage 2, BL = baseline; values in bold are statistically significant

Table C4. Post-hoc for time X intervention condition interaction

Time	ARM	Emmeans	SE	df	Lower CI	Upper CI
BL	CX	1.55	0.08	148	1.39	1.70
FU	CX	1.78	0.08	148	1.62	1.93
BL	TX	1.62	0.08	146	1.47	1.78
FU	TX	1.63	0.08	146	1.47	1.79
Pair 1	Pair 2	Estimate	SE	df	t-ratio	P value
BL CX	FU CX	-0.23	0.05	9836	-4.58	< .001
BL CX	BL TX	-0.08	0.11	149	-0.69	1.000
BL CX	FU TX	-0.08	0.11	149	-0.73	1.000
FU CX	BL TX	0.15	0.11	150	1.36	1.000
FU CX	FU TX	0.15	0.11	150	1.32	1.000
BL TX	FU TX	-0.00	0.05	10003	-0.09	1.000

Note: CX = control condition; TX = intervention condition; BL = baseline; FU = follow-up; df = degrees of freedom; CI = confidence intervals; SE = standard error

Table C5. Post-hoc for Time X victimisation interaction

Time	Victimisation	Emmeans	SE	df	Lower CI	Upper CI
BL	No	1.43	0.05	132	1.32	1.54
FU	No	1.46	0.05	129	1.35	1.57
BL	Yes	1.74	0.07	331	1.61	1.88
FU	Yes	1.94	0.07	339	1.81	2.08
Pair 1	Pair 2	Estimate	SE	df	t-ratio	P value
BL No	FU No	-0.03	0.03	8943	-0.99	1.000
BL No	BL Yes	-0.31	0.05	14793	-5.75	< .001
BL No	FU Yes	-0.51	0.05	14137	-9.57	< .001
FU No	BL Yes	-0.28	0.05	13947	-5.35	< .001
FU No	FU Yes	-0.48	0.05	14916	-8.84	< .001
BL Yes	FU Yes	-0.20	0.07	11806	-3.09	0.012

Note: CX = control condition; TX = intervention condition; BL = baseline; FU = follow-up; df = degrees of freedom; CI = confidence intervals; SE = standard error

Table C6. Post-hoc for *Time X victimisation x Intervention Condition interaction*

Time	ARM	Victimisation	Emmeans	SE	df	Lower CI	Upper CI
BL	CX	No	3.17	0.13	131	2.92	3.42
FU	CX	No	3.04	0.13	130	2.79	3.29
BL	TX	No	3.18	0.12	124	2.93	3.42
FU	TX	No	2.97	0.12	121	2.72	3.21
BL	CX	Yes	3.73	0.16	305	3.43	4.04
FU	CX	Yes	3.80	0.16	312	3.49	4.11
BL	TX	Yes	3.90	0.16	304	3.60	4.21
FU	TX	Yes	3.40	0.16	315	3.11	3.72

Pair 1	Pair 2	Estimate	SE	df	P value
BL CX No	FU CX No	0.13	0.06	8301	1.000
BL CX No	BL TX No	-0.01	0.18	128	1.000
BL CX No	FU TX No	0.20	0.18	127	1.000
BL CX No	BL CX Yes	-0.56	0.12	12661	<.001
BL CX No	FU CX Yes	-0.63	0.12	12380	<.001
BL CX No	BL TX Yes	-0.73	0.20	211	.008
BL CX No	FU TX Yes	-0.25	0.20	216	1.000
FU CX No	BL TX No	-0.14	0.18	128	1.000
FU CX No	FU TX No	0.07	0.17	126	1.000
FU CX No	BL CX Yes	-0.70	0.12	12210	<.001
FU CX No	FU CX Yes	-0.76	0.12	12816	<.001
FU CX No	BL TX Yes	-0.86	0.20	210	.001
FU CX No	FU TX Yes	-0.38	0.20	215	1.000
BL TX No	FU TX No	0.21	0.06	8278	.010
BL TX No	BL CX Yes	-0.55	0.20	208	.154
BL TX No	FU CX Yes	-0.62	0.20	210	.054
BL TX No	BL TX Yes	-0.72	0.12	12257	<.001
BL TX No	FU TX Yes	-0.24	0.12	12210	1.000
FU TX No	BL CX Yes	-0.77	0.20	205	.004
FU TX No	FU CX Yes	-0.84	0.20	208	.001
FU TX No	BL TX Yes	-0.94	0.11	11828	<.001
FU TX No	FU TX Yes	-0.45	0.12	12694	.006
BL CX Yes	FU CX Yes	-0.07	0.14	10002	1.000
BL CX Yes	BL TX Yes	-0.17	0.22	309	1.000
BL CX Yes	FU TX Yes	0.32	0.22	315	1.000
FU CX Yes	BL TX Yes	-0.10	0.22	313	1.000
FU CX Yes	FU TX Yes	0.39	0.22	319	1.000
BL TX Yes	FU TX Yes	0.49	0.14	9997	.001

Note: CX = control condition; TX = intervention condition; BL = baseline; FU = follow-up; df = degrees of freedom; CI = confidence intervals; SE = standard error

Table C7. Linear mixed model results for the OBVQ-9 (sensitivity analysis)

Emotion Model						Externalising Model				
Predictors	Est	std. Error	95% CI	Stat	p	Est	std. Error	95% CI	Stat	p
(Intercept)	2.05	0.15	1.75 – 2.35	13.51	<0.01	3.17	0.26	2.66 – 3.68	12.20	<0.01
age	-0.06	0.02	-0.11 – -0.02	-2.65	0.008	-0.25	0.04	-0.34 – -0.17	-5.69	<0.01
gender (male)	-0.27	0.03	-0.33 – -0.20	-7.75	<0.01	1.98	0.07	1.85 – 2.11	30.08	<0.01
FSM	0.01	0.10	-0.19 – 0.20	0.05	0.959	0.11	0.17	-0.22 – 0.44	0.66	0.511
KS2	-0.19	0.11	-0.40 – 0.03	-1.71	0.087	-0.14	0.18	-0.50 – 0.22	-0.74	0.462
Site	-0.09	0.05	-0.18 – 0.01	-1.83	0.067	-0.06	0.08	-0.22 – 0.09	-0.81	0.419
Time	0.15	0.04	0.08 – 0.22	4.07	<0.01	-0.14	0.05	-0.24 – -0.04	-2.72	<0.01
Intervention Condition (IC)	0.05	0.10	-0.15 – 0.25	0.47	0.637	-0.00	0.17	-0.34 – 0.33	-0.02	0.988
VICT9	0.27	0.04	0.19 – 0.35	6.80	<0.01	0.53	0.06	0.41 – 0.65	8.65	<0.01
Time × IC	-0.17	0.05	-0.27 – -0.07	-3.34	0.001	-0.10	0.07	-0.24 – 0.03	-1.46	0.144
Time × VICT9	0.06	0.05	-0.05 – 0.16	1.08	0.281	0.04	0.08	-0.11 – 0.19	0.48	0.631
IC × VICT9	-0.12	0.05	-0.23 – -0.01	-2.14	0.033	0.00	0.09	-0.16 – 0.17	0.03	0.977
Time × ARM × IC	0.02	0.07	-0.12 – 0.17	0.33	0.739	-0.11	0.11	-0.32 – 0.10	-1.05	0.294
Random Effects										
σ^2	2.82					5.48				
τ_{00}	1.20 _{PID} 0.16 _{TC} 0.19 _{SID}					6.92 _{PID} 0.47 _{TC} 0.50 _{SID}				
ICC	0.36					0.59				
N	9216 _{PID} 450 _{TC} 118 _{SID}					9216 _{PID} 450 _{TC} 118 _{SID}				
Observations	18126					18124				
Marginal R ² / Conditional R ²	0.016 / 0.366					0.083 / 0.624				

Note: eFSM = eligibility for free school meal; KS2 = key stage 2; IC = intervention condition; FU = follow-up; Est = unstandardised estimates; CI = confidence intervals.

Table C8. *Linear mixed model results for classroom-level victimisation*

<i>Predictors</i>	Emotion Model					Externalising Model				
	<i>Est</i>	<i>std. Error</i>	<i>95% CI (Bootstrap)</i>	<i>Statistic</i>	<i>p</i>	<i>Est</i>	<i>std. Error</i>	<i>95% CI (Bootstrap)</i>	<i>Statistic</i>	<i>p</i>
(Intercept)	1.92	0.17	1.58 – 2.26 (1.56 – 2.28)	11.07	<0.01	3.05	0.29	2.49 – 3.61 (2.50 – 3.60)	10.60	<0.01
age	-0.07	0.03	-0.12 – -0.02 (-0.12 – -0.02)	-2.88	<0.01	-0.26	0.05	-0.35 – -0.17 (-0.35 – -0.17)	-5.62	<0.01
gender	-0.23	0.04	-0.30 – -0.16 (-0.30 – -0.17)	-6.55	<0.01	2.02	0.07	1.88 – 2.15 (1.88 – 2.14)	29.38	<0.01
FSM	0.03	0.10	-0.18 – 0.23 (-0.18 – -0.23)	0.24	0.80	0.17	0.17	-0.16 – 0.51 (-0.13 – 0.51)	1.01	0.31
KS2	-0.19	0.11	-0.41 – 0.03 (-0.39 – 0.04)	-1.66	0.10	-0.16	0.18	-0.52 – 0.20 (-0.50 – 0.23)	-0.86	0.39
Site	-0.09	0.05	-0.18 – 0.01 (-0.18 – 0.01)	-1.84	0.07	-0.07	0.08	-0.22 – 0.09 (-0.21 – 0.09)	-0.86	0.39
Class Vict	0.02	0.07	-0.12 – 0.15 (-0.13 – 0.15)	0.22	0.82	-0.05	0.10	-0.25 – 0.15 (-0.25 – 0.15)	-0.51	0.61
Vict	0.66	0.21	0.25 – 1.06 (0.27 – 1.04)	3.19	0.01	0.02	0.32	-0.60 – 0.65 (-0.62 – 0.62)	0.07	0.942
Time	-0.12	0.11	-0.33 – 0.09 (-0.33 – 0.10)	-1.08	0.28	-0.34	0.16	-0.65 – -0.03 (-0.66 – -0.06)	-2.18	0.03
IC	0.08	0.15	-0.20 – 0.37 (-0.21 – 0.38)	0.58	0.56	-0.09	0.23	-0.54 – 0.35 (-0.55 – 0.36)	-0.41	0.68
Class Vict × Vict	-0.25	0.15	-0.53 – 0.04 (-0.52 – 0.03)	-1.68	0.09	0.41	0.23	-0.03 – 0.85 (-0.03 – 0.87)	1.82	0.07
Class Vict × Time	0.24	0.10	0.05 – 0.43 (0.05 – 0.45)	2.52	0.01	0.21	0.14	-0.07 – 0.49 (-0.05 – 0.50)	1.50	0.13
Vict × Time	-0.01	0.28	-0.57 – 0.54 (-0.62 – 0.50)	-0.05	0.96	0.85	0.44	-0.00 – 1.71 (0.06 – 1.73)	1.96	0.05
Class Vict × IC	0.01	0.10	-0.19 – 0.20 (-0.18 – 0.21)	0.08	0.93	0.11	0.15	-0.18 – 0.40 (-0.18 – 0.40)	0.74	0.46
Vict × IC	-0.24	0.28	-0.79 – 0.31 (-0.77 – 0.31)	-0.85	0.39	0.87	0.44	0.01 – 1.73 (0.03 – 1.73)	1.99	0.05
Time × IC	0.18	0.14	-0.09 – 0.45 (-0.09 – 0.45)	1.31	0.19	0.27	0.20	-0.12 – 0.67 (-0.09 – 0.66)	1.38	0.17
Class Vict × Vict × Time	0.11	0.21	-0.30 – 0.53 (-0.27 – 0.56)	0.54	0.59	-0.53	0.33	-1.17 – 0.11 (-1.18 – 0.08)	-1.63	0.10
Class Vict × Vict × IC	0.14	0.21	-0.28 – 0.55 (-0.29 – 0.56)	0.65	0.52	-0.57	0.33	-1.21 – 0.07 (-1.22 – 0.07)	-1.74	0.08

Class Vict × Time × IC	-0.40	0.13	-0.66 – -0.15 (-0.67 – -0.15)	-3.11	0.01	-0.40	0.19	-0.77 – -0.02 (-0.76 – -0.05)	-2.07	0.04
Vict × Time × IC	-0.05	0.38	-0.80 – -0.69 (-0.81 – -0.74)	-0.14	0.89	-1.62	0.58	-2.77 – -0.48 (-2.75 – -0.48)	-2.79	0.01
Class Vict × Vict × Time × IC	0.10	0.29	-0.47 – -0.68 (-0.51 – -0.69)	0.35	0.73	1.02	0.45	0.13 – 1.90 (0.14 – 1.91)	2.24	0.03

Random Effects										
σ^2	2.74					5.36				
τ_{00}	1.20 _{PID} 0.18 _{TC} 0.20 _{SID}					7.08 _{PID} 0.51 _{TC} 0.48 _{SID}				
ICC	0.37					0.60				
N	8941 _{PID} 450 _{TC} 118 _{SID}					8941 _{PID} 450 _{TC} 118 _{SID}				
Observations	16011					16010				
Marginal R ² / Conditional R ²	0.016 / 0.375					0.079 / 0.633				

Note: eFSM = eligibility for free school meal; KS2 = key stage 2; IC = intervention condition; Vict = individual-level victimisation; Class Vict = classroom-level victimisation; Est = unstandardised estimates; CI = confidence intervals.

Table C9. *Linear mixed model results for baseline problems*

<i>Predictors</i>	Emotion Model					Externalising Model				
	<i>Est</i>	<i>std. Error</i>	<i>95% CI (Bootstrap)</i>	<i>Statistic</i>	<i>p</i>	<i>Est</i>	<i>std. Error</i>	<i>95% CI (Bootstrap)</i>	<i>Statistic</i>	<i>p</i>
(Intercept)	1.30	0.11	1.07 – 1.52 (1.07 – 1.51)	11.35	<0.01	2.00	0.20	1.60 – 2.40 (1.60 – 2.41)	9.81	<0.01
age	-0.08	0.02	-0.12 – -0.04 (-0.12 – -0.04)	-3.73	<0.01	-0.18	0.04	-0.25 – -0.10 (-0.25 – -0.10)	-4.62	<0.01
gender	-0.19	0.03	-0.24 – -0.13 (-0.25 – -0.13)	-6.38	<0.01	1.37	0.06	1.26 – 1.48 (1.27 – 1.48)	24.47	<0.01
FSM21	0.04	0.07	-0.10 – 0.18 (-0.09 – 0.19)	0.56	0.57	0.10	0.12	-0.15 – 0.34 (-0.14 – 0.33)	0.78	0.43
KS2	-0.11	0.08	-0.25 – 0.04 (-0.25 – 0.04)	-1.39	0.17	-0.15	0.14	-0.41 – 0.11 (-0.39 – 0.12)	-1.11	0.27
Site	-0.04	0.03	-0.11 – 0.02 (-0.10 – 0.02)	-1.34	0.18	-0.02	0.06	-0.14 – 0.09 (-0.14 – 0.09)	-0.41	0.68
BP	2.71	0.05	2.61 – 2.82 (2.61 – 2.82)	50.00	<0.01	4.13	0.08	3.96 – 4.29 (3.96 – 4.29)	48.90	<0.01
Vict	-0.67	0.09	-0.85 – -0.50 (-0.86 – -0.51)	-7.66	<0.01	-0.71	0.14	-0.99 – -0.43 (-0.99 – -0.43)	-4.92	<0.01
Time	0.37	0.04	0.29 – 0.45 (0.29 – 0.45)	8.71	<0.01	0.16	0.06	0.03 – 0.29 (0.04 – 0.29)	2.48	0.01
IC	0.07	0.08	-0.08 – 0.21 (-0.07 – 0.22)	0.86	0.39	0.10	0.13	-0.16 – 0.36 (-0.19 – 0.36)	0.74	0.46
BP × Vict	-0.92	0.09	-1.08 – -0.75 (-1.09 – -0.75)	-10.62	<0.01	-1.02	0.14	-1.29 – -0.76 (-1.29 – -0.75)	-7.55	<0.01
BP × Time	-1.92	0.07	-2.05 – -1.78 (-2.05 – -1.78)	-28.25	<0.01	-2.03	0.10	-2.22 – -1.83 (-2.22 – -1.84)	-20.57	<0.01
Vict × Time	1.10	0.12	0.87 – 1.33 (0.87 – 1.35)	9.33	<0.01	1.16	0.19	0.79 – 1.53 (0.81 – 1.54)	6.13	<0.01
BP × IC	-0.16	0.07	-0.30 – -0.01 (-0.29 – -0.02)	-2.12	0.03	-0.06	0.12	-0.29 – 0.17 (-0.30 – 0.18)	-0.49	0.63
Vict × IC	-0.05	0.12	-0.29 – 0.20 (-0.28 – 0.21)	-0.37	0.71	-0.01	0.20	-0.41 – 0.40 (-0.39 – 0.39)	-0.03	0.98
Time × IC	-0.15	0.06	-0.27 – -0.04 (-0.26 – -0.03)	-2.57	0.01	-0.13	0.09	-0.30 – 0.04 (-0.31 – 0.05)	-1.49	0.14
BP × Vict × Time	0.71	0.12	0.47 – 0.95 (0.46 – 0.96)	5.75	<0.01	0.98	0.19	0.62 – 1.34 (0.59 – 1.33)	5.29	<0.01
BP × Vict × IC	0.20	0.12	-0.03 – 0.44 (-0.02 – 0.43)	1.69	0.09	-0.05	0.18	-0.41 – 0.31 (-0.42 – 0.31)	-0.26	0.79

BP × Time × IC	0.08	0.09	-0.10 – 0.26 (-0.11 – 0.25)	0.85	0.40	0.06	0.13	-0.20 – 0.33 (-0.21 – 0.33)	0.48	0.63
Vict × Time × IC	0.04	0.17	-0.29 – 0.37 (-0.29 – 0.38)	0.24	0.808	-0.07	0.27	-0.60 – 0.45 (-0.62 – 0.44)	-0.27	0.79
BP × Vict × Time × IC	-0.22	0.17	-0.55 – 0.12 (-0.55 – 0.08)	-1.27	0.20	-0.16	0.25	-0.66 – 0.34 (-0.64 – 0.34)	-0.63	0.53

Random Effects										
σ^2	2.19					4.78				
τ_{00}	0.46 _{PID} 0.13 _{TC} 0.07 _{SID}					3.27 _{PID} 0.38 _{TC} 0.21 _{SID}				
ICC	0.23					0.45				
N	7854 _{PID} 450 _{TC} 118 _{SID}					7853 _{PID} 450 _{TC} 118 _{SID}				
Observations	14924					14922				
Marginal R ² / Conditional R ²	0.327 / 0.482					0.392 / 0.664				

Note: eFSM = eligibility for free school meal; KS2 = key stage 2; IC = intervention condition; Vict = individual-level victimisation; BP = baseline problems; Est = unstandardised estimates; CI = confidence intervals.