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How loneliness and school connectedness associate with academic self-efficacy in upper secondary education: a longitudinal analysis

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Abstract
Academic self-efficacy (ASE) is an established predictor of academic attainment. This longitudinal study investigates the development of ASE at the beginning of upper secondary education in Finland, focusing on the role of loneliness and school connectedness. Panel data from the first three semesters were analysed using individual-level fixed-effects regression. Results show a declining trend in ASE over time, an increase in loneliness negatively associated with ASE, and a decline in school connectedness that remains positively related to ASE, particularly among vocational students. The findings indicate that addressing loneliness and fostering school connectedness are critical during the transition to upper secondary education.

Keywords Academic self-efficacy · Loneliness · School connectedness · Upper secondary education · Fixed-effects regression · Longitudinal study

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1 Introduction

Academic self-efficacy (ASE) refers to a student's belief in their ability to succeed in academic tasks (Bandura, 1997). As academic demands increase, confidence in one's abilities becomes increasingly vital. Within the framework of *Social Cognitive Theory* (SCT) (Bandura, 1997), ASE is recognised as a critical predictor of student outcomes. It influences how students appraise challenges, regulate emotions and sustain motivation, and it consistently predicts student motivation, persistence, performance and achievement (Bandura, 1997; Honicke & Broadbent, 2016; Klassen & Usher, 2010; Lei et al., 2022; Meng & Zhang, 2023; Robbins et al., 2004; Supervía et al., 2022). The development of ASE is shaped by four key sources: mastery experiences, social modelling, verbal encouragement and emotional cues (Bandura, 1997, 2012).

The relevance of ASE is particularly pronounced during upper secondary education, a developmental period marked by intensified expectations and transitions into new social environments. According to Pérez-Marco et al. (2024), students with strong ASE are more likely to set ambitious goals and cope effectively with setbacks, whereas those with lower ASE face greater risks, including school refusal. In addition, socio-emotional factors such as loneliness and school connectedness significantly influence this process. Loneliness, a feeling of exclusion and a lack of meaningful connection—has been linked to depression, anxiety, diminished academic beliefs and poor concentration (Kiuru et al., 2024; Leigh-Hunt et al., 2017; Lyyra et al., 2022). In contrast, school connectedness, encompassing belonging, safety and perceptions of fairness, has been shown to offer protective effects on ASE and school engagement (Raniti et al., 2022; Wei et al., 2022; Zeinalipour, 2022).

Furthermore, research found that loneliness and school connectedness are linked to adolescent well-being (Beattie et al., 2025; Raniti et al., 2022); however, their combined impact on ASE remains underexplored. Prior research has primarily examined these factors separately, often using cross-sectional designs (Grøtan et al., 2019; Zeinalipour, 2022). To address this gap, this study utilised longitudinal data from Finnish upper secondary students to examine changes in ASE, loneliness and school connectedness across general and vocational education and considered their practical implications for adolescent wellbeing. This approach allowed for the exploration of within-person associations and contextual differences across general and vocational settings.

2 Theoretical background

2.1 ASE as a transition skill

During adolescence, an individual's confidence in their academic abilities may become particularly vulnerable to social and contextual influences. Adolescents are developmentally motivated to engage in social comparisons (Burnell et al., 2024), which may influence their self-perceptions and confidence in an academic context. Discrepancies between an individual's abilities and their perceived standards of achievement may link to a decline in ASE, especially if they perceive themselves as

falling short of societal or peer expectations (Grøtan et al., 2019). Bandura's (1997) *Triadic Reciprocal Determinism* posits that adolescents' thoughts, emotions, behaviours and environmental influences interact continuously to shape development. For instance, a student's ASE, social behaviour and the feedback they receive from peers and teachers are interconnected, with each element reinforcing the others. This framing underscores why ASE, rather than academic achievement alone, is central to understanding students' developmental trajectories during adolescence. Consequently, understanding ASE in upper secondary students is essential for fostering success in higher education and beyond.

Furthermore, ASE is a strategic target for educational development because, unlike external factors, it can be modified through pedagogical interventions. While ASE has been identified as a motivational predictor of academic performance in some studies (Elias & MacDonald, 2007; Honicke & Broadbent, 2016), more recent research indicates that performance shapes ASE rather than vice versa, failing to support the reciprocal hypothesis (Honicke et al., 2023). Prior experiences, such as task difficulty, initial performance levels and feedback, have been shown to more consistently influence ASE development over time (Bandura, 1997; Bong & Skaalvik, 2003; Lei et al., 2022). Ultimately, students' ASE in a blended learning environment is shaped by a complex interplay of personal, interpersonal and environmental factors (Wei et al., 2022).

ASE holds particular importance within transitional contexts. Adolescence itself is characterised by significant developmental transitions, including changes in cognitive abilities, social dynamics and self-perceptions (Cheng et al., 2023), as well as changes in the educational context as students transition from lower to upper secondary education. These transitions often involve separation from familiar environments and the formation of new social and academic roles, which can disrupt existing peer relationships and challenge students' sense of belonging (Kiuru et al., 2024). ASE is especially beneficial during these times, including moving between school levels, changing educational tracks and adapting to new learning environments, because it serves as a psychological anchor, helping students navigate uncertainty (Bandura, 1997). In other words, ASE enables students to adapt to new academic and social demands with confidence and is essential for emotional regulation (Bandura, 1997).

2.2 Loneliness and ASE in adolescence

Loneliness is a subjective feeling of social disconnection that arises when an individual's desired social relationships do not align with their actual experiences. This can manifest in two forms: social loneliness (feeling of having limited peer connections) and emotional loneliness (a lack of deep, close emotional bonds) (Junttila & Karlsson, 2024; Kiuru et al., 2020). As partially emphasised earlier, adolescence is a critical period involving profound changes in social dynamics, making individuals in this age group particularly vulnerable to feelings of loneliness. In addition, isolation—social and emotional—can increase physiological stress responses and anxiety levels, which in turn can negatively affect academic performance (Bandura, 1997).

Loneliness can significantly undermine ASE by limiting a student's access to supportive role models and vital social learning opportunities, such as observing suc-

cess, receiving encouragement and developing effective coping strategies (Bandura, 1997). This restricted contact with peers and teachers further constrains the sources of self-efficacy by diminishing opportunities for observational learning (Bandura, 1997). Empirical findings support this relationship. For instance, Kiuru et al. (2024) reported that socially lonely adolescents had the lowest self-esteem and extraversion, traits that may concurrently weaken ASE. Consistently, a Europe-wide study by Schnepf et al. (2023) demonstrated that adolescents' loneliness was significantly associated with their perceived ASE in overcoming academic challenges, thereby highlighting the critical relevance of these constructs within the context of schooling.

Research shows that loneliness tends to intensify during periods of transition, especially when existing social ties are severed or not successfully replaced (Beattie et al., 2025; Kiuru et al., 2020). During adolescence, these experiences can undermine an individual's ASE by limiting opportunities for vicarious learning and social persuasion (Bandura, 1997). Conversely, transition to school types that encourage greater integration and mixing among students, thus necessitating the formation of new social roles, has been associated with a reduction in reported loneliness (Schnepf et al., 2023). This underscores the importance of school environments in shaping adolescents' social experiences and supports the view that school-based interventions may be particularly effective in addressing loneliness. While previous research has highlighted that social transitions and perceived stress contribute to loneliness among university students (Diehl et al., 2018), a clearer understanding of how loneliness associates with ASE specifically among upper secondary students warrants further investigation.

The prevalence of adolescent loneliness in Finland has been rising; according to Lyyra et al. (2022), this is associated with psychosomatic symptoms and increased medication use. Loneliness also undermines self-esteem and mental health, both of which are critical components of healthy development (Lyyra et al., 2021) and ASE (Bandura, 1997). Prior research also supports this association; for instance, a study by Grøtan et al. (2019) found that college students experiencing both social and emotional loneliness were significantly more likely to report low ASE compared to their non-lonely peers. However, that particular study was cross-sectional and focused on older youth, leaving questions regarding how these dynamics manifest among younger adolescents. More recent investigations, however, have continued to highlight the impact of loneliness. For instance, Stevens et al. (2024) reported a negative association between ASE and loneliness, while Eccles et al. (2023) associated loneliness with poorer academic perceptions and increased pressure. Together, these findings underscore the need to examine ASE in relation to loneliness longitudinally and in earlier educational stages.

2.3 School connectedness and ASE in adolescence

School connectedness refers to students' perceptions of feeling emotionally, socially and academically linked to their school (Furlong et al., 2011; Wilkins et al., 2023). This psychological construct encompasses several key facets: supportive relationships with peers and teachers, perceptions of safety, and engagement with the broader school climate. It involves the belief that both adults and fellow students are attentive

to individual needs and supportive of academic development (Centers for Disease Control and Prevention, 2009). Although often used interchangeably with the concept of school belonging (Allen et al., 2018), school connectedness is a broader construct. It encompasses behavioural engagement and perceptions of institutional support, such as participation in school activities and shared adherence to social norms (Raniti et al., 2022). The SCT emphasises the role of social influences in shaping self-efficacy (Bandura, 1997). Although distinct from academic engagement (Furlong et al., 2011), school connectedness is consistently and positively associated with higher ASE (Zeinalipour, 2022). A positive school climate, characterised by supportive relationships and a sense of safety, enhances overall connectedness, student wellbeing and engagement, while strong teacher–student relationships, constructive feedback, peer support and a sense of belonging all contribute directly to ASE (Brown & Evans, 2002; Resnick et al., 1997; Waters et al., 2010; Wei et al., 2022; Zeinalipour, 2022).

Feeling connected to school contributes to adolescents' long-term health (Libbey, 2004; Steiner et al., 2019; Wilkins et al., 2023), academic success (Furlong et al., 2011; Zeinalipour, 2022) and fewer behavioural problems (Brown & Evans, 2002). It is widely recognised as a protective factor for mental health, mitigating the effects of childhood adversity and reducing risks such as emotional distress (Bond et al., 2007; Diggs et al., 2025; Steiner et al., 2019; Wilkins et al., 2023). Adolescents who appear most competent often balance the development of self-competence with a sense of connection to others (Lenz, 2001). Moreover, access to social support has been shown to strengthen learning confidence and ease adjustment during key transitions (Smyth, 2016). Precisely, this feeling of connectedness is crucial during school transitions, as it supports students' emotional and motivational adjustment (Eccles & Roeser, 2011). Disruptions in students' support systems can delay the early identification of difficulties, thereby increasing the risk of motivational academic failure and dropout. Specifically, challenges encountered during the transition from primary to secondary school have been associated with delayed connectedness, while strong school connectedness during this transition is associated with improved student mental wellbeing (Lester et al., 2023). Furthermore, the presence of supportive relationships, such as those with mentors and supervisors, can foster ASE and ease this transitional period (Pinquart et al., 2003).

2.4 The Finnish education system and ASE

Given the increasing prevalence of adolescent loneliness in Finland and the central role of the school context in shaping socioemotional health (Wong et al., 2021), it is important to situate these experiences within the structure of the national education system. In Finland, compulsory education is free of charge and lasts until the age of 18 years, comprising 9 years of comprehensive schooling (grades 1–9), followed by 3 years of upper secondary education. Students typically choose between two publicly funded tracks that both provide eligibility for higher education: general education or vocational education (Ministry of Education and Culture, 2025). Although both tracks are publicly funded, they differ significantly in structure, workload and orientation; general education focuses on theoretical knowledge and preparation for the matriculation examination, while vocational education focuses on the development

of practical and occupational skills through a combination of school-based instruction and workplace training.

Students typically transition to upper secondary schools around 16 years of age, entering new institutions and social settings. Vocational schools enroll a larger proportion of students from socioeconomically disadvantaged backgrounds, specifically those whose parents have lower levels of education or income, and those in need of special education support, such as students with learning difficulties or developmental disorders (Kilpi-Jakonen et al., 2016; Kirjavainen et al., 2013). European research shows that school-level characteristics account for a substantial variation in students' experiences of loneliness, even after controlling for national differences (Schnepf et al., 2023). These structural and compositional disparities provide a strong rationale for examining ASE, loneliness and school connectedness across different school types, particularly as vocational school students' educational trajectories are more frequently marked by vulnerability.

Social connectedness among Finnish upper secondary students declined between 2017 and 2021, a trend that was particularly pronounced among girls (Read et al., 2024). Data from the Finnish Institute for Health and Welfare (2025) indicated that social anxiety levels differed slightly between educational tracks. That is, 31% of vocational school students reported experiencing social anxiety compared to 37% of general school students, while loneliness was identical in both groups at 12%. Furthermore, research showed that European students who lack teacher support, attend schools with a high proportion of low-performing peers, or are themselves low achievers tended to report higher levels of loneliness (Schnepf et al., 2023). In fact, a specific dynamic was observed where students from lower socioeconomic backgrounds experienced greater loneliness when surrounded by more advantaged peers. These contextual differences underscore the importance of comparing vocational and general schools; such a comparison helps clarify how institutional environments shape disparities in students' ASE, their feelings of loneliness and their overall school connectedness.

3 The present study

Earlier studies primarily examined how school connectedness and ASE influence academic outcomes using cross-sectional designs (Bond et al., 2007; Zeinalipour, 2022). The present study, however, shifted its focus to longitudinal associations, addressing a gap in prior evidence, which offered limited comparisons of these dynamics across different educational tracks. Using panel data from the first three semesters of Finnish upper secondary education, the study extended previous cross-sectional findings (Grøtan et al., 2019) by investigating contexts that inherently differ in social climate and learning orientation. Drawing on SCT (Bandura, 1997), the study examined whether ASE and school connectedness decline over time (Furlong et al., 2011) and whether loneliness increases over time (Eccles et al., 2023; Grøtan et al., 2019; Qualter et al., 2015). In addition, it assessed whether variations in loneliness and school connectedness correlate with differences in ASE, consistent with the premise that a diminished sense of belonging can undermine confidence in one's academic abili-

ties (Allen & Boyle, 2018; Eccles & Roeser, 2011). While ASE is not a fixed trait, it represents a relatively stable belief system that can be measured longitudinally (Bandura, 1997), making it well-suited for tracking developmental trajectories in relation to psychosocial factors such as loneliness and school connectedness.

Firstly, the present study examined whether loneliness and school connectedness are associated with ASE over time among Finnish students transitioning into upper secondary education. Based on prior research (Eccles et al., 2023; Grøtan et al., 2019), it is expected that increased loneliness will correspond with lower ASE and that reduced school connectedness will undermine ASE (Zeinalipour, 2022). While reciprocal influences are theoretically plausible (Bandura, 1997), the present analysis focused on the directional pathway from loneliness and school connectedness to ASE. This directional emphasis is justified for several reasons: high ASE does not necessarily guarantee connectedness, foster friendships or protect against feelings of loneliness; experiences of school connectedness are more likely to shape students' confidence in their academic abilities (Zeinalipour, 2022) than the reverse pathway; and this confidence is a central component of overall motivation and ASE (Bandura, 1997).

Secondly, the present study aimed to examine whether students in general and vocational schools differ in how loneliness and school connectedness are associated with ASE. General education is characterised by stronger academic intensity and a rapid increase in the level of difficulty. It also typically requires more independent study and fosters a more competitive achievement climate, which previous research has linked to lower ASE (Midgley et al., 2001). In a longitudinal setting, this may lead to greater declines (or lesser growth) in ASE over time among general students. By contrast, vocational programmes tend to be more practise-oriented and academically demanding. However, they often involve frequent schedule shifts, remote study modules and early work placements, which may limit opportunities to build stable peer relationships, thereby possibly reducing students' overall sense of school connectedness and increasing loneliness. This difference in the way that education is organised in the two school types may also lead to differences in the associations between the psychosocial factors, school connectedness and loneliness, and ASE between the two school types. Due to the lower number of contact hours with both peers and teachers in vocational schools, it is possible that the examined psychosocial factors take on a heightened role in these schools. We test these assumptions by interacting the main associations of interest with school type. Appendix 1 illustrates our conceptual model.

4 Methods

4.1 Participants

This study utilised data drawn from an extensive research project 'Wellbeing for secondary education' (Herkama et al., 2019; Kumlander et al., 2018). The project, conducted between 2016 and 2018, was a collaborative effort between the University of Turku and the Finnish Ministry of Education and Culture. The data collection

focused on two distinct cohorts of students starting their upper secondary education. Both student cohorts were longitudinally followed over the course of two full academic years. Ethical approval for the study was obtained from the University of Turku Ethical Board in June 2016.

The survey targeted all first-year upper secondary students from 8 general schools (828 individuals and 2188 observations) and 12 vocational schools (544 individuals and 1454 observations) located in Southern and South-West Finland. Cohort 1 comprised three data collection waves (W1–W3), while Cohort 2 began participation at W3. Online data collection of the cohort 1 occurred in three periods: W1 in the fall of 2016, W2 in the spring of 2017 and W3 in the fall of 2017. All participants in the selected cohort (Cohort 1) began their general or vocational upper secondary school journey in W1 (fall 2016). The initial W1 recruitment yielded 1,725 respondents, of which 87 were removed for having started secondary education before the fall of 2016. Of the remaining 1,638 respondents, 391 and 554 respondents did not participate in W2 and W3, respectively.

The gender distribution was 51% female, 48% male and 1% other non-binary sex identities (with very little variation across waves), with most students born in 1999 or 2000, making them 16–17 years old during data collection. The vocational schools provided training across various fields, including technology, social and health services, and the hotel and catering sectors.

4.2 Procedure

Data collection sessions were administered online once per semester during regular school hours, with each session lasting approximately 45 min. Participants completed these sessions using a variety of devices, including provided laptop computers, desktop computers and (in a few instances) tablet computers. Two trained research assistants provided instructions and technical assistance throughout the data collection process. For every session, students used individually created passwords (created when they first answered the survey) to log into the online questionnaire platform. Prior to beginning the survey, all participants were assured of the confidentiality of their responses and provided active, informed consent online. To reduce respondent burden due to the large number of constructs assessed and to enhance the validity of the assessment, the questionnaire employed a three-form planned missing design (Graham et al., 2006; Little & Rhemtulla, 2013). This design required each student to respond to approximately 75% of all original items, including a set of common items and two out of three rotating item blocks. This methodology yields data that are missing completely at random (MCAR) (Little & Rhemtulla, 2013). Randomising the question blocks helped to minimise bias due to item ordering.

4.3 Sample selection

The present study drew on data from Cohort 1 of the original sample, comprising three waves (W1–W3). Cohort 2, which began participation at W3, was excluded from the analysis. Only respondents who participated in at least one follow-up wave were retained; consequently, this led to the exclusion of 241 respondents who provided no data for W2 or W3. Within the remaining 1,397 participants, item non-response

in at least one of the three scales of interest was observed (distributed evenly across scales and waves): 11 missing responses in W1 (out of 1397 respondents), 21 in W2 (out of 1247) and 30 in W3 (out of 1084). This resulted in the further exclusion of 25 respondents because they lacked valid responses in at least two of the three waves. The final analytical sample was 1372 individuals and 3642 observations. Within the analytical sample, W2 included 89% of the W1 participants, and W3 included 77%. In general schools, 60% of the sample were female and in vocational schools 39% were female. Attrition rates did not differ significantly between genders (female 16% vs. male 17%). However, vocational education students demonstrated a higher attrition rate (21%) compared to general upper secondary students (13%).

4.4 Measures

The measures utilised in this study assessed students' confidence in mastering academic tasks, emotional and social loneliness and the sense of connectedness to the school community (Appendix 2). No adaptations were made to the instruments; the Finnish versions were used. ASE was evaluated using five items translated into Finnish from the *Patterns of Academic Learning Scales* manual (Mingley et al., 2000). Participants rated the applicability of statements—such as 'I can do even the hardest work in this class if I try'—on a five-point Likert scale. The mean score of all five questions was calculated to represent ASE. The scale represented high internal consistency (Cronbach's $\alpha = 0.93$), with a sample mean of 3.86 (standard deviation [*SD*] = 0.77).

Loneliness was assessed using the validated Finnish version of the *UCLA loneliness scale* (Russell et al., 1980), adapted by Junttila et al. (2013). This instrument is a 12-item scale designed to measure both social and emotional loneliness, with six items dedicated to each subscale. Minor linguistic modifications were made to enhance the clarity and cultural relevance for the study population. Participants utilized a four-point scale to rate their agreement with statements such as 'No one really knows me well' (emotional loneliness) and 'I feel left out' (social loneliness). For consistent interpretation, 6 of the 12 items (items 1, 2, 5, 9, 11 and 12, which were originally phrased to indicate lower loneliness when scored higher) were reverse-coded prior to analysis. The total loneliness scale mean was computed by averaging all 12 items, with higher scores indicating greater levels of loneliness. The scale demonstrated high internal consistency (Cronbach's $\alpha = 0.88$), with a mean score of 1.59 (*SD* = 0.51).

School connectedness was measured using the Finnish translation of the *Adolescent Health's School Connectedness Scale* (Furlong et al., 2011), which included five positively worded items rated on a five-point Likert scale. Items included statements such as 'My school's teachers treat students fairly'. The scale exhibited strong internal consistency (Cronbach's $\alpha = 0.88$), with a mean score of 4.02 (*SD* = 0.82).

School type was coded as a dichotomous variable: 0 for general upper secondary school and 1 for vocational upper secondary school. As school type represents a time-constant characteristic, it could not be included as a direct control variable within the models. The fixed-effects methodology inherently accounts for all stable, time-constant individual-level characteristics, such as demographics, socioeconomic background and school type, across the study period. Therefore, school type was utilized exclusively as a moderator variable (i.e. in interaction terms) in the analyses.

4.5 Data analysis

Descriptive statistics, including means and *SD*s, were computed for key variables across W1–W3. Initial group comparisons were performed to assess significant differences between these waves. The results of these analyses are summarised in Table 1. Following initial analyses, the study employed a longitudinal design spanning the first three semesters of upper secondary school to determine changes in ASE over time. Fixed-effects linear regression models were used to analyse individual-level changes in ASE, loneliness and school connectedness while controlling for stable characteristics that do not vary over time. These models compare each individual's ASE scores across varying levels of loneliness and school connectedness, effectively controlling for omitted variable bias (Andreß et al., 2013). Cluster-robust standard errors were used to address potential heteroscedasticity across observations. The Hausman specification test was conducted (Hausman, 1978) to compare fixed-effects and random-effects models, which confirmed that the fixed-effects approach was the preferred and more appropriate method for the analysis. The fixed-effects approach focuses specifically on within-individual changes over time. Although this method does not capture time-varying characteristics or establish causality, it yields robust insights into ASE dynamics. By controlling for unobserved, time-invariant factors at both the individual and school levels, such as family background, socioeconomic status, institutional culture and long-term resource availability, the analysis reduces bias in the estimates (Andreß et al., 2013).

Table 1 Descriptive statistics for academic self-efficacy, loneliness and school connectedness and significant differences across W1–W3 among all, general and vocational school students

	All		General school		Vocational school	
	Mean	SD	Mean	SD	Mean	SD
ASE						
W1	3.92	0.71	3.95	0.70	3.87	0.73
W2	3.84	0.79	3.87	0.80	3.80	0.78
W3	3.81	0.81	3.83	0.81	3.77	0.81
Significant differences	1 vs. 2 1 vs. 3		1 vs. 2 1 vs. 3		(none)	
Loneliness						
W1	1.55	0.46	1.54	0.46	1.56	0.46
W2	1.61	0.54	1.60	0.55	1.63	0.52
W3	1.63	0.53	1.61	0.52	1.67	0.54
Significant differences	1 vs. 2		(none)		1 vs. 3	
School connectedness						
W1	4.12	0.73	4.10	0.75	4.14	0.70
W2	3.98	0.87	4.00	0.86	3.94	0.89
W3	3.93	0.86	4.00	0.84	3.83	0.88
Significant differences	1 vs. 2 1 vs. 3		1 vs. 2 1 vs. 3		1 vs. 2 1 vs. 3 2 vs. 3	

N (all) W1: 1368; W2: 1221; W3: 1053; total: 3642. *N* (general upper secondary schools) W1: 827; W2: 739; W3: 622; total: 2188. *N* (vocational upper secondary schools) W1: 541; W2: 482; W3: 431; total: 1,454. Significant differences with $p < .05$

ASE academic self-efficacy, *SD* standard deviation, *W* wave

This study employed a series of seven models to examine the associations with ASE. Model 1 assessed the baseline change in ASE over time. Model 2 investigated the association of loneliness with ASE. Model 3 explored the relationship between school connectedness and ASE. Model 4 examined the combined relationship of both loneliness and school connectedness with ASE. Model 5 included two interaction terms to explore whether school type (vocational vs. general) moderated the relationship between time and ASE: vocational × W2 and vocational × W3; W1 and general upper secondary school were the reference categories here. Model 6 examined whether school type moderated the relationship between loneliness and ASE by including the interaction term vocational × loneliness. Finally, Model 7 assessed if school type moderated the relationship between school connectedness and ASE by including the interaction term vocational × school connectedness. Age was excluded from the fixed-effects models due to perfect collinearity with the time variable (i.e. wave); including it would violate model assumptions and lead to estimation issues. Data were analysed using Stata version 17.

5 Results

Table 1 presents summary statistics for ASE, loneliness and school connectedness across different waves and school types. Trends in these variables were compared between general and vocational upper secondary schools. ASE demonstrated a general declining trend over time; the most significant drop occurred between W1 and W2, while stabilisation was observed between W2 and W3 (Fig. 1; Table 1). General school students experienced a significant decline in ASE from W1 to W2 and W1 to W3, with stabilisation observed between W2 and W3. Similarly, vocational school students showed a decline in ASE over time, but the changes did not achieve statistical significance (Table 1).

Loneliness scores for all students increased significantly between W1 and W2, after which no further significant changes were observed through W3. Students in general schools experienced a rise in loneliness from W1 to W2 and remained stable thereafter, while vocational school students observed a significant rise from W1 to W3 (Table 1).

School connectedness was reportedly high in both schools at W1; however, this declined significantly by W2, and the downward trend continued into W3. In general schools, the decrease was significant from W1 to W2, followed by a period of stability. For vocational students, school connectedness declined significantly across all wave transitions (Table 1).

The results of the fixed-effects models are presented in Table 2. In Model 1, the relationship between time and ASE was found to be significant, indicating a decline in ASE over time. This negative trend persisted across subsequent models, although without a significant difference between W2 and W3. Model 2 introduced the loneliness variable, revealing a strongly significant association that remained consistent across all models: as loneliness increases, ASE decreases. In Model 3, the school connectedness variable was included independently, suggesting that as school connectedness increases, ASE also increases.

Model 4 included both loneliness and school connectedness. The inclusion of both variables did not substantially alter the significant negative association of loneliness with ASE or the positive association of school connectedness with ASE. This was a crucial

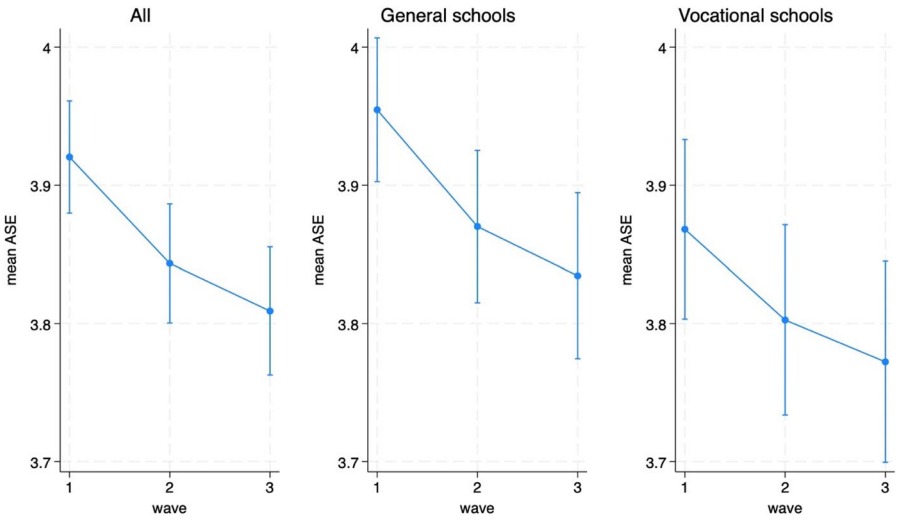

Fig. 1 Academic self-efficacy trends in upper secondary school: All students and by school type (panel data)

finding, demonstrating that the association between loneliness and ASE persists independently, even when accounting for school connectedness. That is, the associations were largely separate, with neither substantially influencing the other's relationship. Although the correlation between ASE and school connectedness was relatively strong (r=.43), multicollinearity was not considered a problem because the fixed-effects model focuses on within-individual changes rather than differences between individuals.

In Model 5, the interaction term between time and school type yielded no significant result. This indicated that the trends in ASE over time did not significantly differ between general and vocational schools when considering overall changes in loneliness and school connectedness. Model 6 examined the interaction between school type and loneliness. The interaction term was not statistically significant, demonstrating that the relationship between loneliness and ASE did not significantly differ between general and vocational schools. In other words, the relationship between loneliness and ASE remained consistent regardless of school type.

In the final model, Model 7, the interaction between school type and school connectedness was statistically significant, with a positive coefficient. This indicated that the association between school connectedness and ASE was stronger for vocational students compared to general students. For general school students, a one-unit increase in school connectedness was associated with a 0.07 unit increase in ASE, whereas for vocational school students, this association was stronger at 0.18 (0.07 + 0.11). Furthermore, in Model 7, the interaction between W3 and school type was also significant, approximately equal in magnitude to the coefficient for W3 itself. This suggests that once the differential association between school connectedness and ASE was accounted for, the decline in ASE over time was only evident among general school students. Among vocational school students, the decline in ASE, particularly between W1 and W3, was largely accounted for by changes in loneliness and, most notably, school connectedness. In contrast, among general school students, these social

Table 2 Fixed-effects panel models of academic self-efficacy among Finnish upper secondary students: associations with time and moderation by school type, loneliness and school connectedness

ASE	M1	M2	M3	M4	M5	M6	M7
W2[a]	−0.091***	−0.071**	−0.067**	−0.056**	−0.065*	−0.066*	−0.072*
	(0.022)	(0.022)	(0.022)	(0.022)	(0.028)	(0.028)	(0.028)
W3[a]	−0.105***	−0.080***	−0.074**	−0.061**	−0.089**	−0.090**	−0.095**
	(0.023)	(0.023)	(0.023)	(0.023)	(0.030)	(0.030)	(0.030)
Loneliness		−0.282***		−0.226***	−0.226***	−0.222***	−0.226***
		(0.033)		(0.034)	(0.034)	(0.046)	(0.034)
School connectedness			0.149***	0.119***	0.121***	0.121***	0.071**
			(0.018)	(0.018)	(0.018)	(0.018)	(0.024)
W2[a] × Vocational school[b]					0.024	0.025	0.044
					(0.044)	(0.044)	(0.044)
W3[a] × Vocational school[b]					0.071	0.072	0.098*
					(0.047)	(0.047)	(0.047)
Vocational school[b] × Loneliness						−0.009	
						(0.066)	
Vocational school[b] × School connectedness							0.113**
							(0.035)
R-squared (within)	0.011	0.042	0.042	0.060	0.065	0.065	0.065
Constant	3.923***	4.360***	3.307***	3.782***	3.773***	3.772***	3.793***
	(0.015)	(0.053)	(0.074)	(0.102)	(0.103)	(0.103)	(0.103)

N = 1372 students; total observations = 3642

ASE academic self-efficacy, *M* model, *W* wave

***p < .001, **p < .01, *p < .05; Standard errors in parentheses: [a]Reference category: W1; [b]Reference category: general school

factors did not account for the observed decline, indicating that other, unmeasured mechanisms may be contributing to reduced ASE within that group.

6 Discussion

ASE showed a gradual decline across the three waves of data collection, with significant differences emerging between the first and both subsequent waves. Students reported feeling progressively lonelier as time progressed; by W2, self-reported loneliness was significantly higher compared to W1. Similarly, school connectedness declined over time, with significant differences between the first and both subsequent waves. These findings are consistent with prior research linking lower ASE with disengagement from school (Pérez-Marco et al., 2024) and loneliness with increased avoidance and anxiety in adolescents (Eccles & Roeser, 2011; Qualter et al., 2015), which underscores the rel-

evance of the current findings. This study highlighted school-based loneliness as a critical factor undermining adolescents' ASE and overall social wellbeing. The observed trends carry potential implications for increased absenteeism and early school leaving, particularly once compulsory education ends at age 18 years in Finland. Loneliness and weak school connectedness may directly reduce students' willingness to attend school, which in turn can erode ASE. Given that ASE is a key predictor of subsequent achievement outcomes, enrolment decisions and occupational aspirations (Bandura, 1997), these findings highlight the importance of fostering supportive school environments.

The first aim of the present study was to examine whether loneliness and school connectedness were associated with ASE over time. The study demonstrated that ASE declined over time among Finnish upper secondary students in both school types. However, the decline was significant among general school students but not among vocational students. The most notable decrease in ASE occurred between W1 and W2, followed by stabilisation.

Self-efficacy tends to decline when individuals encounter more demanding tasks without sufficient support (Bandura, 1997). The substantially higher level of difficulty and the greater requirement for independent work in general education may explain the steeper decrease in ASE in these schools. In contrast, vocational education may offer situations in which students can succeed in practical tasks and receive immediate feedback, which can help sustain their ASE over time.

Furthermore, the patterns for loneliness varied between the two school types. Loneliness increased slightly across waves in both groups; however, the rise in loneliness reached statistical significance only among vocational students between W1 and W3. Vocational students started from a slightly higher level of loneliness, which may reflect more fragmented peer structures and less consistent daily contact with peers and teachers. Vocational programmes often involve irregular schedules, remote modules, and extended periods of workplace training, reducing daily interaction with classmates and limiting opportunities to form stable peer relationships. As students spend more time away from peers and in adult-dominated work environments, feelings of loneliness may accumulate more persistently. In contrast, general upper secondary students typically spend more time on-site with peers, even if their class compositions shift due to course selections. This more continuous peer and teacher presence may help explain why general students' loneliness does not continue to rise as strongly over time.

School connectedness, however, declined in both groups. For general school students, a steady erosion of connectedness was observed, with significant differences emerging between the first and second waves and also, between the first and third waves, after which levels remained relatively stable between waves two and three. Among vocational students, the decline was more pronounced, with significant differences noted across all waves, suggesting a sharper and more consistent weakening of ties to school. One possible explanation is that vocational students may experience less continuity in teacher and instructor relationships, which can weaken their sense of belonging over time, as strong and caring teacher–student relationships are known to promote school connectedness and buffer against negative peer influences (McNeely & Falci, 2004).

In summary, these trends highlighted that vocational students were particularly vulnerable to growing loneliness, while general school students experienced a clearer

decline in ASE. This pattern underscores that different psychosocial dimensions are at risk depending on school type. This aligns with previous research, which associated heightened loneliness and diminished school connectedness with lower levels of ASE (Grøtan et al., 2019; Zeinalipour, 2022).

The second aim of the present study was to examine whether general and vocational school students differed in how loneliness and school connectedness associated with ASE. Loneliness consistently exhibited the strongest negative association with ASE across all models, and this pattern remained consistent regardless of school type. This finding supports existing evidence, which shows that a sense of belonging is intrinsically linked to academic confidence (Brown & Evans, 2002). Correspondingly, the present study's moderation analyses indicated that the positive effect of school connectedness was stronger in vocational schools, suggesting that robust school connectedness may function as a protective buffer within these environments. The vocational pathways, with their focus on practical, tangible tasks, may inherently foster stronger ASE beliefs, whereas general education's emphasis on abstract, theoretical content may heighten students' vulnerability to stress and potentially lower their ASE. These differences between school tracks likely reflect structural and pedagogical features not fully captured by the present models.

Among general school students, ASE declined significantly and remained lower even after accounting for socioemotional factors such as loneliness and school connectedness, indicating that other mechanisms may contribute to this trajectory. It is possible that factors such as peer comparison, academic pressure and performance anxiety create environments with limited opportunities for successful accomplishments, thereby weakening the development of ASE (Bandura, 1997). Moreover, research indicates that authoritative school environments, those that combine robust support systems with clear structure, are linked to stronger ASE and lower stress levels (Wong et al., 2021). However, considerable freedom in course selection in general upper secondary schools can fragment peer groups and reduce class stability, potentially weakening perceived support and contributing to the stronger decline in ASE. These findings align with prior work emphasising the role of a supportive school structures in adolescents' social integration and ASE (Allen et al., 2018; Eccles & Roeser, 2011).

These structural features of schooling may increase feelings of loneliness and weaken students' sense of connectedness, both of which are central to adolescent wellbeing and academic success (Allen et al., 2018; Eccles & Roeser, 2011). Declines in school connectedness suggest fewer opportunities for vital peer and teacher support, outcomes that are associated with lower competence, reduced motivation and heightened health risks (Wilkins et al., 2023). Conversely, environments that foster a strong sense of belonging and emotional safety are associated with higher ASE, greater life satisfaction and lower rates of victimisation (Castelli & Marcionetti, 2024).

6.1 Practical implications and future studies

This study examined key psychosocial challenges faced by adolescents, immediately following the transition from lower to upper secondary education, by analysing longi-

tudinal associations between ASE, loneliness and school connectedness. The findings highlight that the transition reshapes students' ASE, social relationships and school connectedness. ASE may be shaped by broader support structures available at schools. In the context of evolving school environments, such as recent reductions in teaching hours and resources in Finnish vocational education, relational supports may become more fragile. Such changes could increase students' vulnerability to loneliness and weaken their sense of school connectedness, with potential implications for ASE.

Strengthening school connectedness, fostering positive peer relationships, and reducing loneliness appear especially important for supporting vocational school students' ASE (Allen et al., 2018; Castelli & Marcionetti, 2024). Relational structures that promote emotional safety, inclusive peer interactions, and positive teacher–student relationships may help mitigate the emotional and academic consequences of loneliness. Tailored support strategies that reflect the distinct needs of different school types are recommended (Cheng et al., 2023; Finnish National Agency for Education, 2021). For general education student, ASE-focused study load management and structured support within technology-enabled learning environments may be beneficial (Wei et al., 2022). Interventions such as peer cooperative learning (Liu & Ye, 2025) and relational pedagogy (Jederlund & Von Rosen, 2023) may strengthen ASE, reduce loneliness, and enhance school connectedness across educational settings.

Although previous studies have examined loneliness and school connectedness separately, their combined impact on ASE deserves more attention. Further studies should investigate how declines in ASE can be prevented during this transition period. Cross-national comparisons would be valuable, given that the upper secondary education transitions occur at similar ages across countries (Organisation for Economic Co-operation and Development [OECD], 2025). To better capture latent constructs and reduce measurement error, rigorous designs, including controlled studies, mixed-method approaches and structural equation modelling, are recommended. Specifically, mixed-method approaches could deepen understanding of students' subjective experiences. Finally, more longitudinal research is required to examine how developmental stages and various school-level factors influence ASE, loneliness and school connectedness over time.

6.2 Strengths and limitations

A key strength of this study is its longitudinal design, which enabled the examination of within-individual changes over time. This approach offered valuable insights into how loneliness, school connectedness and ASE are interrelated and how these associations evolve, providing a more nuanced understanding than cross-sectional data. The use of validated scales further strengthens the reliability of the findings. While the data were drawn specifically from a Finnish context, the findings inform a broader understanding of how institutional environments relate to ASE, loneliness and school connectedness, and the mechanisms identified may be applicable across educational systems with comparable social structures. Several limitations should also be acknowledged. Although the fixed-effect model efficiently controlled for all time-invariant individual characteristics, such as gender, ethnicity and parental education, it could not account for unmeasured time-varying factors, including changes in parental support or behavioural issues. Furthermore, the reliance on self-report

measures may introduce response bias, and the absence of a control group limits the ability to draw definitive causal inferences.

7 Conclusion

This study demonstrated a significant association between ASE, loneliness and school connectedness among upper secondary school students. The link between ASE and school connectedness was stronger in vocational pathways, where changes in both school connectedness and loneliness largely explained the observed decline in ASE within that cohort. In general upper secondary schools, however, ASE decline persisted even after accounting for these social factors, pointing to the influence of other variables such as heightened academic demands or pressure. Overall, the findings provide longitudinal evidence that ASE trajectories are intrinsically related to social contexts, highlighting the need for educators and administrators to implement tailored support systems that address both the socioemotional and academic dimensions unique to each educational stream during this critical transition phase.

Appendix 1: Conceptual model of the three-wave panel model and tested interaction effects

See Fig. 2.

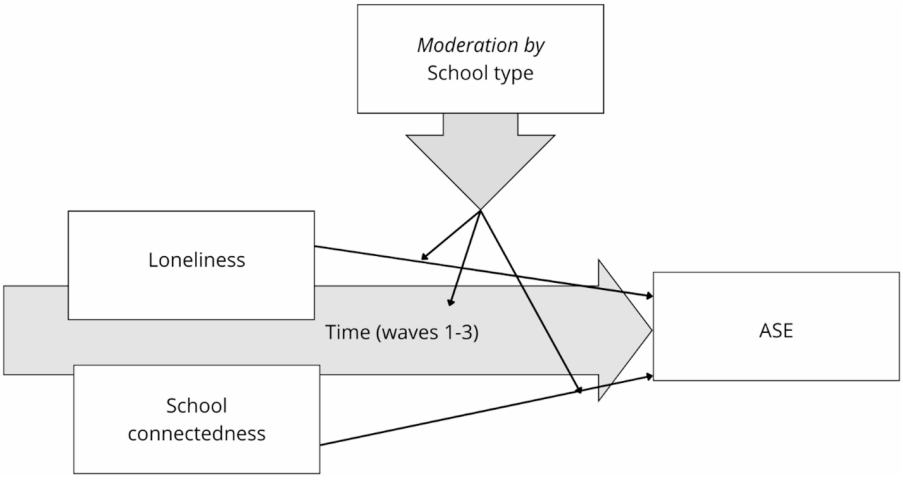

Fig. 2 The conceptual model and the tested interaction effects across the three-wave longitudinal study. Loneliness, school connectedness, and academic self-efficacy were measured at three time points (Waves 1–3), corresponding to the first three semesters of upper secondary education. The model focuses on within-individual change over time. Interaction terms were used to test differences between school types in the development of ASE over time and in the associations between loneliness and ASE as we as school connectedness and ASE

Appendix 2: Description of measures and response scales

Items	Answer options
I'm certain I can master the skills taught in class this year	1 = 'Not at all true'
I'm certain I can figure out how to do the most difficult class work	2 = 'Somewhat disagree'
I can do almost all the work in class if I don't give up	3 = 'Somewhat true'
Even if the work is hard, I can learn it	4 = 'Mostly agree'
I can do the hardest work in this class if I try	5 = 'Very true'
I feel like a part of a friend group	1 = 'Not at all accurate'
I have a lot in common with people around me	2 = 'A little accurate'
I feel I have been left out	3 = 'Pretty accurate'
I feel isolated from other people	4 = 'Exactly accurate'
I find company when I want	
I feel bad that I'm so isolated	
I'm not close to anyone anymore	
My relationships are shallow	
There are people who I feel close to	
Nobody really knows me very well	
There are people who truly understand me	
There are people who I can talk to	
I perceive this school's people close to me	1 = 'Not at all true'
I feel like I belong to the school community	2 = 'Somewhat disagree'
I feel safe in this school	3 = 'Somewhat true'
I am happy that I can go to this school	4 = 'Mostly agree'
My school teachers treat students fairly	5 = 'Very true'

[a]Academic self-efficacy scale (Mingley et al., 2000); [b]Loneliness scale (Finnish version of the UCLA-loneliness scale; Junttila et al., 2013; Russell et al., 1980); [c]School connectedness scale (Furlong et al., 2011)

Author contributions PS performed the statistical analyses and drafted the manuscript. MT contributed to drafting the manuscript and provided supervision. TT authorised the use of data and participated in drafting the manuscript. EKJ supervised the work, reviewed the manuscript, and verified the statistical analyses. All authors read and approved the final manuscript.

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Data availability The fully anonymised dataset is available from the third author, and model samples from the fourth author upon reasonable request.

Declarations

Conflict of interest The authors declare no conflicts of interest.

Ethical approval and consent to participate The procedure followed the ethical standards of Finnish National Board of Research Integrity (TENK, National Advisory Board on Research Ethics 2009) and the Finnish Personal Data Act (523/1999). The data collection procedure was consistent with the Finnish Human Subjects Protection regulations. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments. The study has been evaluated and approved by the Ethics Committee for Human Sciences of the University of Turku. Informed consent was obtained from all the participants.

Use of AI technologies The authors used generative AI tools for language editing. All content was reviewed and approved by the authors.

References

Allen, K. A., & Boyle, C. (Eds.). (2018). *Pathways to belonging: Contemporary research in school belonging*. BRILL. https://doi.org/10.1163/9789004386969

Allen, K., Kern, M. L., Vella-Brodrick, D., Hattie, J., & Waters, L. (2018). What schools need to know about fostering school belonging: A meta-analysis. *Educational Psychology Review*, *30*(1), 1–34. https://doi.org/10.1007/s10648-016-9389-8

Andreß, H. J., Golsch, K., & Schmidt, A. W. (2013). *Applied panel data analysis for economic and social surveys*. Springer. https://doi.org/10.1007/978-3-642-32914-2

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.

Bandura, A. (2012). On the functional properties of perceived self-efficacy revisited. *Journal of Management*, *38*(1), 9–44. https://doi.org/10.1177/0149206311410606

Beattie, M., Kiuru, N., & Salmela-Aro, K. (2025). Belongingness to groups, adolescent loneliness trajectories, and their consequences. *International Journal of Behavioral Development, 49*(3), 240–251. https://doi.org/10.1177/01650254241294019

Bond, L., Butler, H., Thomas, L., Carlin, J., Glover, S., Bowes, G., & Patton, G. (2007). Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes. *Journal of Adolescent Health, 40*(4), 357e9–357e18. https://doi.org/10.1016/j.jadohealth.2006.10.013

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review*, *15*, 1–40. https://doi.org/10.1023/A:1021302408382

Brown, R., & Evans, W. P. (2002). Extracurricular activity and ethnicity: Creating greater school connection among diverse student populations. *Urban Education, 37*(1), 41–58. https://doi.org/10.1177/0042085902371004

Burnell, K., Trekels, J., Prinstein, M. J., & Telzer, E. H. (2024). Adolescents' social comparison on social media: Links with momentary self-evaluations. *Affective Science*, *5*(4), 295–299. https://doi.org/10.1007/s42761-024-00240-6

Castelli, L., & Marcionetti, J. (2024). Life satisfaction and school experience in adolescence: The impact of school supportiveness, peer belonging and the role of academic self-efficacy and victimization. *Cogent Education*. https://doi.org/10.1080/2331186x.2024.2338016

Centers for Disease Control and Prevention. (2009). *School connectedness: Strategies for increasing protective factors among youth*. U.S. Department of Health and Human Services. https://stacks.cdc.gov/view/cdc/5767/cdc_5767_DS1.pdf

Cheng, M., Barnes, G., Edwards, C., Valyrakis, M., & Corduneanu, R. (2023). *Key Transition skills and strategies at the different transition points: Report*. The Quality Assurance Agency for Higher Education (QAA Scotland). https://www.enhancementthemes.ac.uk/explore-the-enhancement-themes/student-transitions/transition-skills-and-strategies

Diehl, K., Jansen, C., Ishchanova, K., & Hilger-Kolb, J. (2018). Loneliness at universities: Determinants of emotional and social loneliness among students. *International Journal of Environmental Research and Public Health*, *15*(9), 1865. https://doi.org/10.3390/ijerph15091865

Diggs, D., Deniz, E., & Toseeb, U. (2025). School connectedness as a protective factor between childhood adversity and adolescent mental health outcomes. *Development and Psychopathology*, *37*(3), 1355–1373. https://doi.org/10.1017/S0954579424001184

Eccles, J. S., & Roeser, R. W. (2011). Schools as developmental contexts during adolescence. *Journal of Research on Adolescence*, *21*(1), 225–241. https://doi.org/10.1111/j.1532-7795.2010.00725.x

Eccles, A. M., Qualter, P., Madsen, K. R., & Holstein, B. E. (2023). Loneliness and scholastic self-beliefs among adolescents: A population-based survey. *Scandinavian Journal of Educational Research*, *67*(1), 97–112. https://doi.org/10.1080/00313831.2021.1983865

Elias, S. M., & MacDonald, S. (2007). Using past performance, proxy efficacy, and academic self-efficacy to predict college performance. *Journal of Applied Social Psychology*, *37*(11), 2518–2531. https://doi.org/10.1111/j.1559-1816.2007.00268.x

Finnish National Agency for Education. (2021). *Education system: General upper secondary education (National Core Curricula of 2019).* Finnish National Agency for Education. https://www.oph.fi/en/education-system/general-upper-secondary-education

Finnish Institute for Health and Welfare. (2025, September 17). *Kouluterveyskyselyn Tulospalvelu: Results service for the School Health Survey.* https://raportointi.thl.fi/t/public/views/KTK_public_fi/Etusivu

Furlong, M. J., O'Brennan, L. M., & You, S. (2011). Psychometric properties of the Add Health School Connectedness Scale for 18 sociocultural groups. *Psychology in the Schools*, *48*(10), 986–997. https://doi.org/10.1002/pits.20609

Graham, J., Taylor, B., Olchowski, A., & Cumsille, P. (2006). Planned missing data designs in psychological research. *Psychological Methods*, *11*(4), 323–343. https://doi.org/10.1037/1082-989X.11.4.323

Grøtan, K., Sund, E. R., & Bjerkeset, O. (2019). Mental health, academic self-efficacy and study progress among college students—The SHoT study, Norway. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2019.00045

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, *46*(6), 1251. https://doi.org/10.2307/1913827

Herkama, S., Turunen, T., Sandman, N., & Salmivalli, C. (2019). Sleeping problems partly mediate the association between victimization and depression among youth. *Journal of Child and Family Studies*, *28*(9), 2477–2486. https://doi.org/10.1007/s10826-018-1249-3

Honicke, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. *Educational Research Review*, *17*, 63–84. https://doi.org/10.1016/j.edurev.2015.11.002

Honicke, T., Broadbent, J., & Fuller-Tyszkiewicz, M. (2023). The self-efficacy and academic performance reciprocal relationship: The influence of task difficulty and baseline achievement on learner trajectory. *Higher Education Research & Development*, *42*(8), 1936–1953. https://doi.org/10.1080/07294360.2023.2197194

Jederlund, U., & Von Rosen, T. (2023). Teacher–student relationships and students' self-efficacy beliefs: Rationale, validation and further potential of two instruments. *Education Inquiry*, *14*(4), 529–553. https://doi.org/10.1080/20004508.2022.2073053

Junttila, N., & Karlsson, L. (2024). *Yksinäisyys* [Loneliness] Duodecim. *Terveyskirjasto*. https://www.terveyskirjasto.fi/dlk01408

Junttila, N., Ahlqvist-Björkroth, S., Aromaa, M., Rautava, P., Piha, J., Vauras, M., Lagström, H., & Räihä, H. (2013). Mothers' and fathers' loneliness during pregnancy, infancy, and toddlerhood. *Psychology and Education*, *50*, 98–104.

Kilpi-Jakonen, E., Erola, J., & Karhula, A. (2016). Inequalities in the haven of equality? Upper secondary education and entry into tertiary education in Finland. In H. P. Blossfeld, S. Buchholz, J. Skopek, & M. Triventi (Eds.), *Models of secondary education and social inequality* (pp. 181–196). Edward Elgar Publishing. https://doi.org/10.4337/9781785367267.00021

Kirjavainen, T., Jahnukainen, M., & Pulkkinen, J. (2013). *Perusopetuksen erityisoppilaiden toisen asteen opinnot* [Upper secondary studies of special needs pupils in basic education] (Tuloksellisuustarkastus). Valtiontalouden tarkastusvirasto. https://vtv.fi/wp-content/uploads/2025/08/tyopaperi-perusopetuksen-erityisoppilaiden-toisen-asteen-opinnot.pdf

Kiuru, N., Wang, M., Salmela-Aro, K., Kannas, L., Ahonen, T., & Hirvonen, R. (2020). Associations between adolescents' interpersonal relationships, school well-being, and academic achievement during educational transitions. *Journal of Youth and Adolescence*, *49*(5), 1057–1072. https://doi.org/10.1007/s10964-019-01184-y

Kiuru, N., Salmela-Aro, K., Laursen, B., Vasalampi, K., Beattie, M., Tunkkari, M., & Junttila, N. (2024). Profiles of loneliness and ostracism during adolescence: Consequences, antecedents, and protective factors. *Child Psychiatry & Human Development*. https://doi.org/10.1007/s10578-024-01664-8

Klassen, R. M., & Usher, E. L. (2010). Self-efficacy in educational settings: Recent research and emerging directions. In T. C. Urdan, & S. A. Karabenick (Eds.), *Advances in motivation and achievement* (Vol. 16, pp. 1–33). Emerald Group Publishing. 10.1108/S0749-7423(2010)000016A004

Kumlander, S., Lahtinen, O., Turunen, T., & Salmivalli, C. (2018). Two is more valid than one, but is six even better? The factor structure of the Self-Compassion Scale (SCS). *PLoS ONE*, *13*(12), e0207706. https://doi.org/10.1371/journal.pone.0207706

Lei, W., Wang, X., Dai, D. Y., Guo, X., Xiang, S., & Hu, W. (2022). Academic self-efficacy and academic performance among high school students: A moderated mediation model of academic buoyancy and social support. *Psychology in the Schools*, *59*(5), 885–899. https://doi.org/10.1002/pits.22653

Leigh-Hunt, N., Bagguley, D., Bash, K., Turner, V., Turnbull, S., Valtorta, N., & Caan, W. (2017). An overview of systematic reviews on the public health consequences of social isolation and loneliness. *Public Health*, *152*, 157–171. https://doi.org/10.1016/j.puhe.2017.07.035

Lenz, B. (2001). The transition from adolescence to young adulthood: A theoretical perspective. *The Journal of School Nursing, 17*(6), 300–306. https://doi.org/10.1177/10598405010170060401

Lester, L., Waters, S., & Cross, D. (2023). The relationship between school connectedness and mental health during the transition to secondary school: A path analysis. *Australian Journal of Guidance and Counselling*. https://doi.org/10.1017/jgc.2013.20

Libbey, H. P. (2004). Measuring student relationships to school: Attachment, bonding, connectedness, and engagement. *Journal of School Health*, *74*(7), 274–283. https://doi.org/10.1111/j.1746-1561.2004.tb08284.x

Little, T. D., & Rhemtulla, M. (2013). Planned missing data designs for developmental researchers. *Child Development Perspectives*, *7*(4), 199–204. https://doi.org/10.1111/cdep.12043

Liu, Y., & Ye, Y. (2025). Exploring how group cooperative learning affect college students' online self-regulated learning: The important role of socially shared regulation, perceived task value, and teacher support. *European Journal of Psychology of Education*, *40*(1), 11. https://doi.org/10.1007/s10212-024-00911-9

Lyyra, N., Thorsteinsson, E. B., Eriksson, C., Madsen, K. R., Tolvanen, A., Löfstedt, P., & Välimaa, R. (2021). The association between loneliness, mental well-being, and self-esteem among adolescents in four Nordic countries. *International Journal of Environmental Research and Public Health*, *18*(14), 7405. https://doi.org/10.3390/ijerph18147405

Lyyra, N., Junttila, N., Tynjälä, J., Villberg, J., & Välimaa, R. (2022). Loneliness, subjective health complaints, and medicine use among Finnish adolescents 2006–2018. *Scandinavian Journal of Public Health*, *50*(8), 1097–1104. https://doi.org/10.1177/14034948221117970

McNeely, C., & Falci, C. (2004). School connectedness and the transition into and out of health-risk behavior among adolescents: A comparison of social belonging and teacher support. *Journal of School Health*, *74*(7), 284–292. https://doi.org/10.1111/j.1746-1561.2004.tb08285.x

Meng, Q., & Zhang, Q. (2023). The influence of academic self-efficacy on university students' academic performance: The mediating effect of academic engagement. *Sustainability*, *15*(7), 5767. https://doi.org/10.3390/su15075767

Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology*, *93*(1), 77–86. https://doi.org/10.1037/0022-0663.93.1.77

Mingley, C., Maehr, M., Hruda, L., Anderman, E., Anderman, L. H., Freeman, K., Gheen, M., Kaplan, A., Kumar, R., Middleton, M., Nelson, J., Roeser, R., & Urdan, T. (2000). *Manual for the patterns of adaptive learning scales*. University of Michigan.

Ministry of Education and Culture. (2025). *The Finnish educational system*. Ministry of Education and Culture. https://okm.fi/en/education-system

OECD. (2025). *Education at a Glance 2025: OECD Indicators*. OECD. https://doi.org/10.1787/1c0d9c79-en

Pérez-Marco, M., Gonzálvez, C., Fuster-Rico, A., Vicent, M., Fernández-Sogorb, A., & Aparicio-Flores, M. D. P. (2024). Adolescent school refusal and academic self-efficacy: A latent profile and regression analysis. *Psychology in the Schools*, *61*(10), 4041–4056. https://doi.org/10.1002/pits.23263

Pinquart, M., Juang, L. P., & Silbereisen, R. K. (2003). Self-efficacy and successful school-to-work transition: A longitudinal study. *Journal of Vocational Behavior*, *63*(3), 329–346. https://doi.org/10.1016/S0001-8791(02)00031-3

Qualter, P., Vanhalst, J., Nowland, R., Roekel, E., Lodder, G., Bangee, M., Maes, M., & Verhagen, M. (2015). Loneliness across the life span. *Perspectives on Psychological Science*, *10*, 250–264. https://doi.org/10.1177/1745691615568999

Raniti, M., Rakesh, D., Patton, G. C., & Sawyer, S. M. (2022). The role of school connectedness in the prevention of youth depression and anxiety: A systematic review with youth consultation. *Bmc Public Health*, *22*(1), 2152. https://doi.org/10.1186/s12889-022-14364-6

Read, S., Salmela-Aro, K., Kiuru, N., Helenius, J., & Junttila, N. (2024). The cohort trends of social connectedness in secondary school students in Finland between 2017 and 2021. *PLOS ONE*, *19*(10), e0312579. https://doi.org/10.1371/journal.pone.0312579

Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., Tabor, J., Beuhring, T., Sieving, R. E., Shew, M., Ireland, M., Bearinger, L. H., & Udry, J. R. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *Journal Of The American Medical Association*, *278*(10), 823–832. https://doi.org/10.1001/jama.1997.03550100049038

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, *130*(2), 261–288. https://doi.org/10.1037/0033-2909.130.2.261

Russell, D., Peplau, L., & Cutrona, C. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology*, *39*(3), 472–480. https://doi.org/10.1037/0022-3514.39.3.472

Schnepf, S. V., Boldrini, M., & Blaskó, Z. (2023). Adolescents' loneliness in European schools: A multilevel exploration of school environment and individual factors. *Bmc Public Health*, *23*(1), 1917. https://doi.org/10.1186/s12889-023-16797-z

Smyth, E. (2016). Social relationships and the transition to secondary education. *The Economic and Social Review*, *47*(4), 451–476.

Steiner, R. J., Sheremenko, G., Lesesne, C., Dittus, P. J., Sieving, R. E., & Ethier, K. A. (2019). Adolescent connectedness and adult health outcomes. *Pediatrics*, *144*(1), e20183766. https://doi.org/10.1542/peds.2018-3766

Stevens, J., Kartel, J., Schoenherr, H., & Fontenot, K. (2024). Understanding loneliness in college students. *Psi Beta Research Journal - Brief Reports*, *4*(1), 18–24. https://doi.org/10.54581/NPWV4206

Supervía, U. P., Bordás, S. C., & Robres, Q. A. (2022). The mediating role of self-efficacy in the relationship between resilience and academic performance in adolescence. *Learning and Motivation*, *78*, 101814. https://doi.org/10.1016/j.lmot.2022.101814

Waters, S., Cross, D., & Shaw, T. (2010). Does the nature of schools matter? An exploration of selected school ecology factors on adolescent perceptions of school connectedness. *British Journal of Educational Psychology*, *80*(3), 381–402. https://doi.org/10.1348/000709909X484479

Wei, Y., Shi, Y., MacLeod, J., & Yang, H. H. (2022). Exploring the factors that influence college students' academic self-efficacy in blended learning: A study from the personal, interpersonal, and environmental perspectives. *SAGE Open*, *12*(2), 1–12. https://doi.org/10.1177/21582440221104815

Wilkins, N., Krause, K. H., Verlenden, J. V., Szucs, L. E., Ussery, E. N., Allen, C. T., Stinson, J., Michael, S. L., & Ethier, K. A. (2023). School connectedness and risk behaviors and experiences among high school students—Youth Risk Behavior Survey, United States, 2021. *MMWR Supplements*, *72*(1), 13–21. https://doi.org/10.15585/mmwr.su7201a2

Wong, M. D., Dosanjh, K. K., Jackson, N. J., Rünger, D., & Dudovitz, R. N. (2021). The longitudinal relationship of school climate with adolescent social and emotional health. *Bmc Public Health*. https://doi.org/10.1186/s12889-021-10245-6

Zeinalipour, H. (2022). School connectedness, academic self-efficacy, and academic performance: Mediating role of hope. *Psychological Reports*, *125*(4), 2052–2068. https://doi.org/10.1177/00332941211006926

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