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## Exploring the emotion-motivation nexus in English-medium higher education: A longitudinal mixed-methods study

Sihan Zhou<sup>a</sup>, Jian Xu<sup>b</sup>, Heath Rose<sup>c</sup>, Jim McKinley<sup>d,\*</sup><sup>a</sup> Department of Curriculum and Instruction, Faculty of Education, The Chinese University of Hong Kong, Shatin, Hong Kong SAR, China<sup>b</sup> Sichuan International Studies University, Chongqing, China<sup>c</sup> Department of Education, University of Oxford, 15 Norham Gardens, Oxford OX2 6PY, UK<sup>d</sup> IOE, Culture, Communication & Media, University College London, 20 Bedford Way, Bloomsbury, London WC1H 0AL, UK

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## ABSTRACT

English-medium instruction (EMI) in higher education evokes a range of emotions in students due to its mix of benefits and challenges for learning and future career development. This study explores the relationship between emotions of hope, enjoyment, and pride and EMI motivation, operationalized as *ideal L2 self*, and *ideal disciplinary self*. A longitudinal mixed-methods design guided the collection of questionnaire ( $N_{T1} = 746$ ;  $N_{T2} = 405$ ) and interview ( $N = 13$ ) data at an EMI university in China. Results from cross-lagged panel analysis of questionnaire data identified a bidirectional, asymmetrical emotion-motivation nexus, where *ideal L2 self* predicted emotions of hope, enjoyment, and pride, and these emotions in turn predicted *ideal disciplinary self*. Interview findings revealed a contextualized emotion-motivation nexus, which was reflective of an L2 self-image underpinned by English as a lingua franca ideology. Additionally, positive and negative emotions were inseparable in co-shaping students' ideal disciplinary self. Pedagogical implications are offered.

*Educational relevance and implications:* University programs that use English as a medium of instruction have grown in lockstep with internationalization trends in higher education globally. Previous research suggests that students whose first language is not English experience tremendous learning difficulties and strong emotional turbulence in EMI programs. Drawing on a longitudinal mixed-methods design, this study unpacks the complex relationship between different types of motivation and emotional experiences of students in EMI university contexts. The results offer important pedagogical suggestions for educational policymaking, curriculum design, and teaching in EMI higher education worldwide to foster students' self-motivated learning and well-being.

## 1. Introduction

The globalization of higher education (HE) has led to the exponential growth of English-medium instruction (EMI) programs worldwide. EMI is widely understood as the use of English to teach academic subjects other than English itself in contexts where the first language for the majority of the population is not English (Macaro, 2018; Rose et al., 2023). The expansion of EMI in HE during the past two decades has been documented in Europe (Lasagabaster and Doiz, 2021; Wächter and Maiworm, 2014), the Middle East (Dearden et al., 2016; Sahan, 2024), Asia (Fenton-Smith et al., 2017; Rose et al., 2020a), and Latin America (An and Murphy, 2018). Its global growth is tightly tied with the role of English as a lingua franca (ELF) internationally, and is heavily driven by

neoliberal initiatives to internationalize universities, improve university ranking, and attract international students (De Costa, 2022).

Emerging research indicates that more investigation is needed into the complex and dynamic range of student emotions in EMI HE (Hillman et al., 2023; Xu and Zhou, 2024). Several recent studies have called for understanding students' emotional experiences in EMI HE beyond the immediate context of classroom learning, to be viewed in relation to their aspired future identity for work or personal development in longer term (Şahan and Sahan, 2023; Xu and Zhou, 2024; Zhou et al., 2024). This is especially important given the growing body of literature which shows that EMI students encounter numerous challenges adjusting to a new medium of instruction, resulting in an increased workload to cope (Zhou and Rose, 2024), and heightened emotional experiences (Hillman

\* Corresponding author at: IOE, Culture, Communication & Media, University College London, 20 Bedford Way, Bloomsbury, London WC1H 0AL, UK

E-mail addresses: [sihanzhou@cuhk.edu.hk](mailto:sihanzhou@cuhk.edu.hk) (S. Zhou), [xujian@link.cuhk.edu.hk](mailto:xujian@link.cuhk.edu.hk) (J. Xu), [heath.rose@education.ox.ac.uk](mailto:heath.rose@education.ox.ac.uk) (H. Rose), [j.mckinley@ucl.ac.uk](mailto:j.mckinley@ucl.ac.uk) (J. McKinley).

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et al., 2023). The present study aligns with this recent EMI research agenda to explore the relationship between students' ideal self-images and their emotional experiences, with a particular focus on positive emotions.

In second language (L2) research, recent studies on positive psychology have shifted the foci of research away from a cognitivist paradigm to recognize the importance of affect in language learning, and widened the research agenda to explore the positive dimensions of emotion (Dewaele et al., 2019; Li, 2019). In a recent review of emotion-related studies published since 2010, Plonsky et al. (2022, p.347) noted a "massive expansion in the range of emotions" during the past ten years, which has substantially enriched research that has historically focused on negative emotions such as anxiety. The need to shift the attention to the positive side of emotions, as MacIntyre et al. (2019) argue, is not to paint a rosy picture that denies the existence of problems. Rather, it is to recognize and capitalize on the 'broadening' power of positive emotions to help learners activate their inherently available resources for optimal learning (Fredrickson, 2001, 2008, 2013). Recent studies have begun to explore the nexus between positive emotions and students' self-guides to understand how emotions can transform into motivated learning behavior (e.g., Feng and Papi, 2020; MacIntyre and Gregersen, 2012; Saito et al., 2018; Teimouri, 2017). However, these studies often adopt a cross-sectional design informed by a positivist, quantitative paradigm to examine the correlations between emotional and motivational variables. The field is in dire need of longitudinal studies to unpack the complex relationship between emotion and motivation, while understanding this relationship in relation to the features of learning contexts where students are situated (Dewaele et al., 2019).

The present study adopts a longitudinal mixed-methods design to examine the nexus between students' experiences of positive emotions (i. e., enjoyment, pride, hope) and their ideal selves in an EMI HE setting. By 'nexus' we refer to a complicated series of connections between different emotional variables and types of ideal selves in EMI HE. We align with Kojima and Yashima's (2017) conceptualization of ideal self in EMI contexts to distinguish between a *language-* and *discipline-oriented* self to capture the dual objectives of subject and language learning. Quantitative longitudinal questionnaire data were analyzed through cross-lagged panel analysis to identify relationships between emotions and ideal selves. These relationships will be further triangulated and explained via in-depth qualitative interview data. The study will advance both EMI and L2 emotion research through providing a synergistic, situated understanding of emotion-motivation nexus. Based on this understanding, suggestions will be offered to institutional policy-making, curriculum design and teaching to motivate students' learning and support their well-being in EMI university programs.

## 2. Background

### 2.1. Conceptualizing EMI motivation through ideal self

Motivation in EMI has been explored through a range of theories, with the aspirational motivations and personal goals of the *ideal self* central to those discussions (see Kojima and Yashima, 2017). Dörnyei (2009) used the concepts of possible selves (Markus and Nurius, 1986) and self-discrepancy theories (Higgins, 1987), to create the L2 Motivational Self System (L2MSS). This system distinguishes between the ideal L2 self, driven by personal aspirations, and the ought-to L2 self, driven by external expectations. L2MSS suggests that these future self-images motivate students to align their current selves with their desired future selves. However, as Dörnyei (2010) noted, that the ideal self corresponds to a *promotion* focus whereas the ought-to self is usually linked to a *prevention* focus. As Hamilton and Serrano (2015, p. 4) explained, the ideal self is aspired for "the best scenario" that one can achieve yet the ought-to self represents "traits to avoid or norms to obey" that divert the learners from feared outcomes. Empirical evidence has

suggested that compared to ought-to self, ideal self is a stronger motivator for learning behavior due to its inherently optimistic characteristics that can help students develop a sense of competence (Ueki and Takeuchi, 2013).

The notion of ideal self makes it possible to research students' motivation for learning in EMI HE beyond the immediate university context to connect to their future employability or self-development (Doiz and Lasagabaster, 2018). Şahan and Şahan (2023) argue that students' motivation to learn in EMI universities is often underpinned by a belief that English is an important global lingua franca for business and academia. Emerging research has attested to the applicability of conceptualizing students' motivation in EMI learning through an ideal L2 self framework. In Spain, Doiz and Lasagabaster (2018) found that students enrolled in EMI university programs commonly held an ideal L2 self, and such a self-image formed part of their "imagined identities" in the English-speaking international communities to which "they would like to belong" for future employment (p. 662). In Hong Kong, Du and Jackson (2018) noted that students from mainland China enrolled in EMI universities to develop an increasing awareness of the importance of English in local job seeking, and thus built up an idealized self-image as a competent English user to be advantaged in the job market.

EMI research has yet to disentangle how different motivational orientations affect students' learning. In EMI HE, students are usually primarily concerned with the learning of disciplinary knowledge instead of just improving their English proficiency. In a number of recent studies, researchers have found that L2-related motivation minimally impacted students' academic success (e.g., Rose et al., 2020b) or strategic learning behaviors (e.g., Zhou et al., 2023) in EMI university programs. Rose et al. (2020b) point out that the potency of ideal L2 self as a strong motivator in L2 learning contexts may not translate into EMI contexts, and thus call for including other motivational constructs related to subject learning. In line with Kojima and Yashima (2017) to distinguish motivation related to language and disciplinary learning, we conceptualize students' ideal self in EMI HE as consisted of *an ideal L2 self* and *an ideal disciplinary self*. The ideal L2 self represents learners' aspired self-image to become a competent English user, while the ideal disciplinary self represents a self-driven desire to become an expert in their subject field. Based on Kojima and Yashima's (2017) study, we further hypothesize that the two types of ideal selves are correlated with each other, which jointly motivate students' learning in EMI HE contexts.

### 2.2. Exploring the nexus between emotion and ideal self

Research during the past decade has called for investigating the role of emotion in shaping L2 selves (e.g., Feng and Papi, 2020; MacIntyre and Gregersen, 2012; Saito et al., 2018; Teimouri, 2017). Fredrickson's (2001, 2008, 2013) broaden-and-build theory has often been used to explain the influencing mechanism of emotions on the motivational power of self-guides. The theory posits that emotions have 'broadening' powers. Positive emotions can "broaden people's momentary thought-action repertoires and build their enduring personal resources" that lead to new learning opportunities and experiences (Fredrickson, 2001, p. 219). Such emotions also promote resilience to stressful events, and build social resources that contribute to learners' overall well-being.

Drawing on the broaden-and-build theory, researchers have argued that positive emotions can potentially strengthen students' ideal L2 self to encourage motivated learning behavior (MacIntyre and Vincze, 2017; Saito et al., 2018; Teimouri, 2017). L2MSS premises learning to take place based on a cognition of discrepancies between the present and the future. MacIntyre and Gregersen (2012) contend that these noticed discrepancies may only have the motivating power when they produce emotional reactions. Drawing on the notion of 'imagination', MacIntyre and Gregersen argue that when learners experience strong anticipated emotions associated with achieving their imagined ideal selves, they can better harness the broadening power of emotions to engage in motivated

learning. In MacIntyre and Vincze's (2017) questionnaire-based study with secondary Italian school students, they found that positive emotions were more strongly correlated with ideal L2 self than ought-to L2 self. In another study with Japanese EFL students, Saito et al. (2018) also reported positive, significant correlations between ideal L2 self and the positive emotion of enjoyment. They concur with previous studies to note that when L2 learners can visualize their ideal future selves vividly, they might experience more positive emotions associated with learning.

Despite noted progress on understanding the connection between emotion and motivation in L2 learning, more research is needed to unpack the complexities of this relationship. Previous studies have been dominated by cross-sectional designs, lacking longitudinal data that can disentangle the tentative causal relationship between the two constructs. Further, in much of the extant relevant research, a positivist paradigm with quantitative design has been primarily adopted. MacIntyre et al. (2019) cautioned that the dominant use of quantitative design might fall short of unpacking the emotion-motivation nexus in relation to the social contextual factors. The present study therefore draws on a longitudinal mixed-methods design to first disentangle the complex relationship between emotion and motivation through data collected at different time points. Moreover, it also uses qualitative interview data to further explain the relationship identified through statistical analysis with reference to the specific contextual features of EMI HE to provide a situated understanding of the emotion-motivation nexus.

### 2.3. Students' emotional landscape in EMI contexts

Research that explores students' emotional experiences in EMI contexts is still in its infancy. Emerging evidence suggests that EMI tertiary education brings about intense and varied emotional experiences (Hillman et al., 2023). On one hand, students in some studies were found to enjoy the prestige of their EMI institution and take pride in the language opportunities offered by EMI programs. For example, in Nepal, Sah (2023) noted that students viewed EMI as a ticket to mobile the social and symbolic ladders upward. This view created hope and pride for especially students matriculating from EMI secondary schools who were more proficient in English. In Turkey, Şahan and Sah (2023) also found that students were proud of the added value associated with English abilities provided by EMI, and recognized such value as offering them advantages in the global job market. On the other hand, negative emotions were also reported prevalently in EMI programs, where students reflected on suffering from anxieties about English proficiency (Hopkins and Gkonou, 2023), experiencing shame due to their perceived lack of competence to communicate in EMI classes (Sah, 2023), and feeling frustrated over their L1 use in EMI classrooms (Şahan and Sah, 2023). These studies indicate that studying through EMI at the tertiary level of education is likely to arouse strong emotions for students who are confronted by dual challenges of learning new disciplinary knowledge and coping with language barriers.

From a positive psychology perspective, we aim to understand to what extent students experience emotions of hope, enjoyment, and pride in EMI HE contexts, how they make sense of such emotions through their learning experiences, and how these emotions interplay with their learning motivation. As MacIntyre et al. (2019) explain, researching positive emotions does not exclude the existence of problems. Rather, it highlights the inherently available resources and abilities held by learners that can be recognized, expanded, and capitalized on to benefit learning. Kuteeva (2023) described EMI HE as a 'tension-filled' environment, where students need to navigate different languages and ideologies to handle linguistic challenges associated with subject learning. In an EMI Business program in Japan, Galloway and Rose (2013) observed that students viewed English as a communicative tool in the business world, and they demonstrated a stronger understanding of English as a lingua franca (ELF) than their English teachers had realized. Students prioritized the practical use of the language in business professional settings over sticking to a 'native' English standard. As Fang

(2017) has noted, the English spoken in China could be understood through the ELF perspective as a "similect" (p. 22), which reflects the fluid and dynamic nature of expressions dependent on specific communicative situations and interlocutors. As subject knowledge learning is a primary concern in EMI HE, students' motivation might reflect an ELF-based ideology that mitigates their negative emotions associated with using standardized English. Hence, a nuanced understanding of EMI students' motivation and its association with their emotions is necessary for fostering positive emotional experiences, enhancing students' resilience and well-being in a tension-filled environment as EMI HE, and for raising EMI policy makers' awareness to transform the environment into an emotionally supportive one.

Adopting a longitudinal mixed-methods design, the present study aims to first, explore the relationship between positive emotions and ideal selves through quantitative cross-lagged panel analysis; second, to explain the relationship between the two constructs with regard to EMI contextual features through in-depth qualitative analysis of interviews. Two research questions guided our inquiry in this study:

1. What is the relationship between students' ideal selves (i.e., ideal L2 self, ideal disciplinary self) and their emotions (i.e., enjoyment, hope, pride) in EMI HE?
2. How do students make sense of the link between their ideal selves and emotional reactions through EMI learning experiences?

### 3. Methods

The study adopts a longitudinal mixed-methods design, collecting data through two rounds of questionnaires at the beginning (Time 1/T1) and the end of one academic semester (Time 2/T2). Semi-structured interviews were conducted after the second round of questionnaires to triangulate with and explain the results from the quantitative analyses.

#### 3.1. Context and participants

We collected data at an international EMI university in south China. The university employs a highly internationalized staff team from more than 50 countries worldwide and English is used as the official lingua franca for teaching, assessment and administration. The university's undergraduate program comprises one year of foundation courses for English for Academic Purposes (EAP) and three years of EMI subject courses. Upon arrival at the university, students participated in a placement test and were streamed into three levels of EAP courses of *Foundation*, *Standard*, and *Advanced*. We strictly followed the ethical guidelines of the participant university for data collection. An official ethical approval for research involving human subjects has been obtained from the university.

We adopted a purposive sampling strategy to recruit students from Year 2 and Year 3 because these students have been immersed in the EMI university for at least one year, and have started their EMI subject courses. All students have Chinese as their first language (L1) and were matriculated from Chinese-medium secondary schools prior to university. They all attended the Standard level of EAP courses in their first year of study and passed the course final exams at the end of the year, and thus achieved an English proficiency above an intermediate level. Due to the participating university's ethical regulations, we could not access students' EAP test scores as an objective measure of their English proficiency, and this limitation is duly noted. Students were invited to participate from a range of disciplinary fields such as economics and finance, media and communication, medical and pharmaceuticals, information and computer science, and applied mathematics. A total of 746 participants completed the questionnaire at T1 and among them 405 students continued to participate to fill out the questionnaire at T2. As attrition is almost inevitable in longitudinal research, we conducted a Pearson's Chi-square test to compare key demographic estimates

between T1 and T2 sample. Results of the Chi-squared test show that the samples from T1 ( $N = 746$ ) and T2 ( $N = 405$ ) were not significantly different in academic year level ( $\chi^2(3) = 0.83, p = .84$ ), gender ( $\chi^2(2) = 3.88, p = .14$ ), and major ( $\chi^2(4) = 0.74, p = .95$ ), suggesting that the sample composition remained relatively stable. Listwise deletion was used to handle missing data to reduce possibilities of biased statistics derived from a variance-covariance matrix (Cox et al., 2014). Guided by a maximum variation sampling strategy, we invited 13 interviewees from the students who completed survey at both time points. The interviewees were purposively selected to capture a range of gender, year level, and major. Table 1 outlines the key demographic information of the participants.

### 3.2. Measures and data collection procedures

Data were collected through an online questionnaire administered twice during an academic term, followed by semi-structured interviews upon the questionnaire completion at T2. An email containing a link to the online questionnaire was sent to all Year 2 and Year 3 students to introduce the purpose of the study to invite participants on a voluntary basis. Students were informed that they could withdraw from the study for any or no reason and that their information would be kept in strict confidentiality. The questionnaire included two subscales which altogether took students around ten minutes to complete on average.

The *Questionnaire of ideal L2 and disciplinary self* was adapted from Taguchi et al.'s (2009) L2 self questionnaire. Four items were chosen from the original questionnaire which were applicable for students studying at an EMI university context (see Appendix A). These four items measured students' projected ideal selves to use English in their future life or work (e.g., 'Whenever I think of my future career, I imagine myself using English'). Four items were also developed to represent students' aspired future self as a disciplinary expert (e.g., 'I can imagine myself becoming an expert in my discipline in the future'). Students were asked to indicate their level of agreement to the items using a 6-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). The questionnaire was subject to an expert check by two professors in English language education to improve its face and content validity. A confirmatory factor analysis was conducted to evaluate the structure of latent constructs. The Cronbach'  $\alpha$  values for the *ideal L2 self* and *ideal disciplinary self* factors were 0.81 and 0.86 at T1, and 0.71 and 0.85 at T2, respectively, indicating good reliability of the scale.

The *Questionnaire of enjoyment, hope, and pride* was adapted from the short version of Achievement Emotions Questionnaire developed by Bieleke et al. (2021). The emotions of enjoyment, hope, and pride were measured by four items each that describe students' typical feelings when studying for a course. Minor modifications were made to tailor the items to the context of an EMI university. For example, the original enjoyment item 'I enjoy the challenge of learning the materials' was

**Table 1**  
Demographic information of participants.

Demographics	T1 questionnaire ( $N = 746$ )	T2 questionnaire ( $N = 405$ )	Interview ( $N = 13$ )
<b>Gender</b>			
Male	300	139	5
Female	446	266	8
<b>Age</b>			
19	352	183	5
20	289	163	3
21 and above	105	59	5
<b>Year level</b>			
Year 2	469	232	6
Year 3	277	173	7
<b>Major</b>			
Humanities & Social Sciences	328	183	7
STEM	418	222	6

adapted to be 'I enjoy the challenge of learning the materials for EMI courses'. The sample items for hope and pride were 'I feel optimistic that I will make good progress at studying my courses through EMI' and 'When I excel at my studies in EMI courses, I swell with pride', respectively. The Cronbach'  $\alpha$  for enjoyment, hope, and pride factor was 0.81, and 0.91 and 0.85 at T1, and 0.83, 0.91, and 0.88 for the three factors at T2, respectively, demonstrating good reliability at both time points.

At the end of the semester, semi-structured interviews were conducted with 13 students on an individual basis. The interviews explored students' (1) projected images of their ideal L2 and disciplinary selves in the future, (2) their emotional experiences when studying for EMI courses, and (3) their perceived relationship between self-images and emotions (see Appendix B for the interview protocol). The interviews lasted around one hour for each participant, were conducted in Chinese, and were audio-recorded for data analysis.

### 3.3. Data analysis

To answer Research Question 1, we first tested two measurement models at both time points through confirmatory factor analysis (CFA). Then, longitudinal structural equation modelling (SEM) was performed in *Mplus* 8.4 to examine the directional relationships between two ideal selves and three emotional variables (i.e., enjoyment, hope, pride) over time. The CFA and SEM models were tested against the adequacy criteria including Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI)  $\geq 0.9$ , as well as Standardized Root Mean Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA)  $\leq 0.08$  at a 95 % confidence interval (Kline, 2016).

A cross-lagged panel (CLP) analysis was run to understand potential causal relationships between variables through allowing for the examination of directional and temporal relationships between interested variables over time (Little, 2024). CLP is a widely used technique for examining reciprocal causal effects using longitudinal data, however the ability of this type of analysis to show causality has been a matter of recent debate (Lucas, 2023). Nonetheless, researchers have argued that CLP models are highly appropriate for examining common psychological research questions when compared to other alternatives (Orth et al., 2021), especially when these variables are not seen as stable or trait like, as they are in our study. Furthermore, in the specific area of EMI, researchers have specifically called for CLP analysis of psychological variables to better understand the reciprocal casual effects over time (Soruç et al., 2024). The data analysis for RQ1, therefore, addresses this call. Specifically, CLP was conducted to examine the relationships (1) between ideal selves and emotions at the same temporal point (*unlagged relationship*, e.g., Ideal disciplinary self T1  $\rightarrow$  Enjoyment T1), (2) between the same variable across two time points (*auto-lagged relationship*, e.g., Ideal disciplinary self T1  $\rightarrow$  Ideal disciplinary self T2), and (3) between different variables across time (*cross-lagged relationship*, e.g., Ideal disciplinary self T1  $\rightarrow$  Enjoyment T2). Fig. 1 summarizes the hypothesized relationships between variables for CLP analysis.

To answer Research Question 2, we conducted thematic analysis of interview data following Kuckartz's (2014) guidelines using NVivo 12 to understand students' perceptions of the interplay between their projected ideal selves and emotions while studying through EMI. Transcripts were first read carefully to code passages into main categories of 'ideal L2 self', 'ideal disciplinary self', and 'emotional experiences'. Within each main category, data were then coded inductively to allow subcategories and themes to emerge. The first and the second author coded the transcripts independently, and then compared, discussed and revised their coding until agreements were reached. Using the 'matrix coding' function in NVivo, the passages coded both under categories related to ideal selves and emotions were retrieved together to allow for an examination of the relationship between the two.

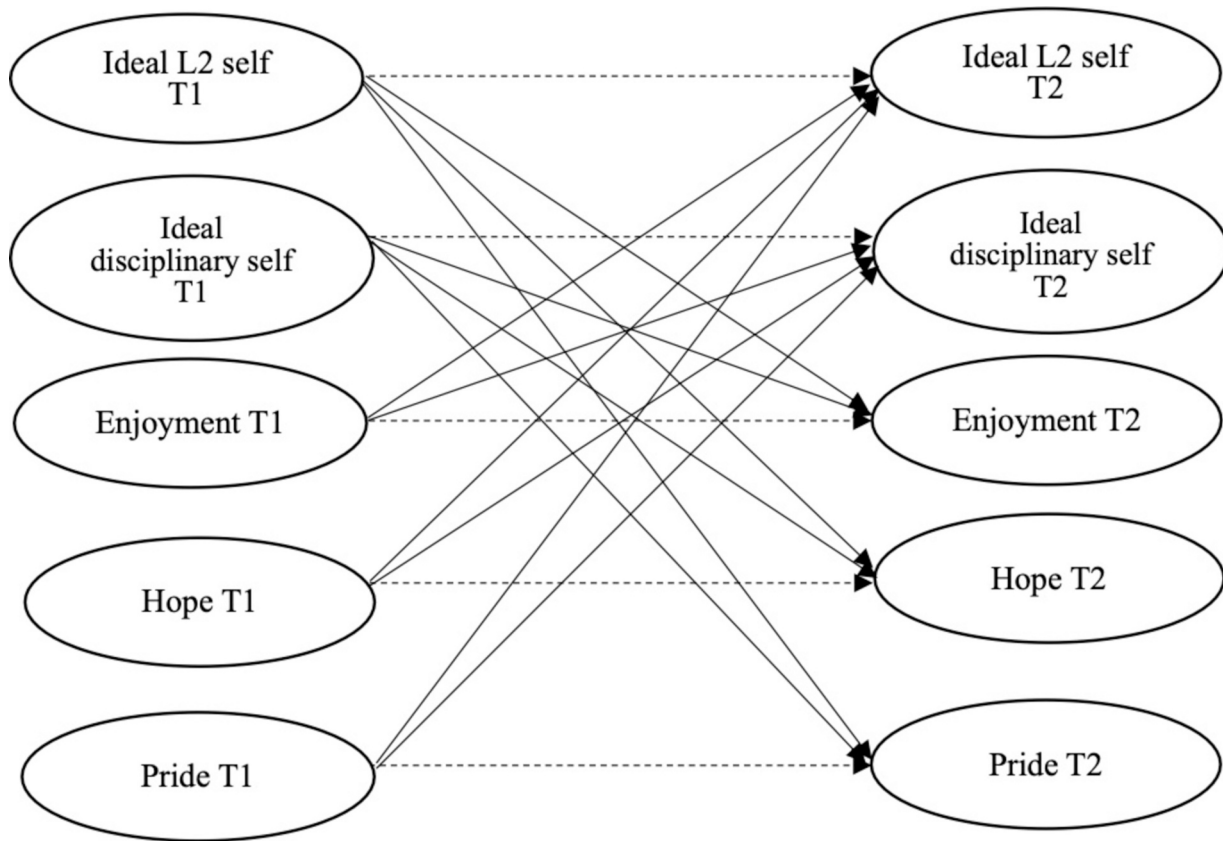


Fig. 1. The hypothesized relationships for cross-lagged panel analysis

Note: The five latent variables were correlated with each other and their double arrow lines are not shown here for conciseness. The observed items are also not shown.

4. Results

4.1. Modelling the relationship between emotions and ideal selves

4.1.1. Descriptive statistics and correlation analyses

Table 2 presents the descriptive statistics and Pearson correlation coefficients for emotional and ideal self-related variables at T1 and T2. Students' ideal L2 self ( $Mean_{T1} = 4.21, Mean_{T2} = 4.30$ ) and ideal disciplinary self ( $Mean_{T1} = 4.28, Mean_{T2} = 4.26$ ) remained relatively stable over time. Similarly, changes in students' emotions including enjoyment ( $Mean_{T1} = 4.07, Mean_{T2} = 4.16$ ), hope ( $Mean_{T1} = 4.13, Mean_{T2} = 4.19$ ), and pride ( $Mean_{T1} = 4.57, Mean_{T2} = 4.56$ ) also seemed minimal. Notably, at both time points, the mean value of students' sense of pride ( $Mean_{T1} = 4.57, Mean_{T2} = 4.56$ ) substantially surpassed other emotions, indicating that students generally felt proud of studying at an EMI HE context.

Results from Pearson correlation analyses show that the correlations for all pairs of variables reached a significant level ( $p < .01$ ), where the majority demonstrated a moderate level of correlation. At T1, the correlation coefficients between variables ranged from 0.42 to 0.75, with relatively stronger correlation between emotional variables. The correlation coefficients ranged from 0.28 to 0.78 at T2, with similarly stronger correlations between emotional variables.

4.1.2. The measurement models

Two measurement models were tested through CFA at T1 and T2, respectively, where each latent variable was indicated by its corresponding observed items. At T1, the measurement model comprising ideal L2 self and ideal disciplinary self demonstrated satisfactory model fit ( $\chi^2/df = 2.87, p < .001, CFI = 0.97, RMSEA = 0.07, SRMR = 0.04$ ). The measurement model inclusive of enjoyment, hope, and pride also fit the empirical data well ( $\chi^2/df = 3.81, p < .001, CFI = 0.93, RMSEA =$

Table 2  
Descriptive statistics and correlation coefficients for latent variables ( $N = 405$ ).

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Ideal L2 self T1	4.21	0.91	1									
2. Ideal disciplinary T1	4.28	0.93	0.53**	1								
3. Enjoyment T1	4.07	0.95	0.46**	0.42**	1							
4. Hope T1	4.13	1.02	0.53**	0.47**	0.75**	1						
5. Pride T1	4.57	0.88	0.44**	0.47**	0.71**	0.72**	1					
6. Ideal L2 self T2	4.30	0.89	0.55**	0.38**	0.49**	0.48**	0.44**	1				
7. Ideal disciplinary T2	4.26	0.88	0.40**	0.63**	0.37**	0.40**	0.40**	0.54**	1			
8. Enjoyment T2	4.16	0.93	0.43**	0.40**	0.59**	0.56**	0.53**	0.51**	0.45**	1		
9. Hope T2	4.19	0.98	0.43**	0.43**	0.57**	0.65**	0.51**	0.51**	0.49**	0.78**	1	
10. Pride T2	4.56	0.85	0.28**	0.36**	0.50**	0.51**	0.54**	0.47**	0.47**	0.65**	0.71**	1

\*\*  $p < .01$ .

0.08, SRMR = 0.05). Model indices at T2 for the two ideal selves ( $\chi^2/df = 3.68, p < .001, CFI = 0.97, RMSEA = 0.08, SRMR = 0.04$ ), and for the three emotions ( $\chi^2/df = 3.61, p < .001, CFI = 0.93, RMSEA = 0.08, SRMR = 0.05$ ) were also acceptable, suggesting that the data fit the model well and the subsequent CLP analysis could be further conducted.

4.1.3. The cross-lagged panel model

A cross-lagged panel model was tested to understand the temporal and potential causal relationships between ideal selves and emotions. The empirical data fit the hypothesized model adequately ( $\chi^2/df = 2.54, p < .001, CFI = 0.90, RMSEA = 0.06, SRMR = 0.07$ ). Fig. 2 summarizes the total variance ( $R^2$ ) accounted for each variable at T2, and the significant unlagged, auto-lagged, and cross-lagged associations between variables ( $p < .01$ ). All auto-regressive paths reached a significant level, meaning that the five latent variables at T1 significantly predicted their corresponding variables at T2, with regression coefficients ranging from a small to a moderate level. These results correspond to the hypothesized relationships and the correlation analyses, indicating that within a short period of one academic semester, students' ideal selves and emotional status remained relatively stable.

The cross-lagged paths show that students' ideal L2 self at T1 predicted more types of positive emotions at T2 than ideal disciplinary self. Ideal L2 self at T1 positively predicted pride ( $\beta = 0.19, p < .01$ ), enjoyment ( $\beta = 0.25, p < .01$ ), and hope ( $\beta = 0.37, p < .01$ ) at T2. However, ideal disciplinary self at T1 only positively predicted pride at T2 ( $\beta = 0.19, p < .01$ ) with a small coefficient. This indicates that when students aspired to become competent English users in the future, they might generate more positive feelings when studying via EMI. Compared to students' discipline-oriented future self, their language-oriented self-image seemed to trigger more positive emotions in EMI university studies.

The relationships between ideal selves and emotions, however, were not reciprocal—students' emotions experienced at T1 mostly predicted their ideal disciplinary self at T2 rather than their ideal L2 self. Both enjoyment ( $\beta = 0.37, p < .01$ ), hope ( $\beta = 0.43, p < .01$ ) and pride ( $\beta = 0.45, p < .01$ ) at T1 positively predicted ideal disciplinary self at T2 with moderate coefficients, whereas none of the emotions predicted ideal L2 self significantly. This result suggests that students' enjoyment, hope and pride associated with EMI learning could strengthen their projected future self as successful disciplinary professionals, but might hardly

affect their perception of future language self. Hence, results from the CLP analysis reveal an asymmetrical influencing mechanism between emotions and two types of ideal selves, where (1) ideal L2 self positively predicts emotions of enjoyment, hope, and pride associated with EMI learning, and (2) these positive emotions in turn predict students' perception of ideal disciplinary self.

4.2. Students' perceived interplay between emotions and ideal selves

4.2.1. Positive emotions derived from an ELF-based ideal L2 self

The interview findings support CLP analysis to reveal students' projected L2 self as an important factor triggering emotional reactions. However, the qualitative data further show that this L2 self was based on a tacit understanding of English as a lingua franca (ELF) for academic and workplace communication within a multilingual professional community, instead of viewing English as a standard Anglophone norm. This ELF-based ideal L2 self facilitated students' appreciation of the extra language opportunities offered by EMI programs to generate a sense of hope and enjoyment, and made students more easily take pride in using English to communicate with teachers and peers successfully.

Eight out of thirteen participants (all referred to by pseudonyms) in the interviews referred to the role of English as a global or international language, and viewed it necessary for accessing knowledge and skills for their future development. Students reported to develop an L2 self closely associated with their future plans for studying abroad or career development. Tian (Year 2, Applied chemistry), for example, described how she enjoyed the language privilege provided by EMI courses for her future plan of studying Archaeology abroad:

English is an academic lingua franca worldwide. If I want to pursue a master's degree abroad in Archaeology, using English is inevitable because I need to read literature and write essays in English. In China we have relics attached with deep cultural value, but the western countries are stronger in archaeological techniques. I want to study abroad to bring these techniques back home... I'm happy that I get to study at an EMI university from my undergraduate years, because it can provide me some advantages when applying for and adapting to a master's program abroad later.

When Tian visualized her future self to “read literature and write essays in English” as her plan to study abroad required, she appreciated

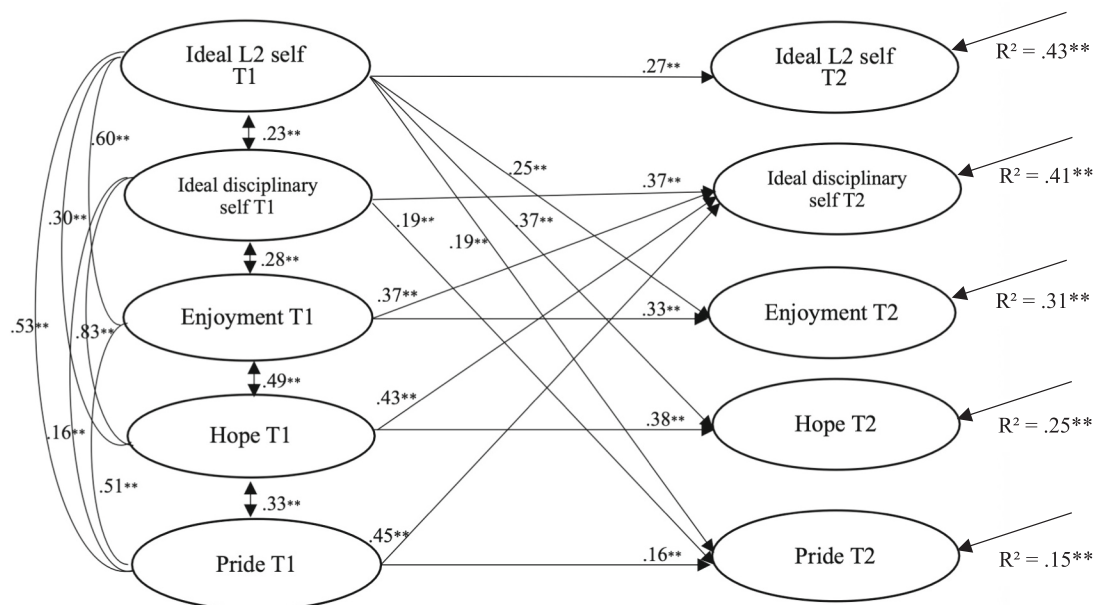


Fig. 2. The cross-lagged associations between ideal selves and emotions  
 Note. \*\*  $p < .01$ .

and derived joy from her current EMI programs for helping her achieve this plan. For Tian, imagining herself to use English for academic or professional development indicated an L2 self built on a premise of English as a shared global linguistic tool. English was no longer viewed as a property held exclusively by Anglophone countries, but a useful lingua franca for knowledge creation and dissemination within the international academic community. As Tian also reflected: “Even if I come back to China for work later, I will still need to read and write journal papers in English”. Thus, the L2 self that Tian developed has reflected an understanding of English as a global lingua franca associated with both her short-term plan to study abroad and long-term goal to work in academia in her home country.

Students' perceptions of ideal L2 self also reflected a critical awareness to recognize the multilingual reality of EMI programs and thus accepting a wider variety of Englishes. The L2 self that many students aspired to achieve was no longer directed at speaking ‘perfect’ English with no errors, but to prioritize its communicative effectiveness. This L2 self reduced students' anxiety for communication, and created ‘proud’ moments whenever they experienced success in meaning conveyance. Kang's (Year 2, Finance) comment illustrated how such an L2 self allowed him to take pride in interactions with peers from different linguistic and cultural backgrounds:

I have several international friends [at the university], and they are from Indonesia, Korea, the UK and the US. This term, I invited some of them to join my study group. When I talked to them in English, I felt at ease—there's no need to get anxious for using a wrong tense or word. I'm proud to say that we have become close friends. I wanted to know what questions they would raise and what perspectives they would take...English is like tactics in a war. If you want to win a battle, you need tactics to strategize your force. For me, English is the tactic that allows me to know how people from different cultures approach the same issue. It's through this communication, we can ‘take the essence and discard the dregs’.

Comparing ‘English’ to ‘tactics in a war’, Kang's comment reflected an L2 self to use English as a communicative tool to understand perspectives from different cultures. Oriented at developing such an L2 self, Kang felt “at ease” when speaking to his international friends and was no longer anxious about speaking ‘error-free’ English. He subsequently took pride in “becom[ing] close friends” with the international students, and further recognized his own effort to communicate as it allowed him to “take the essence and discard the dregs” when approaching subject learning. Similarly, Yu (Year 2, Communications) also reflected an aspired L2 self to speak ‘useful English’ instead of ‘perfect English’. This shifted perception increased her tolerance to language errors: “After all, English is not my mother tongue. So more or less, there will be mistakes. As long as I can use English to make my meaning across and get relevant responses, I'd already be very proud of myself”. When students developed an ELF-based L2 self to recognize English varieties and prioritize its communicative value, they seemed more likely to derive a sense of pride even from trivial success in communicative language use.

#### 4.2.2. *The effect of emotions on ideal disciplinary self: Two sides of the coin*

Although we set out to explore how positive emotions interplay with ideal selves, our interview data show that negative emotions were heavily commented by students, which reveals ‘the other side of the coin’. These negative emotions co-emerged with the positive ones, and co-shaped students' ideal disciplinary self.

To illustrate, when students took pride in and enjoyed opportunities to receive academic training in English, they felt empowered to become successful in their subject learning. For these students, studying via EMI was regarded as accessing an extra knowledge system where they could harness different methods of reasoning and knowing, as illustrated in Fang's (Year 3, Applied mathematics) comment:

Chinese and English textbooks differ in terms of their respective logics of knowledge presentation. Many Chinese textbooks are like reference books and are suitable for consolidating knowledge. English textbooks guide students to learn and are more novice-friendly. It's a privilege that I can access both knowledge systems in this EMI university, and I'm proud of it. This is impossible with a single medium of instruction. If I can get used to it, my ways of reasoning would change and become more diversified.

Fang's feeling of ‘privilege’ indicated a sense of joy and pride brought by an additional channel of knowledge acquisition provided by EMI programs. Notably, Fang did not equate EMI with English-only instruction, but recognized it as bilingual that was distinguished from “a single medium of instruction”. Hence, he valued knowledge making in both his L1 Chinese and L2 English by comparing, deliberating, and synthesizing the two systems. It was this access to dual systems of reasoning and knowing that made him feel proud, and further empowered him to develop an aspiration to succeed in his subject learning.

An unexpected finding from the interviews, however, was that students' development of ideal disciplinary self could also stem from their strategic handling of negative emotions associated with EMI learning. For many students, their initial reaction to learning disciplinary knowledge through an L2 started with fear and anxiety. Jun (Year 3, Biological statistics), for example, reflected that EMI created a “psychological barrier” and “natural fear” for her to understand disciplinary concepts: “I feel that I could understand immediately if the [subject] content is taught in Chinese. But once it's delivered in English, I feel the knowledge is deep and elusive”. Xia (Year 3, Finance) also commented on how anxious she was when she first studied and prepared for the macroeconomics course:

When I first studied the textbook of macroeconomics, I felt very anxious. In every sentence there might be three or four words I didn't know. It was very time-consuming looking up all individual words, and then connecting them to understand the meaning. I couldn't even finish one page in one hour. I'd need to spend 20 to 25 hours only on reading the textbooks to prepare for a week's course!

This strong sense of anxiety, however, drove her to adapt learning strategies to avail of both Chinese and English materials:

Later on, I developed this strategy to split my laptop screen into two windows— one showing the English version and the other with Chinese translations. I looked at both versions when reading. It was faster, and I wouldn't be as anxious. Especially for key concepts, I'd first understand them in Chinese to sketch a general scope. Then I'd transfer this understanding back to the English version to scrutinize it.

For Xia, shuttling between Chinese and English to understand disciplinary concepts reduced her apprehension and helped her resume a sense of control over learning. Recalling this successful experience of strategy adaptation, Xia expressed a sense of pride: “It proved my ability to learn. It's not about the actual knowledge learned, but rather, my ability to adapt and learn something new. This is exactly what I need for working in consultancy in the future”. As such, the initial anxiety transformed into strategic adaptation, which in turn strengthened the student's confidence and self-image to become a successful professional in the future.

## 5. Discussion

Drawing on a longitudinal mixed-methods design, findings of our study show that students' emotions and ideal selves are connected in EMI HE contexts. Quantitative CLP analysis suggests a bidirectional, asymmetrical relationship: ideal L2 self positively predicts students' emotions of enjoyment, hope, and pride associated with EMI learning; these emotions in turn predict their ideal disciplinary self positively.

Qualitative findings further reveal a synergistic, contextualized understanding of the emotion-motivation nexus, and highlight the inseparable relationship between positive and negative emotions to co-shape motivated learning.

### 5.1. A synergistic, contextualized understanding of the emotion-motivation nexus

Both quantitative and qualitative findings of our study suggest that students' emotional experiences are associated with their ideal self-images, highlighting a synergistic understanding of the emotion-motivation nexus. In our study, students reported to enjoy the language opportunities offered by EMI programs when they imagined themselves to use English for studying abroad or career development. MacIntyre and Gregersen (2012) argue that when students develop vivid, elaborate imaginations of their ideal L2 selves, they experience anticipated feelings and emotions associated with such future selves. Therefore, when students could visualize themselves as competent English users in their future studies or work, they might tend to value and enjoy learning through EMI. Our findings concur with previous L2 research to show that students' clear visualization of ideal L2 self has the potential of affecting their emotions in learning (MacIntyre and Vincze, 2017; Teimouri, 2017). Hence, we call for EMI research to unpack students' emotions in EMI HE in relation to their short- and long-term development goals and motivation so as to understand not only *what* but also *why* certain emotions are generated.

Our findings also reveal that the interplay between emotions and ideal selves is complex and situated, which needs to be understood in relation to the broader contextual factors. In EMI HE, one such factor is the multilingual reality that often prioritizes subject learning (Dafouz and Smit, 2016; Zhou and Rose, 2024). A key finding from our interviews is that students' L2 self in EMI HE reflected a tacit language ideology that embraced English as a lingua franca shared among multilingual speakers. Students also aspired to speak 'useful' English instead of 'perfect' English, owing to a focus on learning subject content through academic communication in EMI contexts. This finding contrasts with Sahan et al.'s (2022) study in Thailand and Vietnam, where EMI teachers and students reported to prefer a native-standard, English-only instructional model. An explanation for this disparity could be that the participants in our study had exposure to EMI for at least one year. This exposure might have shaken students' previous belief to speak 'error-free' English to incentivize using English as a lingua franca for academic or professional communication. As our findings show, when students developed an ELF-based L2 self, it sheltered them from the anxiety of making language mistakes, and helped them derive joy and pride more easily from even trivial success of communicative language use. Similar findings were also reported in Galloway and Rose's (2013) study in an EMI Business program in Japan. Students were well aware of the possibilities to communicate with professionals from Southeast Asian countries instead of just with those from English-speaking countries in their future work. They thus reported strong perceptions of ELF and embraced a more flexible use of English, which is similar to what was revealed in our study.

### 5.2. The role of emotion in motivated learning: Facilitative or debilitating?

Results from the CLP analysis of longitudinal data reveal a bidirectional but asymmetrical influencing mechanism between emotions and two types of ideal selves: L2 self predicts emotions, yet emotions in turn predict disciplinary self. This finding offers empirical evidence to Kojima and Yashima's (2017) hypothesis to distinguish two types of self-guides in EMI contexts as *language-* and *discipline-*oriented. It also responds to Rose et al.'s (2020a) call to scrutinize different motivation types in EMI contexts. A notable finding of our study is that positive emotions primarily predicted students' ideal disciplinary self rather than their ideal L2 self. A plausible explanation is that students in EMI HE courses might

prioritize the learning of subject knowledge over language. Hence, it is possible that the "broadening" powers of students' positive emotions (Fredrickson, 2001, p. 219) might be primarily directed at building resources to enhance their subject learning. The result that ideal L2 self positively predicted emotions of enjoyment, hope, and pride in EMI HE also complements L2 research that has shown correlations between emotion and motivation variables through cross-sectional designs (MacIntyre and Vincze, 2017; Saito et al., 2018; Teimouri, 2017). However, given the differences between EMI and L2/English learning, such relationship may need further research to investigate whether it differs across the two contexts.

Although our study set out to explore positive emotions, we unexpectedly found that negative emotions were important facilitators of learning. In fact, positive and negative emotions co-shaped students' disciplinary self, and were transformable through learning experiences in EMI contexts. This echoes MacIntyre et al.'s (2019) argument that an integrative understanding of positive and negative experiences is needed to move beyond static, dichotomous description of emotions. In our study, many students' first reactions to subject learning through an L2 were fear and anxiety. Such fear and/or anxiety first created a misconception that the subject knowledge became harder, and might generate a debilitating effect to abate students' confidence and interest in subject learning. Researchers have warned that EMI can easily create 'epistemic injustice' (Zheng and Qiu, 2024), where students with lower proficiency access lower levels of reasoning and are often disadvantaged in knowledge construction and dissemination (Ou and Gu, 2021). Indeed, our interview findings align with this argument to show that EMI may create initial emotional barriers that hinder or demotivate less proficient students from disciplinary knowledge building.

However, our findings also present an optimistic side of the picture to show that students' negative emotions may trigger their strategic 'push-back', further nurturing positive emotions and ideal disciplinary self. MacIntyre and Vincze (2017) note that negative emotions may serve a facilitative function, when it threatens learners' positive sense of self so as to facilitate learning to restore their positive self-image. In our interviews, Xia, who initially suffered from anxiety in EMI course preparation, developed a strategy to shuttle between Chinese and English to achieve efficient learning. Her success in this agentic, strategic use of bilingual resources transformed her initial anxiety to a sense of control and pride, which eventually nurtured her ideal disciplinary self-image. A catalyst for this transformation, notably, was the student's increased recognition of bilingual/multilingual resources. Fang's interview account in our study also illustrates that simultaneously accessing L1 Chinese and L2 English provided him with two channels of reasoning and knowing. EMI research has called for encouraging students' use of diverse linguistic and semiotic resources for knowledge building (Lin and Lo, 2017; Ou and Gu, 2021). Our findings support this call to show that encouraging multilingual practices in EMI HE contexts can generate positive emotional consequences. As the broaden-and-build theory holds (Fredrickson, 2001, 2008, 2013), such positive emotions can in turn help learners broaden their thinking and exploration, motivating them to create new learning and experiences, and help students build strong, clear future self-images to aspire for success in their disciplinary fields.

## 6. Conclusion: Pedagogical implications and limitations

To our knowledge, this study is the first longitudinal mixed-methods research to investigate the emotion-motivation nexus in EMI HE contexts. Our findings offer several pedagogical implications for EMI policymaking, curriculum design, and classroom teaching.

First, institutional policymaking should reflect the multilingual reality of EMI HE, and recognize learners' need to access multilingual resources for disciplinary knowledge building. EMI lecturers should allow students to use their L1 for lesson preparation so that a more systematic, well-organized knowledge schema could be established that promotes deep-level processing of information in class (see Zhou et al., 2023).

Interactions with teachers during and after class can also involve a mixture of languages to build better rapport and encourage students for co-construction of knowledge (An and Macaro, 2022).

Second, language support curriculum (e.g., EAP courses) in EMI HE should embed a well-being component to help students understand, recognize, and regulate their emotions associated with studying through EMI. This curriculum should help students (1) establish a clear, appropriate ideal L2 self-image to foster positive emotions, and (2) develop a critical understanding of negative emotions as a signal for adaptive behavioral change to unleash its facilitative power. Specifically, such curriculum can be designed following three stages: awareness raising, vision substantiation, and action planning (see MacIntyre and Gregersen, 2012). Stage 1 awareness raising can encourage students to brainstorm and discuss future work or life scenarios for English use to first create a rough vision of ideal L2 self. Stage 2 substantiates this vision through realistic, achievable expectations. EAP teachers can use authentic learning activities that resemble workplace tasks to help students establish appropriate language ideologies that recognize English as a lingua franca. Finally, Stage 3 scaffolds students to use their ideal L2 self as guidance to set short- and long-term learning goals, and teach students self-regulated learning strategies to translate their goals into well-planned, concrete learning behavior (Zhou and Thompson, 2023).

We acknowledge certain limitations when interpreting the findings of our study. First, the participants were sampled from an international university representing a ‘full EMI’ model institution with a larger ratio of English use. The findings would likely be different from ‘partial EMI’ programs where English is less used. Second, the data collected in this study were self-report in nature, which depend greatly on students’ honesty in reporting. Due to the participating institution’s regulations, we were not able to access the students’ English test scores as a measure of their language proficiency. We therefore call for future research to use more objective methods for data collection, and sample from various types of EMI HE contexts to measure students’ emotional and motivational experiences. Third, the study had a noted attrition issue, which might have affected the interpretation of the results. Although Cox et al. (2014) point out that there is no straightforward method to confirm whether the data are missing at random or not, we still need to acknowledge that such attrition might possibly introduce bias to the results. For example, it might be possible that students remaining to participate were those more motivated for learning. We therefore encourage future studies to adopt stronger incentive measures to sustain students’ continued participation to reduce attrition, and cross-check the results of our study with future studies of similar longitudinal designs. Despite the limitations, we believe that the study offers important insight into a synergistic, contextualized understanding of the emotion-motivation nexus in EMI HE, which contributes to both EMI and L2 emotion research. The longitudinal mixed-methods design is also a methodological innovation that benefits from a temporal approach to disentangle the potential causal relationships between learning-related variables that future research can draw on.

#### CRediT authorship contribution statement

**Sihan Zhou:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jian Xu:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis. **Heath Rose:** Writing – review & editing. **Jim McKinley:** Writing – review & editing.

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#### Declaration of competing interest

The authors report there are no competing interests to declare.

#### Appendix A. Questionnaire items used in this study

##### Ideal L2 self

1. I can imagine myself living abroad and using English effectively for communicating with the locals.
2. I can imagine myself living abroad and having a discussion in English.
3. Whenever I think of my future career, I imagine myself using English.
4. The things I want to do in the future require me to use English.

##### Ideal disciplinary self

1. I can imagine myself engaging in professional communications with my colleagues in my subject area of study.
2. I can imagine myself becoming an expert in my discipline in the future.
3. Whenever I think of my future career, I imagine myself using the disciplinary knowledge I learnt.
4. The things I want to do in the future require me to use disciplinary expertise.

##### Enjoyment

1. I enjoy the challenge of learning the materials for EMI courses.
2. I enjoy dealing with EMI course materials.
3. I am so happy about the progress I made in EMI courses that I am motivated to continue studying.
4. When my studies in EMI courses are going well, it gives me a rush.

##### Hope

1. I feel confident when studying for EMI courses.
2. I feel confident that I will be able to master the materials in EMI courses.
3. I feel optimistic that I will make good progress at studying my courses through EMI.
4. My sense of confidence motivates me to continue my studying for EMI courses.

##### Pride

1. I am proud of myself when learning subject knowledge through EMI.
2. I think I can be proud of my accomplishments in studying EMI courses.
3. Because I want to be proud of my accomplishments, I am very motivated to study for EMI courses.
4. When I excel at my studies in EMI courses, I swell with pride.

#### Appendix B. Interview protocol

1. What is your priority for learning in your EMI university program (English, subject knowledge, or both)? Why?
2. To what extent are you motivated to learn English in EMI programs? Why?
3. How do you imagine yourself to continue using English in your future study or job? Can you describe what you hope to achieve in English learning by the end of your EMI program?
4. To what extent are you motivated to learn subject knowledge in EMI programs? Why?

5. How do you imagine yourself to continue using subject knowledge in your future study or job? Can you describe what you hope to achieve in subject learning by the end of your EMI program?
6. How do you feel about your study in EMI courses so far?
7. Can you describe a moment when you experienced strong emotions in your recent study for EMI courses? How do you think these emotions might be related to your motivation for learning, if at all?
8. To what extent do you think your emotions are related to your motivation for English and subject learning, respectively? Why, or why not?

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### Further Reading

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**Sihan Zhou** is an Assistant Professor in the Department of Curriculum and Instruction at the Chinese University of Hong Kong. Her research focuses on English as medium of instruction in higher education. Her work has most recently appeared in journals such as *Language Teaching*, *System*, *International Journal of Bilingual Education and Bilingualism*,

*Studies in Second Language Learning and Teaching*, *Applied Linguistics Review*, *ELT Journal*, and *RELC Journal*.

**Jian Xu** is a professor at Sichuan International Studies University. He obtained his Ph.D. degree from The Chinese University of Hong Kong. His research interests include second language writing and listening comprehension. His work has appeared in journals such as *Journal of Second Language Writing*, *Assessing Writing*, *System*, *RELC Journal*, *Studies in Second Language Learning and Teaching*, *Applied Linguistics Review*, *Journal of Multilingual and Multicultural Development*, *Higher Education Research & Development*.

**Heath Rose** is Professor of Applied Linguistics at the University of Oxford. He has published widely related to language education in journals such as *Higher Education*, *Language Policy*, *Applied Linguistics*, *ELT Journal*, *TESOL Quarterly*, *System*, and *Modern Language Journal*. Heath is the coordinator of the English Medium Instruction Research Group, and runs the wider EMI Oxford Research Network.

**Jim McKinley**, SFHEA, is Professor of Applied Linguistics at University College London. He has taught in higher education in the UK, Japan, Australia, and Uganda, as well as US schools. His research targets implications of globalization for L2 writing, language education, and higher education studies, particularly the teaching-research nexus and English medium instruction. He is an Editor-in-Chief of the journal *System*, and a co-Editor of the Cambridge Elements series *Language Teaching* (Cambridge University Press).