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Loneliness and Scholastic Self-Beliefs among Adolescents: A Population-based Survey

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ABSTRACT

Loneliness has previously been linked to cognitive and attentional bias, and such biases may have a detrimental impact on perceived scholastic self-beliefs. Little is known about the relationship in school-aged adolescents. The current study examined the association between loneliness and scholastic self-beliefs in a nationally representative Danish sample of adolescents (aged 11-, 13- and 15 years, $n = 3815$, collected in 2014 by the Health Behaviour in School-aged Children study (HBSC)). Through binary logistic regressions, results demonstrated that higher levels of loneliness, measured by a single item and a composite score, were associated with poorer self-reported achievement perception, higher feelings of school dissatisfaction, and greater feelings of school pressure. Results also suggested gender played a moderating role. The current study highlights the importance of loneliness for scholastic self-beliefs, and provides a novel insight by utilising distinct loneliness measures. The implications, in relation to research and practise, are discussed.

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Loneliness; one-item and composite-score of loneliness measurement; HBSC; adolescents; scholastic self-beliefs

Introduction

Addressing potential barriers in educational accomplishment is a key focus of policymakers and researchers (Schuelka et al., 2020) given that educational outcomes during school years can have considerable impact on employment prospects (Wolf, 2011), personal income (Kosik et al., 2018), physical health (Agardh et al., 2011; Huseinovic et al., 2019), and mental wellbeing (Fergusson & Woodward, 2002; Kosik et al., 2018). Research has identified variables that tend to compensate for negative changes in academic functioning that impact educational outcomes, with positive peer relationships having an important beneficial influence (Ford & Smith, 2007; Juvonen, 2007; Wentzel, 2017; Wentzel et al., 2018). However, less is known about the role of peers in the development of academic self-concept and school engagement (Antonopoulou et al., 2019; Bakadorova & Raufelder, 2017), which are closely associated with academic performance (Marsh et al., 2006) and motivational outcomes (Denissen et al., 2007; Wigfield et al., 2015). In order to effectively support adolescents in their scholastic education, it is important to examine how peer relationships, particularly the feeling of disconnection from peers (loneliness), affects adolescent students' scholastic self-beliefs. In the current paper, we explore the association between loneliness and scholastic self-beliefs during adolescence.

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Previous research has demonstrated a strong relationship between positive peer relationships and academic functioning (Ford & Smith, 2007; Juvonen, 2007) measured as academic achievement (Liem et al., 2008) and engagement (Martin & Dowson, 2009). Humans have an innate need to belong (Baumeister & Leary, 1995) and classmates and peers can satisfy that need, by providing support and contributing to a positive sense of self (Baumeister & Leary, 1995). Peers can also foster and encourage achievement related beliefs and behaviours (Martin & Dowson, 2009), resulting in a greater sense of connection and internalisation of motivational beliefs (Liem & Martin, 2011). Whilst the presence of meaningful and fulfilling social connections can have a positive impact on an individual's educational outcomes, it seems likely that a lack of meaningful social connectedness (loneliness) has the opposite effect.

Peers have been shown to play a role in changing scholastic self-beliefs (Antonopoulou et al., 2019; Bakadorova & Raufelder, 2017), but there are few studies; those that are available do not look at the lack of meaningful peer relationships or how loneliness influences scholastic self-beliefs and school engagement. Given that loneliness is accompanied by a negative cognitive bias (Qualter et al., 2015), we might assume that it extends to their self-perceptions of their academic performance. In addition, evidence shows that loneliness increases distraction to focus attention on negative information in the social environment (Qualter et al., 2013), which means a lonely child may pay less attention to academic information within the classroom, missing key learning opportunities because they are distracted by social factors within the classroom environment.

Much of the research examining the relationship between loneliness and educational outcomes has focused on older adolescents who are either college or university students. Within those samples, loneliness had a significant and negative relationship with the student's perceptions of their academic functioning as measured by self-report items (Lin & Huang, 2014; Naqshbandi et al., 2017; Stankovska et al., 2016; Stoliker & Lafreniere, 2015), and had a direct impact on academic motivations resulting in an indirect impact on academic performance (Wohn & LaRose, 2014). Thus, results from studies in older adolescents support the relationship between loneliness and scholastic self-beliefs.

There is limited empirical examination of the associations between loneliness and educational outcomes in school-aged children and adolescents. The existing research shows that among young adolescents', loneliness is negatively, and significantly, related to teacher-rated academic performance (Bayram Özdemir et al., 2017) and school liking (Bayram Özdemir et al., 2017; Gest et al., 2005). Changes in loneliness over the course of the academic year, alongside feelings of victimisation and low self-worth, were shown to predict grade point average and school attendance (Juvonen et al., 2000). The growing body of evidence in school-aged children suggests loneliness could be an important factor when considering a child's school functioning and perceived and objective academic performance.

The peer ecology in the school setting is a microsystem (Bronfenbrenner, 1979), in which youth socialise and influence one another, creating their own peer culture and society. How well youth navigate and adapt to that peer ecology influences how well they adjust to school (Wentzel, 2009). In the current study, we examine the association between scholastic self-beliefs and not feeling a sense of belonging to that peer ecology (loneliness). We acknowledge that peers may be particularly important during adolescence when there are significant changes in peer relationships (Csikszentmihalyi & Larson, 1984) and to the school context (Barber & Olsen, 2004; Simmons & Blyth, 1987), and so we explore the potential implications of loneliness for academic success, exploring whether lonely youth view themselves to be less academic and are less engaged with school than their non-lonely peers.

Measures of Loneliness

A key area of debate within youth loneliness is the choice of measurement. Popular measures of youth loneliness often contain many items, such as the Loneliness and Social Dissatisfaction

scale (Asher & Wheeler, 1985) and the Loneliness and Aloneness Scale for Children and Adolescence (Marcoen & Brumagne, 1985). However, these are lengthy measures, often deemed inappropriate for large, population-based surveys which often measure a number of different constructs. As a result, the shorter UCLA scale (Russell et al., 1980) is often preferred in large surveys and has been revised to include 8 items (Hays & DiMatteo, 1987), 4 items (Russell et al., 1980) and 3 items (Hughes et al., 2004). Large surveys often favour single item measures due to their ease and brevity (Sarstedt & Wilczynski, 2009).

Despite the ease of single item questions, such measures require an individual to identify, and label themselves, as "lonely" and, therefore, carry an element of social stigma (Victor, Grenade, et al., 2005). In the adult literature, previous examinations of the use of single item and composite measures of loneliness demonstrate low levels of classification agreement between the two (Shiovitz-Ezra & Ayalon, 2012; Victor, Grenade, et al., 2005). In a previous study utilising the HBSC Denmark sample (Eccles et al., 2020a), we examined the associations between loneliness and self-reported health complaints using two distinct measures of loneliness – one direct, one indirect. Using data from the same larger sample as presented in the current study, results showed that (1) higher loneliness on both measures of loneliness was associated with poorer health, and (2) children were not consistent in their reporting of loneliness across the two measures, and less likely to be classified as lonely when using the single item if they were male (Eccles et al., 2020a). Because the current study utilises the same data set, we will not examine relationships between the two measures, but will further explore the comparability of the measures when examining important outcomes. Thus, in the current study, we provide a novel examination of how two different measurement tools may be differentially related to scholastic self-beliefs in school-aged children aged 11–15 years. To our knowledge, no other study has examined that to date.

The Importance of Gender and Age

The current study also provides the opportunity to examine the role of age and gender in the association between loneliness and scholastic self-beliefs. Research examining the presence of gender differences in loneliness yields mixed results including girls report higher levels of loneliness than boys (Corsano et al., 2006), boys report higher levels of loneliness than girls (Wols et al., 2015), and also little or no effect of gender (Bossaert et al., 2012; Weeks & Asher, 2012). Considering those mixed findings, it is important to continue examining the presence of gender differences in loneliness and how they may influence the relationship and association with related outcomes, including academic achievement and functioning.

Betts and Rotenberg (2007) demonstrated loneliness was negatively associated with school liking, and the relationship was stronger for girls than boys; that is perhaps because girls see the classroom as a more important source of social support than boys and have higher expectations of school friendships as a result (Chan & Cheng, 2004). It may, therefore, be the case that girls will experience greater effects of loneliness than boys, when looking at scholastic self-beliefs including school satisfaction.

It is also important to consider the role of age, and the HBSC provides the opportunity to examine the associations within three age groups: 11-year olds, 13-year olds, and 15-year olds. There are few population based data-sets that include adolescents of different ages, and even fewer that include measurement of loneliness; those we do have provide the following results: A study of UK adolescents suggested that 15 year olds were significantly more lonely than their younger adolescent peers (Qualter et al., 2021), and the Young Australian Loneliness Survey demonstrated 12–13 year olds and 14–17 year olds were significantly less lonely than those aged 18 years old (Lim et al., 2019). Because adolescents are markedly more sensitive to peer acceptance, rejection, and approval than are children or adults (Foulkes & Blakemore, 2016; Somerville, 2013) they report more experiences of loneliness than those other age groups; given, too, the considerable shifts within the adolescent social structure as youth age, adolescents are at an increased risk of loneliness

as they transition through adolescence due to the considerable social reorientation process that occurs during this time (Goossens, 2018).

Within that process, there is a greater independence from family relationships (Laursen & Hartl, 2013), greater dependence on peer relationships (Larson & Richards, 1991), greater importance on group acceptance (Crone & Dahl, 2012) and increased interest in romantic relationships (Collins et al., 2009; Erikson, 1963). As adolescents develop, these transitions may become more apparent and, therefore, have a greater impact on the feelings of loneliness in those older, compared to younger, adolescents. Thus, it is important to examine the role of age in the experience of loneliness and in relation to important outcomes.

There are other reasons to expect age effects to be evident in the current study. Age is important in the formation of scholastic self-beliefs, with the period until middle adolescence being particularly vulnerable to declines in academic self-concept (Marsh & Hocevar, 1985; Wigfield et al., 1991). That change has been shown to be an effect of transition to high school and the associated shifts in educational contexts (Wigfield et al., 2015). Between middle and late adolescence, scholastic self-beliefs have been shown to be more stable, with far fewer changes (Marsh & Hocevar, 1985).

Current Study

Using self-report data from the Health Behaviour of School-aged Children (HBSC) study from Denmark, we predict there will be a robust association between loneliness and scholastic self-beliefs, and we explore the relationship using two distinct measures of loneliness. Further, the current study explores whether those associations are moderated by age and gender separately.

Method

Participants. The data used in the current study were collected as part of the Health Behaviour in School-aged Children (HBSC) collaborative cross-national survey. The HBSC collects data every four years from adolescents age 11-, 13- and 15-years, from 50 countries and regions across Europe and North America. The current study utilises data from Denmark collected in 2014. This data set was used due to inclusion of two distinct measures of loneliness. The participants were all students in the fifth, seventh, and ninth grade (corresponding to age groups 11-, 13- and 15-years) in a random sample of schools, drawn from a complete list of private and public schools. One hundred and seventy schools were invited to participate, and 48 accepted (participation rate for schools: 28.2%; it is important to note school participation was representative of schools across Denmark). The most common reasons for non-participation were (1) the school had recently participated in a similar health survey, or (2) lack of time and resources caused by the implementation of a major national school reform. The participation rate for students was 85.7%. The current study included 3814 students with complete data on all variables (Age 11: $n = 1104$, 29%; Age 13: $n = 1356$, 35%; Age 15: $n = 1354$, 36%; Demographics are displayed in Table 1 and relationships between variables are presented in Table 2).

Measures

Data were collected through self-completion of the internationally standardised HBSC questionnaire in the classroom (Roberts et al., 2009). In Denmark, the following *loneliness measures* were included in the HBSC questionnaire:

(1) ***Composite Loneliness Score.*** The 4-item UCLA measure (Roberts et al., 1993) includes the following items: *How often do you feel isolated from others? How often do you lack companionship? How often do you feel left out? How often do you miss feeling close to someone*? Participants answered each item using the following scale: *1=Never, 2=Rarely, 3=Sometimes, 4=Often*. In

Table 1. Sample characteristics including demographics, loneliness, and academic outcomes ($N = 3814$).

Gender	Male	1840 (48.2%)
	Female	1974 (51.8%)
Age group (in years)	11	1104 (28.9%)
	13	1356 (35.6%)
	15	1354 (35.5%)
Family Occupational Class	High	1508 (39.5%)
	Medium	1426 (37.4%)
	Low	527 (13.8%)
	Unclassifiable	353 (9.3%)
Family Structure	2 Parents	2839 (74.4%)
	1 Parent	644 (16.9%)
	Reconstructed / Other	331 (8.7%)
Family Affluence Score	Mean (SD) = 15.20 (2.03)	range = 6–19
Loneliness		
4-item Composite	Mean (SD) = 7.95 (2.98)	range = 4–16
	Skewness = .50 (SE = .40)	
	Kurtosis = −.43 (SE = .08)[a]	
Single Item	Mean (SD) = 1.48 (.70)	range = 1–4
	Never	2363 (62.0%)
	Sometimes	1172 (30.7%)
	Often	186 (4.9%)
	Very Often	93 (2.4%)
Scholastic Beliefs		
Academic Perception	Higher than average	2570 (67.4%)
	Average or less	1244 (32.6%)
School Satisfaction	Like school	3249 (85.2%)
	Do not like school	565 (14.8%)
School Pressure	Not pressured	2662 (69.8%)
	Pressured	1152 (30.2%)

[a]The skewness and kurtosis value suggest a slight platykurtic distribution for loneliness scores. BLR is robust against normality violations and therefore was deemed an appropriate analysis choice.

the current sample, the 4-item measure demonstrated high internal reliability ($\alpha = .84$). For each participant, responses on the 4-items were totalled to create a composite loneliness score, with higher scores indicated higher loneliness. Scores ranged from 4 to 16.

(2) ***Single-item measure.*** Participants were also asked "Do you feel lonely?" on the following scale: *4=Never, 3=Sometimes, 2=Often, 1=Very often*. The single-item measure was reverse coded so that a higher score indicated higher loneliness. Scores ranged from 1 to 4.

Scholastic outcomes

Achievement Perception. Children were asked the following question "What does your class teacher think of your school performance compared to your classmates?". Responses indicated 1 = "Really good", 2 = "Good", 3 = "Average", and 4 = "Below minimum". This outcome was dichotomised into "higher than average" (1 + 2) and "average or less" (3 + 4). This measure is widely used and are perceived as valid measures of perceived academic achievement (Faught et al., 2017; Samdal et al., 1999).

Table 2. Pearson's bivariate correlation between composite loneliness score, single item loneliness score and continuous scholastic belief outcomes.

	1	2	3	4
1. Composite Loneliness Score				
2. Single Loneliness Scores	.615**			
3. Academic Achievement	.167**	.121**		
4. School Satisfaction	.287**	.298**	.277**	
5. School Pressure	.254**	.246**	.198**	.248**

**Correlation is significant < 0.01 level.

School Satisfaction. This item asked children "What do you think of the school at the moment?". Responded indicated 1 = "I really like school", 2 = "Like school", 3 = "Do not like", and 4 = "I do not like at all". This outcome was dichotomised into "like school" (1 & 2) and "Do not like school" (3 & 4). The item on school engagement has been included in the HBSC study since 1985/86.

School Pressure. Children were asked to indicate "How pressured do you feel about the schoolwork you have to do (both in school and as homework at home?"). Responses were 1 = "Not at all", 2 = "A little bit", 3 = "Some", and 4 = "Very". This outcome was dichotomised into "not pressured" (1 & 2) and "pressured" (3 & 4). The item has been included in the HBSC study since 1993/94.

Control Variables

Age and gender: As outlined earlier, early adolescence is a time of considerable social change (Goossens, 2018) and it is, therefore, important to include age as a control variable throughout the analysis – particularly when considering the period until middle adolescence is a particularly salient time for academic self-concept (Marsh & Hocevar, 1985; Wigfield et al., 1991). Gender differences have previously been reported in the relationship between loneliness and scholars' beliefs (Betts & Rotenberg, 2007). As a result, both variables were controlled for throughout all analysis.

Socio-economic status: Previous research has demonstrated the importance of a child's socioeconomic status (SES) as a predictor of academic achievement (Bradley & Corwyn, 2002) and loneliness (Madsen et al., 2019; Qualter et al., 2021). Children from lower SES background are at risk of developing academic skills significantly slower (Morgan et al., 2009) and lower exposure to language complexity and enrichment experiences (Hackman et al., 2015) compared to their peers from higher SES backgrounds. Adolescents from lower SES are also more likely to experience loneliness (Qualter et al., 2021), with those located in economically deprived regions, where "uncared for" towns translate into "uncared for" people, reporting higher loneliness (Batsleer & Duggan, 2020). Considering the role SES might play, the following indicators were controlled for in all analyses:

Family Occupational Class – The students' socioeconomic status was measured by their family occupational class. The students answered these questions: "Does your father/mother have a job?", "If no, why does he/she not have a job?", "If yes, please say in what place he/she works (for example: hospital, bank, restaurant)" and "Please write down exactly what job he/she does there (for example: teacher, bus driver)". Each participant was categorised by the highest-ranking parent into three levels: High (I-II, e.g., professionals and managerial positions), middle (III-IV, e.g., technical and administrative staff, skilled workers), and low (V, unskilled workers and VI, economically inactive).

Family Structure – Participants were also given a checklist of people from which they ticked those living in their main or only home. The checklist included mother, father, stepmother (or father's partner), stepfather (or mother's partner), siblings, grandparents, and adults other than their parents (foster parents or care homes). From those data, respondents were coded as living with both parents, single parent, reconstructed family (i.e., stepfamily), and other. In the current analysis, family structure was recoded into three categories: Two-parent family, single parent family, and reconstructed/other.

Family Affluence Scale – The Family Affluence Scale (Currie et al., 2008; Hartley et al., 2016) is a child friendly measure of the resources available to the child's family. The family affluence scales asks the following 6 questions: (1) Does your family own a car van or truck?, (2) Do you have your own bedroom?, (3) How many computers are there in your house?, (4) How many bathrooms do you have in your house?, (5) Does your house have a dishwasher?, and (6) How many times have you been on holiday abroad in a year? Responses to the items are as follows: Items 2 and 5 = "Yes / No" responses; Items 1, 3, 4 and 6 = "None", "One", "Two" or "Two or more" respectively. FAS was treated as continuous variable with a higher score indicating a higher level of family affluence.

Analysis Plan

Using SPSS V26, differences between the two measures of loneliness and two key demographics – age and gender – within the current analytical samples of HBSC dataset were investigated through a series of ANOVA (as analytical sample differs marginally from previous study, Eccles et al., 2020a). Then, a series of binary logistic regression (BLRs) explored the associations between loneliness and scholastic beliefs. All analyses controlled for age, gender and SES indicators (family structure, family occupational status & family affluence). The first set of BLRs were conducted for the whole sample. To examine the moderation effects of age and gender separately, the BLR were stratified, first, by gender and then, by age. Moderation effects were examined by comparing beta and standard errors between groups, generating Z-scores (Z-scores ≤ 1.96 indicating a significant moderating effect). To reduce the potential for Type 1 errors, the conservative value of $p < .001$ was applied.

Results

Gender and Age Group Differences on Loneliness

To examine the presence of gender and age group differences in this analytical sample of the HBSC Danish data set, a series of 2 (gender: male/female) X 3 (age: 11, 13, 15) between group ANOVAs examined potential differences in self-reported loneliness. For the 4-item composite score, there was a main effect of gender ($F(1,3808) = 162.45$, $p < .001$, $\eta^2 = .041$), with girls reporting significantly higher loneliness (M = 8.55, SD = 3.02) than boys (M = 7.31, SD = 2.79). Age group was also seen to have a significant effect on loneliness as measured by the composite score ($F(2, 3808) = 19.93$, $p < .001$, $\eta^2 = .010$), with post hoc analysis showing that older adolescents (aged 15 years) reported significantly higher loneliness (M = 8.33, SD = 2.94) than the younger adolescents (age 11 years; M = 7.56, SD = 2.89; MD = .78, $p < .001$; age 13 years; M = 7.89, SD = 3.04; MD = .44, $p < .001$). The 13-year-old adolescents also reported significantly higher levels of loneliness than the youngest age groups (MD = .33, $p = .012$). There was no significant interaction between gender and age group on loneliness as measured by the 4-item UCLA scale ($F(2, 3808) = 2.56$, $p = .077$, $\eta^2 = .001$).

A very similar pattern of results emerged for the single item loneliness measure. Results demonstrated a main effect of gender ($F(1, 3808) = 89.72$, $p < .001$, $\eta^2 = .023$) with girls reporting significantly higher loneliness (M = 1.58, SD = .74) than boys (M = 1.36, SD = .64). There was a significant main effect of age group ($F(2, 3808) = 14.59$, $p < .001$, $\eta^2 = .008$) and agrees with the composite measures results. Post hoc analysis suggests, with the single item measure, there was a significant difference between all age groups and their loneliness scores, with the eldest reporting significantly higher levels of loneliness (M = 1.55, SD = .73) than adolescents in the younger age groups (age 11 years; M = 1.39, SD = .66, MD = .19, $p < .001$; age 13 years; M = 1.48, SD = .70, MD = .07, $p = .023$). In addition, the 13-year olds also reported significantly higher levels of loneliness than the 11-year olds (MD = .10, $p = .003$). As with the composite score, there was no interaction between gender and age group ($F(2, 3808) = 1.52$, $p = .219$, $\eta^2 = .001$) for the single item measure. In consideration of the potential differences, subsequent moderation analysis will be conducted separately first for gender and then by age group.

Loneliness and Scholastic Beliefs

As outlined in Table 3, loneliness was significantly associated with self-reported achievement perceptions, school satisfaction, and experiences of school pressure. Those associations were observed across both measures of loneliness: higher levels of loneliness resulted in an increased risk of reporting higher levels of school pressure, greater dissatisfaction with school, and rating achievement perceptions as "average or less".

Table 3. OR (95% CI) for low achievement perception, low school satisfaction and high perceived school pressure by loneliness among 11-, 13- and 15-year old adolescents ($N = 3814$).

	Achievement Perceptions[a] OR (95% CI)	School Satisfaction[b] OR (95% CI)	School Pressure[c] OR (95% CI)
UCLA Composite Score	1.12 (1.09–1.14)*	1.22 (1.19–1.26)*	1.16 (1.13–1.18)*
Single Item	1.39 (1.26–1.53)*	2.42 (2.15–2.72)*	1.77 (1.60–1.95)*

Note: *Associations significant $p < .001$; Gender, Age, Family Occupational Class, Family Structure, and Family Affluence Scale were included in the analyses as control variables.
[a]Reference category "Higher than average".
[b]Reference category "Like School".
[c]Reference category "Not pressured".

The Moderating Role of Gender and age Group

An additional series of BLR examined the role of age group and gender as potential moderators of the association between loneliness and the three scholastic belief outcomes.

As outlined in Tables 4 and 5, both loneliness measures were comparable across genders and ages for achievement perceptions, school satisfaction, and school pressure. We found that gender did not moderate the relationship between loneliness and most scholastic beliefs (Z scores < 1.96). Gender did moderate the relationship between loneliness and school satisfaction, with a significantly stronger effect for girls than boys both the single item of loneliness (Z = 2.08) and the composite measure (Z = 2.20).

For age group, there was a moderating role for achievement perceptions on the single item measure of loneliness, with a greater effect seen for the youngest compared to the oldest (Z score – 2.08) participants. Further, for the single item, there was a stronger effect for the youngest compare to the oldest for school satisfaction (Z score = 2.69). No such effects were observed for the composite measure of loneliness.

Discussion

The current study examined whether loneliness was associated with scholastic self-beliefs in school-aged adolescents. The current study had two main findings: (1) loneliness was associated with poorer achievement perception, lower school satisfaction, and higher school pressure, and those effects were consistent for both the indirect and direct measures of loneliness, and (2) age group and gender did not demonstrate a moderating effect across the majority of associations. However, gender appeared to moderate the associations between loneliness – regardless of measurement tool – and school satisfaction with a strong effect observed for girls. For age group, the relationship between loneliness, when measured using a single item, and both

Table 4. OR (95% CI) for low achievement perception, low school satisfaction and high perceived school pressure by loneliness among 11-, 13- and 15-year old adolescents stratified by gender ($N = 3814$).

	Achievement Perceptions[a] OR (95% CI)	School Satisfaction[b] OR (95% CI)	School Pressure[c] OR (95% CI)
Girls			
UCLA Composite Score	1.12 (1.09–1.16)*	1.26 (1.21–1.32)*	1.15 (1.13–1.19)*
Single Item	1.40 (1.23–1.59)*	2.70 (2.31–3.16)*	1.81 (1.59–2.07)*
Boys			
UCLA Composite Score	1.11 (1.07–1.15)*	1.18 (1.13–1.23)*	1.16 (1.12–1.21)*
Single Item	1.38 (1.19–1.61)*	2.10 (1.76–2.51)*	1.73 (1.48–2.02)*

Note: *Associations significant $p < .001$; Age, Family Occupational Class, Family Structure, and Family Affluence Scale were included in the analyses as control variables.
[a]Reference category "Higher than average".
[b]Reference category "Like School".
[c]Reference category "Not pressured".

Table 5. OR (95% CI) for low achievement perception, low school satisfaction and high perceived school pressure by loneliness among 11-, 13- and 15-year old adolescents stratified by age ($N = 3814$).

	Achievement Perceptions[a] OR (95% CI)	School Satisfaction[b] OR (95% CI)	School Pressure[c] OR (95% CI)
Age 11 years			
UCLA Composite Score	1.16 (1.10–1.22)*	1.28 (1.20–1.36)*	1.19 (1.13–1.25)*
Single Item	1.67 (1.35–2.05)*	3.16 (2.48–4.02)*	1.79 (1.47–2.19)*
Age 13 years			
UCLA Composite Score	1.11 (1.06–1.15)*	1.21 (1.15–1.27)*	1.14 (1.10–1.19)*
Single Item	1.30 (1.11–1.53)*	2.73 (1.95–2.88)*	1.70 (1.44–2.01)*
Age 15 years			
UCLA Composite Score	1.10 (1.05–1.14)*	1.21 (1.15–1.27)*	1.15 (1.12–1.20)*
Single Item	1.35 (1.15–1.58)*	2.12 (1.76–2.55)*	1.82 (1.55–2.14)*

Note: *Associations significant $p < .001$; Gender, Family Occupational Class, Family Structure, and Family Affluence Scale were included in the analyses as control variables.
[a]Reference category "Higher than average".
[b]Reference category "Like School".
[c]Reference category "Not pressured".

achievement perception and school satisfaction was greater for the youngest compared to the oldest adolescents in the sample.

Association Between Loneliness and Scholastic Beliefs

The results from the current study demonstrate loneliness is associated with poorer scholastic self-beliefs: higher feelings of loneliness were associated with a significantly increased risk of reporting lower levels of achievement perception and school satisfaction, and greater school pressure. The results suggest the associations are robust because they were observed across two distinct measures of loneliness and three distinct measures of scholastic beliefs. These results support previous research that highlighted the negative impact loneliness can have on education outcomes during childhood and adolescence (Bayram-Ozdemir et al., 2017; Betts & Rotenberg, 2007; Coplan et al., 2011 Gest et al., 2005; Juvonen et al., 2000). Not feeling like one fits into the school peer ecology influences scholastic self-beliefs, which have been consistently shown to be associated with academic performance (Marsh et al., 2006) and motivational outcomes (Denissen et al., 2007; Wigfield et al., 2015): it is possible that increased loneliness leads to negative self-perceptions and evaluations about one's social abilities, and that negativity is transferred to other domains, such as one's ability at school. This explanation is in line with the model of loneliness (Cacioppo & Hawkley, 2009), but because we have only examined cross-sectional data, it is also possible that those who perceive themselves to be under academic pressure and not like school feel disconnected from the peer ecology of the school because it is simply not a place they like. Thus, there is a need for prospective studies that allow for examination of loneliness and scholastic belief outcomes over time, so that directional and reciprocal effects can be explored.

Measures of Loneliness

In the current study, the associations between loneliness and scholastic self-beliefs were consistent across two distinct measures of loneliness, even whilst controlling for age, gender and relevant family socioeconomic indicators. Previous studies utilising the HBSC Denmark data demonstrated the utility of using either measure of loneliness to predict outcome (health and sleep outcomes; Eccles et al., 2020a). Thus, it is important for further research to utilise multiple measures of loneliness – where possible – to explore the usefulness of single item measures which have seen popularity in recent research with adults (BBC Loneliness Experiment, 2018; Savikko et al., 2005; Victor, Scambler, et al., 2005), providing brevity without losing important information.

Importance of Gender and Age

The current study also examined the importance of gender and age group, first in relation to loneliness and then, as moderating factors with scholastic beliefs. Results showed that girls reported significantly greater levels of loneliness than boys. Whilst that is in line with previous research (Corsano et al., 2006; Rönkä et al., 2014), it is important to note findings relating to gender are mixed with some research reporting higher levels of loneliness for boys (Uruk & Demir, 2003; Wols et al., 2015), or little/no effect of gender (Bossaert et al., 2012; Weeks and Asher., 2012). In the current study, girls reported higher levels of loneliness than boys on both the direct and in-direct measure of loneliness. Previous research suggests, that when gender differences are found, boys typically score higher on the UCLA (Borys & Perlman, 1985), but lower than girls on the single loneliness item, which could be a result of the stigma surrounding loneliness (Crock & Major, 1989); our results are consistent with the latter, but not the former, findings suggesting the effects might be more cohort specific. In addition, it is important to consider the small effects sizes associated with the results reported within the current study: it may be the case such findings do not represent any meaningful difference. A recent meta-analysis (Maes et al., 2019) supports such an interpretation, and the presence of gender differences within loneliness remains unclear and should be interpreted with caution.

When examining the results relating to age group, the oldest school-children reported higher levels of loneliness than their younger peers. Developmental changes associated with adolescence such as social reorientation (Goossens, 2018), greater independent from family (Laursen & Hartl, 2013) and greater importance placed on group acceptance (Crone & Dahl, 2012) may explain why the oldest children in the sample experienced greater loneliness. However, again, effect sizes for those differences are small and it may be more meaningful to look at the moderating effects of age and gender in relation to other outcomes, rather than the presence potential differences alone.

While associations were significant regardless of age group and gender, those individual differences appeared to moderate the relationship on certain outcomes. For gender, loneliness was more strongly associated with school satisfaction for girls compared to boys. For age group, loneliness was more strongly associated with school dissatisfaction and lower achievement perception among the youngest children (age 11 years) compared to the eldest (age 15 years). Taken together, the results from the current study highlight the importance of loneliness when examining educational functioning.

Supporting previous findings (Betts & Rotenberg, 2007), we found an association between loneliness and school satisfaction was greater for girls compared to boys. Girls may view classmates as a more important sources of social support than boys and have higher expectations of school friendships as a result (Chan & Cheng, 2004). Other research also supports the notion that there are expected gender differences in aspects of the school setting that are important to wellbeing. In a cross-sectional study, Lohre et al. (2010) showed that enjoying schoolwork and receiving help from teacher was important to boys' school wellbeing but not for girls Prospectively, Løhre et al. (2014) demonstrated no significant difference in reports of school wellbeing between boys and girls, but the potential underlying predictors highlighted importance differences. For boys, academic support was important; for girls, loneliness was highlighted as a potential factor. It is clear from previous research, and the findings highlighted within the current study, that the relationship between loneliness and scholastic beliefs is not clear and warrants continued attention.

Strengths and Limitations

The current study allowed for a novel examination of the use of two different loneliness measures and the relationship with scholastic beliefs in a large and nationally representative sample of school children. That is a considerable strength to the current study. Although representative of the country the sample represents, it is important to note the majority of children included in the

study reported high levels of family affluence and that may limit the generalisability of the findings to other populations, cultures, and countries. The student-level response rate within the participating schools was high, but there is still a risk of selection bias, especially if the non-participating students had higher levels of loneliness and lower levels of scholastic beliefs. In this case, the study may have underestimated the association between the two variables.

The current study focuses on under-researched age groups of school-children in terms of scholastic self- beliefs. The applied variables are well-known in studies of adolescents and considered valid and appropriate, but the current study does not include objective measure of academic functioning. Future research should focus on including objective measures of academic performance such as grade point average. Also, regarding measurement, one could argue that there is an issue of shared variance between the school satisfaction measure and the loneliness measures. Responses to the school satisfaction measure likely reflect some of the social aspects of students' situation in school, but, while the correlations between school satisfaction and loneliness were the strongest in the study, that association would be classified only as small to medium using Cohen (1988) guidelines on effect sizes.

The inclusion of two distinct measures of loneliness is a considerable strength of the current study, providing a unique opportunity to examine the two measures in one, nationally representative sample, but it is important to note the measures are related to loneliness in general and do not specifically apply to the school context. The current study provides a novel and important insight into the use of one direct and one indirect measure of loneliness. Future research could expand upon the results presented here to examine the role of peer-specific loneliness, using, for example, the peer subscale of the Loneliness and Aloneness Scale for Children and Adolescence (Marcoen & Brumagne, 1985) or loneliness specific to the school environment (Weeks & Asher, 2012), to further inform the debate regarding measurement choice in youth loneliness.

The current analysis included the control of a range of potential confounder variables throughout the analysis which is important – particularly the inclusion of SES indicators. However, it should be noted the SES indicators were self-reported by the child. Whilst that could be considered a potential limitation of the current study, it should be noted school children's reports of their parent occupations have been shown to be reasonably accurate (Ensminger et al., 2000).

Implications for Schools

The results of the current study highlight the robust association between loneliness and perceived scholastic self-beliefs including achievement, school liking, and experiences of pressure. The current study highlights the important role social connections and relationships plays within the school environment. Considering the school as a microsystem (Bronfenbrenner, 1979), it is crucial to identify any factors that impact a child's ability to thrive within the education setting. Loneliness could be one of those factors. As such, it is important that classroom teachers provide opportunities to foster positive peer relationships and embrace interventions aimed at improving social connectedness, and reducing loneliness. Improving social connectedness within the classroom could result in improvements to pupils' well-being and likely an immediate beneficial impact on their feelings towards school and academic outcomes. Combined with findings from previous research (Lohre 2010; Løhre et al., 2014), the results of the current study, suggest gender may be an important consideration when considering how to improve socioemotional wellbeing in the school environment, and it could be that interventions need to be tailored to the gendered-specific expectations and importance of social relationships. Current evidence supports the utility of interventions for loneliness among adolescents and young people (Eccles & Qualter, 2021), and future research should aim to examine the exact mechanism underlying the relationship between loneliness and perceived scholastic beliefs to help inform the development of effective interventions for school-aged children.

Conclusion

The current study showed an association between children's experiences of loneliness and concurrent beliefs about their own academic abilities and experiences of school. It is important for future research to utilise longitudinal methodologies to examine whether those relationships are robust over time and demonstrate whether the associations are causally related. The results of the current study have implications for schools, governments, and other invested bodies: they show (1) that children's current feelings about their social relationships are related to their beliefs about school, and (2) interventions aimed at alleviating loneliness could also results in positive attitudes towards school, increased engagement in learning, and overall better academic performance.

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No potential conflict of interest was reported by the author(s).

Data Sharing

The datasets analysed during the current study are not publicly available, but the data used in the current study can be requested from the corresponding author.

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