



Completion of upper secondary education: Predictions of the psychosocial learning environment and academic achievement

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ABSTRACT

Background: Lack of upper secondary school completion (dropout) is a serious concern. Psychosocial factors of the learning environment, such as perceived emotional support from teachers and loneliness among peers remain largely unstudied as predictors of completion.

Aims: The main aim of this five-year longitudinal study was to investigate whether psychosocial learning environment factors experienced early in upper secondary school contribute to the likelihood of school completion; either directly, or indirectly via academic achievement.

Sample: Participants were 1241 upper secondary school students in Norway.

Methods: A longitudinal panel design combining register data and student self-reports was implemented. Register data included GPA from the end of lower secondary school, GPA from the end of first year of upper secondary school, and upper secondary school completion. Self-reports included perception of emotional support from teachers and loneliness among peers in the first year of upper secondary school. Control variables were gender, study track, and immigrant background. A structural equation model with completion (vs. dropout) as the outcome was estimated in Mplus.

Results: An indirect positive effect on completion was found for emotional support from teachers, mediated by subsequent academic achievement. A direct negative effect on completion was found for loneliness among peers. Among students with pronounced loneliness, completion rate was 10 percentage points lower than among those reporting no loneliness.

Conclusions: Loneliness among peers was identified as a substantial risk factor for school dropout. On the other hand, findings indicate that sufficient perceived emotional support from teachers can promote completion.

1. Introduction

Having a formal certification from upper secondary education benefits both the individual and society, and accordingly, increased completion rates are continuously high on the political agenda. In Norway, these rates have shown a modestly positive trend over the last five years; however, twenty percent of youths starting in upper secondary education have not attained a formal certification within five or six years of entering the upper secondary system (Statistics Norway, 2022). Non-completion (hereafter, “dropout”) is particularly high in vocational upper secondary programs. Although Norway has a relatively low share of NEETS¹ and low non-employment rates compared to many other Western countries, lack of upper secondary completion is a particular risk for NEET status in Norway (OECD, 2018). An improved understanding of how to prevent dropout from upper secondary

education is thus crucial.

Several studies have attested the predictive role of previous academic achievement for school completion (Gubbels, van der Put, & Assink, 2019), and for upper secondary school completion, this is typically analyzed based on grades achieved by the end of compulsory school (e.g., Markussen, Frøseth, & Sandberg, 2011). In fact, previous academic achievement has repeatedly been identified as the single most important factor for school completion (Battin-Pearson et al., 2000; Dæhlen, 2017; Markussen et al., 2011). Nonetheless, dropout risk is recognized to be complex (Gubbels et al., 2019; Rumberger, 2011), also involving psychosocial factors in school (Krane, Karlsson, Ness, & Kim, 2016; Ripamonti, 2018; Tvedt, Bru, Idsoe, & Niemiec, 2021; Virtanen, Vasalampi, Lerkkanen, Pelkonen, & Poikkeus, 2022). What remains largely unexplored in rigorous designs however, is how students’ perceptions of the psychosocial learning environment during upper

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¹ NEET status: Young people (aged 15–24) neither in education, employment, or training.

secondary school contribute to the likelihood of actual school completion. Further insight would elucidate this complex process and guide effective intervention strategies.

Therefore, this longitudinal study combines register data pertaining to students' academic achievements (by the end of compulsory school and after the first year of upper secondary school) with students' self-reports of how they perceive the psychosocial learning environment (i. e., emotional support from teachers and loneliness among peers) during the first year of upper secondary school. Emotional support from teachers and loneliness among peers have emerged as two important psychosocial factors in previous research examining students' self-reported dropout intentions (e.g., Frostad, Pijl, & Mjaavatt, 2015; Tvedt, Bru, & Idsoe, 2021). To our knowledge, however, no previous study has tested the prediction of actual completion (vs. dropout). Herein, these factors are investigated as predictors of completion five years after entry to upper secondary school; either direct or indirect via pathways of subsequent academic achievement. Fig. 1 (section 1.3.) illustrates the study's timeline and conceptual model.

Our interest lies in the role that students' early experiences of upper secondary school play (i.e., midway through the first academic year)—that is, after the initial phase of transition but while the students are still new to this educational context. During this early phase, few students have already quit, making it easier to identify early intervention strategies for upper secondary school. Moreover, research from other educational contexts (younger students) has revealed that social experiences during the early phase may particularly affect later outcomes (Hamre & Pianta, 2001).

1.1. The role of academic achievement and psychosocial learning environment in school completion (vs. dropout)

Although considered the single most important predictor of school completion, previous academic achievement fails to explain much of the variance in student completion vs. dropout; correlations between previous academic achievement and completion typically range from $r = .40$ through $r = .54$ (Battin-Pearson et al., 2000; Holen, Waaktaar, & Sagatun, 2018; Virtanen et al., 2022) or to explain between 18% (boys) and 23% (girls) of the variance in dropout risk (Lessard, Poirier, & Fortin, 2010). This has led researchers to broader investigations to unravel the more complex patterns involving psychosocial factors in school that may contribute to the dropout process (Hardre & Reeve, 2003; Krane et al., 2016). Such studies have typically employed students' self-reported dropout intentions rather than their actual behavior as the dependent variable (Frostad et al., 2015; Hardre & Reeve, 2003; Tvedt, Bru, Idsoe, et al., 2021). Nonetheless, these studies lend empirical support to the notion that some aspects of the psychosocial learning environment are particularly salient in a dropout process, including perceived emotional support from teachers and loneliness among peers at school (Frostad et al., 2015; Haugan, Frostad, & Mjaavatt, 2019; Tvedt, Bru, & Idsoe, 2021; Tvedt, Bru, Idsoe, et al., 2021). These aspects were therefore chosen in the present study, which notably expands on earlier studies by including the factual measure of school completion (vs. dropout).

The two psychosocial factors are theorized as aspects of *relatedness* (as in Self-determination theory [SDT]; Ryan & Deci, 2017b) with the two main social agents in school settings; perceived emotional support from teachers represents relatedness with teachers, and loneliness at school represents lack of relatedness with one's peers. Indeed, a recent interview study with young people who left school before graduating highlights that their unmet need for relatedness in school was critical in their narratives regarding the dropout process (Pikkarainen, Kykyri, & Harju-Luukkainen, 2022).

1.1.1. Perceived emotional support from teachers

When students perceive teachers as caring, being available when they need help, and believing in their ability to learn and achieve their

academic goals, this indicates perceived emotional support from teachers (Hofkens & Pianta, 2022; Patrick, Kaplan, & Ryan, 2011). Emotional support from teachers is regarded a key aspect of an educational context that fosters motivation and growth (Ryan & Deci, 2017b) and as a core component of teacher–student relationships (TSR; Hofkens & Pianta, 2022; Wentzel, 2015). Perceived emotional support is known to be strongly associated with other forms of perceived teacher support, including academic support (Bru, Stornes, Munthe, & Thuen, 2010), feedback quality, and autonomy granting (Tvedt, Bru, & Idsoe, 2021).

Numerous studies indicate that, as the affective aspect of TSR, emotional support promotes students' engagement and academic achievement (Roorda, Koomen, Spilt, & Oort, 2011; Roorda, Jak, Zee, Oort, & Koomen, 2017; Tao, Meng, Gao, & Yang, 2022). While older students typically report weaker support from their teachers (Bokhorst, Sumter, & Westenberg, 2010; Bru et al., 2010), evidence suggests that the importance of emotional support is even greater among students in secondary school (Roorda et al., 2011). In a recent study among upper secondary school students that included three different sources of perceived teacher support, emotional support showed the strongest association (negative) with self-reported dropout intentions (Tvedt, Bru, & Idsoe, 2021). Also, among different types of perceived teacher support, emotional support has revealed the strongest association with academic achievement (Tao et al., 2022).

Herein, we investigate the extent to which perceived emotional support from teachers in the first year of upper secondary school might predict successful completion of upper secondary education, potentially via enhanced academic achievement. Previous findings concerning the prospective link between TSR and dropout are mixed: Some quantitative studies using individual-level student reports of TSR have found non-significant predictions (Krane et al., 2016; Virtanen et al., 2022), but students' perceptions of teachers' support during their final year of compulsory school have been identified as indirectly related to school completion via their grades in compulsory school (Holen et al., 2018). Studies investigating the differences in mean TSR between schools report that schools with higher mean TSR levels have lower dropout rates (Krane et al., 2016). Various interview studies (Lessard, Butler-Kisber, Fortin, & Marcotte, 2014; McGrath, 2009; Ramsdal, Bergvik, & Wynn, 2018) have noted that students who drop out have often experienced poorer relationships with their teachers than those who complete school or partially attribute their failure to complete to poor relations with school staff. Taking this together with evidence suggesting that affective TSR promotes academic engagement and achievement (Roorda et al., 2011, 2017; Tao et al., 2022), we hypothesize that perceived emotional support from teachers positively predicts upper secondary completion and that this association primarily operates indirectly via enhanced academic achievement.

1.1.2. Loneliness among peers at school

Loneliness is the subjective and unpleasant experience of a discrepancy between one's desired and actual social relations (Perlman & Peplau, 1981). Our study focuses on loneliness among peers at school, which may be regarded as a lack of perceived relatedness or lack of social inclusion among peers. During the last decade, a worrying increase in school loneliness has been found worldwide (Twenge et al., 2021). From a developmental perspective (Buhrmester, 1990; Steinberg & Morris, 2001), the amplified significance of peer relations in adolescents' lives renders lack of relatedness with peers particularly detrimental. Motivation theories (Juvonen & Knifsend, 2016; Niemiec & Ryan, 2009) propose that the degree to which students experience relatedness with their peers will affect the quality of their academic motivation and thereby their efforts and persistence in learning activities. Lack of support from one's peers is known to be particularly harmful to the degree to which students report academic tasks to be meaningful and relevant (Legault, Green-Demers, & Pelletier, 2006). Indeed, peer relations may be of utmost importance in contemporary classrooms wherein collaborative learning approaches are emphasized

(Gauvain, 2016; Ministry of Education and Research, 2017).

Compared to students' relationships with teachers, the impact of loneliness among peers on academic achievement is less explored. Nonetheless, some studies suggest that loneliness is negatively associated with academic success; applying a longitudinal design, Benner (2011) found that high school students who were chronically or increasingly lonely experienced more academic difficulties, including less favorable academic achievement development. Also, a meta-analysis of school belonging (Korpershoek, Canrinus, Fokkens-Bruinsma, & de Boer, 2020), a concept of which supportive peer relationships is a core element (Craggs & Kelly, 2018), concluded that there is a small positive association between school belonging and academic achievement. Alienation from classmates has shown weak yet inconsistent prediction on subsequent achievement (Morinaj, Hadjar, & Hascher, 2020). Although the abovementioned studies may suggest that loneliness negatively impacts academic achievement, others indicate no such relationship (Juvonen, Nishina, & Graham, 2000), and the conclusion is uncertain (Newsom et al., 2013).

The empirical association between loneliness among peers and dropout intentions has been well documented (Frostad et al., 2015; Haugan et al., 2019), including in longitudinal designs (Tvedt, Bru, Idsoe, et al., 2021). To the best of our knowledge, however, the predictive role of loneliness in actual completion (vs. dropout) has not previously been investigated. Moreover, the mechanisms via which loneliness may lead to dropout remains poorly understood. While previous studies have reported that positive peer relationships can prevent school dropout (Ricard & Pelletier, 2016; Virtanen et al., 2022), these studies did not assess whether academic achievement plays a mediating role in this process.

There are theoretical and empirical reasons to expect that loneliness will predict school dropout, also in a more direct manner than via diminished academic achievement. It has long been recognized that for many students, the pursuit of various social goals at school is equally important as the pursuit of academic goals (Wentzel, 1989). As such, if social goals are not satisfactorily achieved at school, students may seek affiliation in alternative arenas—for example, from peers who have already dropped out, which may contribute to their own decision to drop out (Lessard et al., 2008; Studsrød & Bru, 2011; Vitaro, Larocque, Janosz, & Tremblay, 2001). Moreover, relatedness frustration (i.e., loneliness, Vansteenkiste, Ryan, & Soenens, 2020) is associated with psychological distress (Ryan & Deci, 2017a), which is considered a risk factor for dropping out of school (Melkevik, Nilsen, Evensen, Reneflot, & Mykletun, 2016). Insufficient social inclusion may thus serve as a push-out mechanism that is not primarily driven by impaired academic achievement.

In sum, the mixed results with respect to the association between loneliness and academic achievement alongside the substantial findings regarding the relationship between loneliness on dropout intentions suggest that loneliness among peers is negatively associated with school

completion and that this association may be direct and/or indirect.

1.2. The Norwegian educational context

In Norway, children commence formal schooling the year they turn six, after which they are enrolled in 10 years of compulsory schooling: primary and lower secondary school. While upper secondary education is not compulsory, 98% of adolescents commence upper secondary education immediately after 10th grade (Udir, 2020). All children have a statutory right to attend upper secondary, and they apply to their preferred schools and educational programs based on the grade points they obtain across all subjects at the end of compulsory schooling (after 10th grade). The various upper secondary programs belong to either a vocational or an academic track. Programs in the academic track are three years in duration, whereas most programs in the vocational track entail two years in school plus a further two years in apprenticeship. In the Norwegian educational report system, the assessment point for completion vs. dropout has typically been five years after entry to upper secondary education (Udir, 2020).

1.3. The present study

The main aim of this study was to examine how two core psychosocial factors (perceived emotional support from teachers and loneliness among peers) measured during the first year of upper secondary school contribute to upper secondary completion (vs. dropout). Furthermore, the degree to which academic achievement in upper secondary school mediates any of the relationships between these psychosocial variables and school completion was studied to understand the mechanisms via which these variables function. The two psychosocial variables were investigated in conjunction with previous academic achievement (after 10th grade). While this is a widely recognized and significant explanatory factor for school completion, it was considered informative to assess how much of the variance in school completion it leaves unexplained. The introductory research question (RQ1) directly addresses this issue:

- Research Question 1 To what extent does previous academic achievement (from compulsory school, i.e., 10th grade) predict upper secondary completion (vs. dropout)?
- Research Question 2 To what degree does students' perceived emotional support from teachers in the first year of upper secondary school predict upper secondary completion (vs. dropout), either directly or indirectly via subsequent academic achievement?
- Research Question 3 To what degree does loneliness among peers in the first year of upper secondary school predict upper secondary completion (vs. dropout), either directly or indirectly via subsequent academic achievement?

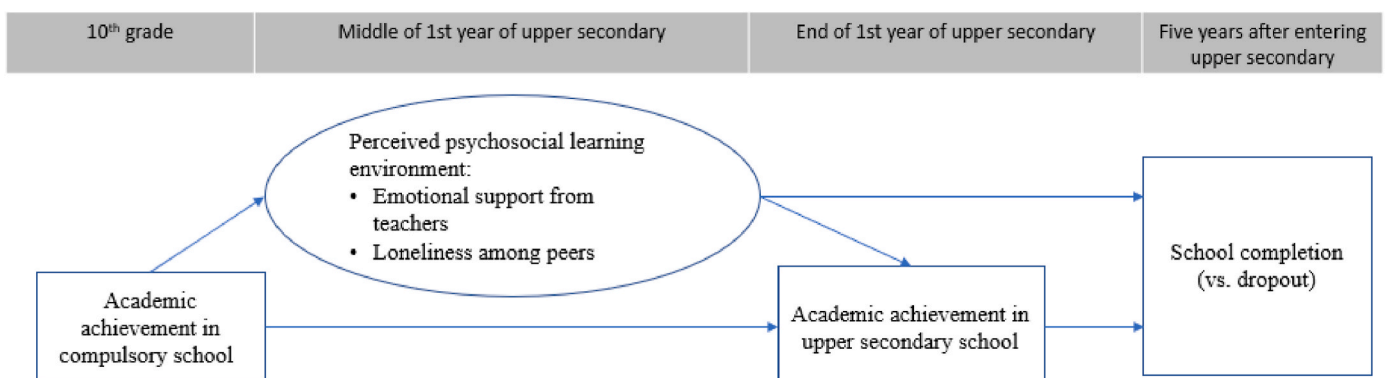


Fig. 1. Timeline and conceptual model.

Based on existing research, we expected previous academic achievement to be a significant predictor of upper secondary school completion. However, we anticipated that both perceived emotional support from teachers and loneliness among peers during the first year of upper secondary school would also contribute significantly to the prediction in a positive and negative direction, respectively. Regarding the mediating role of subsequent academic achievement, a stronger empirical basis emerges for emotional support from teachers than for loneliness among peers. Hence, the association between emotional support and completion was expected to be primarily indirect, whereas the association with loneliness could be both direct and/or indirect. Fig. 1 illustrates the study’s timeline and conceptual model.

Note that the path drawn from previous academic achievement (compulsory school/10th grade) to the psychosocial factors in upper secondary school is based on the premise of time precedence and some empirical indications that associations between the psychosocial learning environment and academic achievement may be reciprocal (Košir & Tement, 2014; Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010). However, this is not a research question in the present study.

2. Method

2.1. Sample and procedure

The sample was recruited from among first-year upper secondary students in the academic year 2016–2017, from seven public upper secondary schools in the southwest of Norway (Rogaland). Students were distributed in 82 classes. The study is part of a larger project (Tvedt, Bru, & Idsoe, 2021; Tvedt, Bru, Idsoe, & Niemiec, 2021; Tvedt, Virtanen, & Bru, 2022) that combines students’ self-reports and register data from the county council, and it is the first study to report analyzes of actual completion vs. dropout. The seven schools from which the students were recruited were purposively selected (Trochim, 2020) to represent the student population in terms of gender, study programs, GPAs from lower secondary school, and residence in urban/rural locations. Ninety percent (N = 1379) of the invited students opted to participate. Students who were repeating the first year of upper secondary school (n = 138) were excluded from the sample since the outcome variable was whether or not students had successfully completed within five years, and these students would have exceeded this duration when the completion data was collected. This sorting generated a study sample of N = 1241, of whom 16.5% did not meet the criteria for successful completion (i.e., “dropouts”), a percentage close to that reported in Rogaland County (16.7%; Statistics Norway, 2022). Table 1 provides an overview of the sample’s characteristics.

Students’ self-reports were collected by means of an electronic survey within a normal classroom setting under their teacher’s supervision. To enable the link between the register data and the survey data, a code was assigned to each participant in the county register, and this code was also assigned to the respective student’s response in the electronic survey setup (SurveyXact). No personally identifying information appeared in the researchers’ files. All procedures to distribute information, ensure consent, and store data complied with ethical standards

Table 1
Characteristics of the sample.

	Dropout subgroup n = 205 (16.5%)	Completion subgroup n = 1036 (83.5%)	Total sample N = 1241
Gender [males]	133 (64.9%)	491 (47.4%)	624 (50.3%)
Study track [vocational]	150 (73.2%)	474 (45.8%)	624 (50.3%)
Immigrant background	52 (25.4%)	134 (12.9%)	186 (15.0%)

and were approved by the Norwegian Centre for Research Data.

2.2. Measures

The psychosocial constructs (perceived emotional support from teachers and loneliness among peers) were assessed with multiple self-report indicators to capture the underlying latent constructs. Although these indicators represent established scales, confirmatory factor analysis results for each scale are reported in the section of each measure. The overall measurement model with all indicators of the two constructs loading on their expected factor only yielded good fit to the data: $\chi^2(42) = 90.356, p < .001$; CFI = .989; TLI = .986; SRMR = .025; RMSEA = .030 (90% CI: 0.022, 0.039), with all standardized factor loadings $\geq .752 (p < .001)$.

2.2.1. Perceived emotional support from teachers

A five-item scale widely used in previous research in both lower and upper secondary schools (e.g., Bru, Stornes, Munthe, & Thuen, 2010; Tvedt, Bru, & Idsoe, 2021) was used to capture students’ individual perceptions of the emotional support received from their teachers. The items cover perceptions of the degree to which they can trust their teachers and the extent to which their teachers care about and have faith in them (e.g., *I feel that my teachers have faith in me; I can trust my teachers*). Responses were made on a 6-point scale (1, *Completely disagree*–6, *Completely agree*). After allowing two residuals to correlate ($r = .472$), as described in previous work (Tvedt et al., 2021), the measurement model showed adequate fit to the data: $\chi^2(4) = 28.623, p < .001$; CFI = .989; TLI = .973; SRMR = .016; RMSEA = .070 (90% CI: 0.048, 0.096). The internal consistency was good ($\alpha = .93$), and a composite score was used for descriptives and bivariate correlations (Table 2).

2.2.2. Loneliness among peers at school

A Norwegian version of the Loneliness and Social Dissatisfaction Questionnaire (Asher & Wheeler, 1985), with six items specified to the school context (e.g., *I have no one to talk to in class; I feel lonely at school*), was used to assess loneliness among peers at school. Several studies conducted in Norwegian upper secondary schools have used this scale (Frostad, Pijl, & Mjaavatn, 2015; Tvedt, Bru, Idsoe, & Niemiec, 2021), which has a 6-point response format (1, *Absolutely not true*–6, *Absolutely true*). The measurement model showed good fit to the data: $\chi^2(9) = 14.717, p = .099$; CFI = .995; TLI = .992; SRMR = .012; RMSEA = .023 (90% CI: 0.000, 0.043). Internal consistency was good ($\alpha = .94$), and a composite score was used for descriptives and bivariate correlations (Table 2).

2.2.3. Academic achievement

Students’ academic achievements were collected at two time points: 1) after compulsory school (10th grade) and 2) after the first academic year in upper secondary school. These data were obtained from the county’s school administration and are unweighted means of achieved grades (range 1–6) across all subjects, following the same procedure at both time points.

2.2.4. School completion vs. dropout

The binary outcome (1 = completion, 0 = dropout) was obtained from the county’s school administration and identified whether or not a student had successfully completed upper secondary education with formal certification five years after entering the upper secondary education system. Formal certification could take the form of certification for higher education (upon successful completion of an academic track) or a journeyman’s certificate (upon successful completion of a vocational track).

2.2.5. Control variables

Gender (0 = male, 1 = female), study track (0 = vocational track, 1 = academic track), and immigrant background (0 = no immigrant

Table 2
Descriptive information and bivariate correlations.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Emotional support from teachers	–							
2. Loneliness among peers	-.20**	–						
3. Academic achievement 10th grade	.07*	-.13**	–					
4. Academic achievement US	.21**	-.07*	.69**	–				
5. Gender	-.05	.02	.29**	.20**	–			
6. Study track	-.08**	-.06*	.56**	.15**	.21**	–		
7. Immigrant background	-.05	.04	-.17**	-.22**	.03	.03	–	
8. Completion (vs. dropout)	.07*	-.14**	.38**	.41**	.13**	.20**	-.13**	–
Mean	4.50	1.47	4.02	4.04	0.50	0.50	0.15	0.83
Standard deviation	1.10	0.94	0.83	0.80	–	–	–	–

Note. * $p < .05$, ** $p < .01$. US = Upper secondary school. Emotional support, loneliness, and academic achievements range 1–6. Gender is coded 0 = male, 1 = female. Study track is coded 0 = vocational and 1 = academic. Immigrant background is coded 0 = no, 1 = yes. Completion is coded 0 = dropout, 1 = completion.

background, 1 = both parents born outside of Norway) were included as control variables in the structural equation model, based on prior documentation that students from immigrant backgrounds and males typically achieve lower academic grades and are overrepresented in dropout statistics. Moreover, dropout rates are higher in vocational tracks (Statistics Norway, 2022).

2.3. Analytic strategy

In an initial phase, measurement models of the latent constructs were evaluated in Mplus (v. 8.10). Model fit was guided by criteria proposed by Hooper, Coughlan, and Mullen (2008), whereby good fit was indicated by CFI and TLI >0.950, SRMR <0.080, and RMSEA <0.070. Composite scores (the mean across items) were created for the two constructs in SPSS (v.28) for descriptive and bivariate analysis.

To address the research questions regarding predictions of school completion, a structural equation model with completion vs. dropout as a binary outcome was estimated in Mplus. The model was specified according to Fig. 1, with the two psychosocial variables and previous academic achievement serving as predictors of school completion, and subsequent academic achievement as a potential mediator. Gender, immigrant background and study track were specified as control variables for each step in the structural model. The maximum likelihood estimation with robust standard errors (MLR) was used to account for non-normal distributions of observed variables (Muthén & Muthén, 1998-2017). None of the included variables had more than 2.3% missing values; however, the full information maximum likelihood (FIML) was used as default in Mplus. Furthermore, given that the dependent variable was categorical, and the continuous intermediate variable had some missing data, the Monte Carlo integration was applied.

The psychosocial variables were assessed to focus on students' perceptions of their individual relationships with teachers and peers, and not theorized as inherent classroom climate measures (Marsh et al., 2012). According to Marsh et al. (2012), contextual effects may still occur, and the nested structure of the data (students nested in classes) instigated an inspection of the intraclass correlations (ICC). Perceived emotional support from teachers yielded an ICC that could have justified a two-level approach (ICC = .125). By contrast, loneliness had very low ICC (0.006). Moreover, since the outcome variable (school completion) yielded only 2% variance at the classroom level after previous academic achievement and the control variables were entered, a two-level approach was not considered appropriate to address the research questions. The complex option in Mplus was applied to account for the nested structure of the data, i.e., adjusting for potential bias in standard errors (McNeish, Stapleton, & Silverman, 2017).

To test the significance of indirect effects, a bias-corrected bootstrap analysis (500 draws) was run to calculate a confidence interval around the estimated effects (MacKinnon, Lockwood, & Williams, 2004). This follow-up analysis was implemented with ML estimation since bootstrapping is not an option with MLR. A likelihood-ratio test was used to

compare the model with only indirect effects from the psychosocial variables with models allowing direct effects onto completion.

3. Results

The bivariate correlations (Table 2) revealed that the two psychosocial variables were weakly associated with school completion in the expected directions. Of the study variables, academic achievement in upper secondary school yielded the strongest bivariate association with school completion.

Regarding the structural equation model, comparison between a model with only indirect effects from the psychosocial variables and a model that allowed a direct effect from loneliness on completion favored the latter ($\Delta D(1) = 7.15, p < .001$). No evidence was found for a direct effect from emotional support ($\Delta D(1) = 0.42, p > .100$). Fig. 2 presents the standardized estimates from the final model.

The direct effect of loneliness on completion was negative ($\beta = -.095, p < .001$), and no significant prediction was found from loneliness to academic achievement in upper secondary school ($\beta = .022, p = .350$). A weak positive prediction was found from perceived emotional support from teachers to academic achievement in upper secondary school ($\beta = .120, p < .001$), and academic achievement in upper secondary substantially predicted school completion ($\beta = .418, p < .001$). Table 3 summarizes the indirect and total effects, as well as odds ratios from the structural equation model.

Given that the odds ratio (OR) deviates from relative risk (RR; here, representing the change in likelihood of completion for one unit increase on the independent variable) when the incidence of an outcome is high, the OR of the psychosocial variable with the direct effect on completion (i.e., loneliness) was converted to RR using the formula given by Zhang and Yu (1998). In this case, the OR of 0.783 corresponded to an RR of 0.961. The prevalence of completion in the group who reported no loneliness (85.4%) was multiplied by 1-RR (0.039), giving a 3.33 percentage point decrease per unit of loneliness in completion probability. Since few students had loneliness scores in the two upper response categories, it was more meaningful to compare the 10% of students with the highest loneliness scores (mean score 3.88) with the group who reported no loneliness (mean score 1). This difference of 2.88 units in loneliness scores between the groups corresponds to an estimated difference of 9.6 percentage points in completion—that is, a 75.8% completion rate among the 10% with the greatest experience of loneliness.

4. Discussion

This study's main aim was to investigate the degree to which perceived emotional support from teachers and loneliness among peers during the first year of upper secondary school contribute to the prediction of upper secondary completion. The findings regarding emotional support from teachers and loneliness among peers are

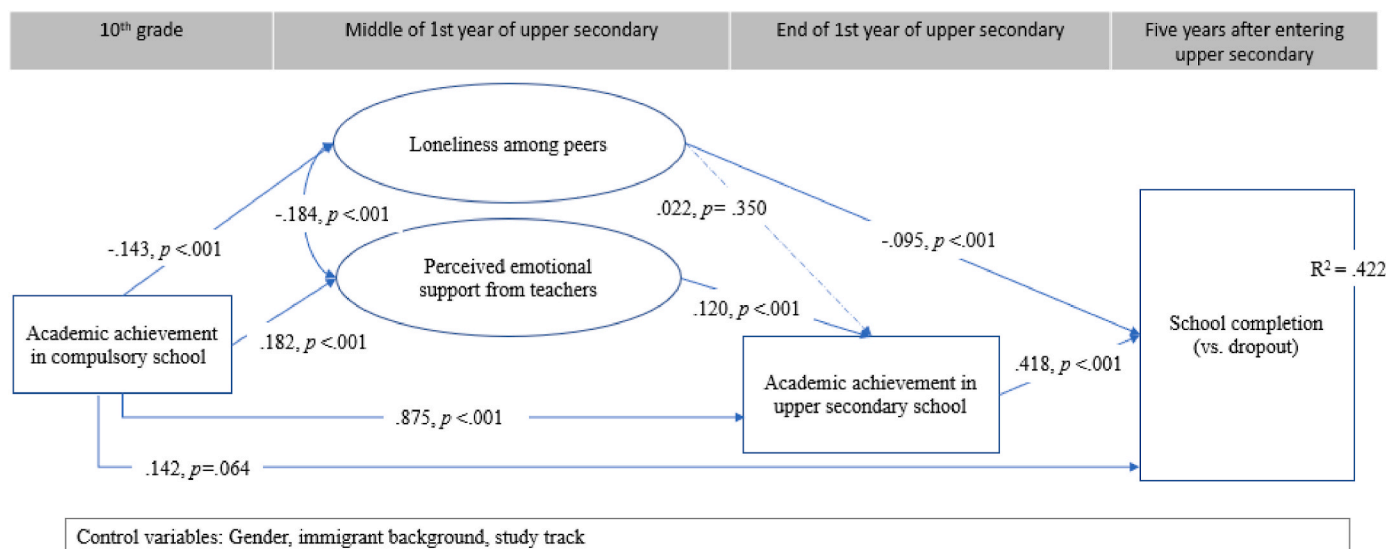


Fig. 2. Standardized estimates from the structural equation model. Note. To increase readability, the figure does not show indicators of the two latent factors.

Table 3 Standardized indirect and total effect estimates, confidence intervals, and odds ratios from the structural equation model with school completion as the outcome.

	Indirect effect (95% CI)	Total effect (95% CI)	Odds ratio (95% CI)
Emotional support from teachers	.050 ($p < .001$) (.029, .077)	.050 ($p < .001$) (.029, .071)	—
Loneliness among peers	.009 ($p = .346$) (-.011, .031)	-.086 ($p < .001$) (-.142, -.030)	0.783 ($p < .001$) (0.680, 0.902)
Academic achievement 10th grade	.387 ($p < .001$) (.298, .525)	.530 ($p < .001$) (.435, .624)	1.503 ($p = .127$) (0.973, 2.321)
Academic achievement US	—	.418 ($p < .001$) (.313, .523)	3.456 ($p < .001$) (2.394, 4.991)

Note. US = Upper secondary school. Emotional support, loneliness, and academic achievements range 1–6. Confidence intervals (95% CI) for the indirect effects are based on a model estimation with bias-corrected bootstrapping.

discussed below; first, some comments on the role of previous academic achievement (by the end of compulsory school, i.e., 10th grade), which was addressed as an introductory research question.

Students' previous academic achievement emerged as the best predictor of completion (Table 3; total effect). The prediction is considered to be moderate to strong, and the variable accounted for 20% of the variance in completion vs. dropout. This aligns with earlier studies and verifies the importance of this factor from previous schooling (Holen et al., 2018; Lessard et al., 2010) while confirming that a substantial degree of variance in school completion remains unexplained.

4.1. Perceived emotional support from teachers as a predictor of school completion

Perceived emotional support from teachers in the first year of upper secondary school yielded a weak significant positive prediction of school completion. This prediction was indirect, mediated by improved academic achievement by the end of the first year of upper secondary school. This mechanism corroborates findings from a study conducted in lower secondary school (Holen et al., 2018) and contributes evidence that these affective ties between teachers and students are also important among older adolescents. Students in upper secondary school are taught by multiple teachers and are subject to greater expectations of individual responsibility; nonetheless, the individual perception of emotional support from teachers seems to matter. First, the positive prediction on academic achievement while accounting for prior academic achievement is noteworthy. While it aligns with theoretical

expectations (Hofkens & Pianta, 2022; Ryan & Deci, 2017b), few studies have empirically tested this relationship in this age group while controlling for previous achievement (Kashy-Rosenbaum et al., 2018; Roorda et al., 2011). The finding speaks for strategies to maximize upper secondary teachers' prerequisites for establishing high-quality relationships with all students.

In statistical terms, however, perceived emotional support's effect on school completion was modest. To this matter, one should keep in mind that students at risk of dropping out may have a long history of poor relationships with teachers (Holen et al., 2018; McGrath, 2009), which can cause them to be skeptical regarding the support they perceive in the new academic setting. This may make it difficult for their teachers to build supportive relationships that really matter in terms of completion. The descriptive statistics for perceived emotional support from teachers suggest that although most students perceive relatively good emotional support, the variation is substantial and signifies potential for improvement for some students. The results also revealed a tendency for students with lower academic achievement from compulsory school to experience less emotional support from teachers than their higher-performing peers, suggesting that the system may fall short of accommodating the students who are most in need.

The modest contribution may also suggest that emotional support, although robustly associated with engagement and learning (Roorda et al., 2017; Tao et al., 2022), needs to be combined with high-quality instructional and organizational support (Hofkens & Pianta, 2022), particularly in subjects that are challenging for students at risk of dropping out. Given that students interact with multiple teachers,

provision of tailored support to those students who really need it requires strong coordination among the staff. A systematic approach, whereby teachers strategically approach students who do not actively seek help themselves and ensure that they have sufficient contact with each student every day may prove beneficial.

4.2. Loneliness among peers as a predictor of school completion

Loneliness among peers at school showed a direct, negative association with completion, reflecting the tendency for lonely students to exhibit increased dropout risk. Results indicated that the probability of completing upper secondary school is reduced by approximately 10 percentage points for the 10% segment who reported the higher levels of loneliness, compared to the students who experienced no loneliness. This estimate corresponds to a 15% vs. a 25% dropout rate respectively, while taking the other variables in the model into account. This represents a considerable increase in dropout. Previous studies examining the role of loneliness in self-reported dropout intentions (Frostdad et al., 2015; Haugan et al., 2019; Tvedt, Bru, Idsoe, et al., 2021) have suggested that loneliness may constitute a potential dropout risk. This present study, the first to link loneliness to actual dropout, substantiates these findings. Considered in tandem with the recent documentation of a marked increase in school loneliness across several countries (Twenge et al., 2021), this highlights that loneliness in upper secondary school is a critical cause for concern.

Interestingly, the longitudinal association between loneliness and completion was *direct*, indicating that academic achievements in upper secondary school have little bearing on this prediction. This is partly at odds with studies suggesting a positive association between aspects of peer relationships and academic achievement (Korpershoek et al., 2020). However, mixed results have been reported from longitudinal designs (Morinaj et al., 2020) and studies measuring loneliness among peers in upper secondary school in relation to subsequent academic achievement are scarce. So, while the current results revealed a tendency that students with lower achievement levels from compulsory school were at greater risk for loneliness in upper secondary school, the mechanism underlying the prospective link from loneliness to dropout seems to relate directly to a sense of social exclusion as a push-out mechanism. This situation of poor peer relations may reinforce students' search for peer affiliation outside school with people who express negative attitudes toward school or have themselves dropped out (Studsrod & Bru, 2011; Vitaro et al., 2001). More knowledge regarding the social and emotional experiences of lonely students in upper secondary school is required—for example, regarding exposure to bullying (Matthews et al., 2022) and emotional distress (Eres, Lim, Lanham, Jillard, & Bates, 2021; Lalayants & Prince, 2015).

Our findings emphasize the need to develop measures that help students to find companionship with peers in upper secondary school, and these efforts should be implemented early in upper secondary school. First, it is important that teachers avail of opportunities to address questions about students' well-being and peer relationships in individual student conversations. Furthermore, the teacher's role in scaffolding collaborative peer work may be important, since the impact of such work may otherwise be less valuable—or even stressful—for students with low social status or skills (Gauvain, 2016). Promising results have been documented for a school-based universal intervention facilitating social relationships between students by assigning them to partnerships early in upper secondary school (Morin, 2021). However, the lack of evidence for effects on loneliness in the longer term advocates an approach that combines more intensive and selective intervention strategies (Morin, 2022).

4.3. Methodological considerations

The combination of register data over a five-year period with students' self-reports represents a strength of this study. The ability to

combine these data relied on a close collaboration with the county's school administration for developing systems to ensure data quality and the respondents' confidentiality. The data combination facilitated this investigation of school completion—an outcome that is high on the political agenda—while recognizing adolescents' subjective perceptions of relatedness with teachers and peers in school. The analyses contribute insights regarding the role of students' psychosocial experiences in a strict methodological approach where other well-known predictors were also included.

The sample size is considered relatively large. Regarding generalizability, however, it should be noted that participants were recruited exclusively from one region in Norway, a region that shows slightly above-average upper secondary completion rates (Statistics Norway, 2022). Nonetheless, apart from Norway's two northernmost counties which clearly deviate with lower completion rates than the rest of the country (Statistics Norway, 2022), variations across the regions are not particularly pronounced. Furthermore, the purposive selection of schools in collaboration with the county's school administration yielded a sample with an appropriate variation in demographics and educational programs. However, international differences among educational systems may nonetheless limit the generalizability of the study's findings to other countries.

The fact that students were asked about their perceptions of emotional support from their teachers *in general* may have reduced some critical variation in this measure. Students' relationships with their different teachers may vary in quality (Roorda, Jorgensen, & Koomen, 2019), and when asked, their responses may have concealed experiences with specific teachers that are of significance for the individual student. Self-report measures are also generally associated with methodological concerns (e.g., response set and social desirability) that should be acknowledged. Nonetheless, the psychosocial constructs are inherently subjective, and the use of well-established scales with multiple indicators strengthens the validity of the investigation.

Finally, although the study included academic achievement at two time points in addition to other well-known predictors of school dropout in combination with the psychosocial variables, a considerable amount of variation in school completion (vs. dropout) remained unexplained. This may reflect unmeasured factors in the school context but may also involve negative life events that impede the accomplishment of educational tasks (Samuel & Burger, 2020). Future investigations should strive to include a broader set of psychosocial and instructional factors in school as well as psychological measures combined with register data.

4.4. Conclusion

This study's most important contribution is the finding that students' experiences during the first year of upper secondary school in terms of perceived emotional support from teachers and loneliness among peers contribute significantly to the likelihood of school completion. While the predictions from these psychosocial variables were weak, the findings suggest a potential in measures targeting the psychosocial learning environment early in upper secondary school to prevent school dropout.

Findings regarding perceived emotional support from teachers indicate some capacity to prevent dropout via enhanced academic achievement. The modest strength of this prediction may indicate that teacher support must be more finely tailored to the needs of at-risk students. Regarding loneliness among peers, a significant direct negative effect on school completion was found, and this was not mediated by subsequent academic achievement. The effect corresponded to a substantial estimated increase in dropout risk from approximately 15% through 25% between students reporting no loneliness and the tenth who reported the highest levels of loneliness. Alongside the evidence of an increasing trend in school loneliness (Twenge et al., 2021), this firmly advocates intervention efforts to prevent loneliness in schools.

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CRedit authorship contribution statement

Maren Stabel Tvedt: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Visualization, Project administration. **Edvin Bru:** Conceptualization, Methodology, Investigation, Writing – review & editing, Project administration.

Declaration of competing interest

None.

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