Positive mental health and supportive school environments: A population-level longitudinal study of dispositional optimism and school relationships in early adolescence

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ABSTRACT

Objectives: The present study examined the degree to which early adolescents' relationship experiences in school (i.e., peer group belonging, peer victimization, and supportive relationships with adults)—at the individual level and at the school-level—were associated with their dispositional optimism, concurrently and over time.
Method: Self-report data from over 4000 4th and 7th graders were obtained via a population-level measure designed to assess students' supportive relationships, well-being, and resilience (i.e., the Middle Years Development Instrument). An indicator for family income (SES) was obtained through tax filer information.
Results: Multilevel modeling revealed that in Grade 4, greater peer belonging, fewer experiences of peer victimization, and higher levels of adult support in school were linked to higher optimism, above and beyond the effects of sex, age, English as a Second Language (ESL), and SES. Additionally, school-wide levels of peer belonging and adult support (i.e., indicators of a supportive social school climate) were significant positive school-level predictors of optimism. Longitudinally, school-wide peer belonging in Grade 4 was associated to increases in students' optimism from 4th to 7th grade.
Conclusions: The findings suggest that positive relationship experiences in school are key contributors to positive mental health, over and above the absence of negative relationship experiences (i.e., victimization). These findings also suggest that being embedded in a school with a positive social relational climate contributes to students' current and future positive mental health, over and above individual relationships with peers and adults. The present research extends previous research by identifying contextual assets that are linked to dispositional optimism and can be applied in the context of school-based intervention programs to promote positive mental health in schools.

1. Introduction

Optimism is a vital part of health and well-being (Scheier et al., 2001). It is defined as the general tendency to expect the best and the general belief that good things will happen (Gillham and Reivich, 2014). Although considered a disposition or trait, optimism changes throughout the life course and can be fostered and cultivated through interventions (Carver et al., 2010). The benefits of dispositional optimism for physical health and success in life have been well documented (Gallagher and Lopez, 2009; Patton et al., 2011; Rasmussen et al., 2009). Optimism also has been identified as a protective factor for resilience in life circumstances involving risk and adversity (Riolli et al., 2002).

During the past decade, the importance of optimism as a positive mental health indicator in childhood and adolescence has been emphasized (Gillham and Reivich, 2014). Moreover, schools in particular have been identified as a critical developmental context in which optimism can be nurtured and promoted to contribute to students' developmental trajectories of health and success (Clonan et al., 2004). Research examining the link between young people's experiences in the school context and their tendency to be optimistic is therefore much needed; it can inform intervention strategies aimed at enhancing children's and adolescents' positive mental health in school (Greenberg, 2010; Weare and Nind, 2011).

The purpose of the present study was to examine the degree to which early adolescents' peer belonging, experiences with being bullied (i.e., victimization), and supportive adult relationships in school were predictive of their dispositional optimism—concurrently and over time. Specifically, we examined the contribution of these social relational experiences to early adolescents' optimism both at the level of the individual and at the level of the school context. We aggregated students' scores on each of these variables by school and examined their school-level contribution via multi-level modeling (i.e., serving as an indicator for the school-wide social relational climate). We focused on social experiences in school due to the critical role that the school environment plays in early adolescent development (Eccles and Roeser, 2011). We concentrated on the period of early adolescence (typically understood as ages 10 to 14) because it is a formative time in development that is marked by key transitions in social relationships (Eccles, 1999). Indeed, as children enter early adolescence, relationships with peers (e.g., school peers) and adults outside the home (e.g., teachers, mentors) play an increasingly important role for their positive development and well-being (Eccles, 1999; Haddad et al., 2011).

The present study extends previous research on dispositional optimism in childhood and adolescence in several ways. First, a recent cross-sectional study linked early adolescents' optimism to a broader range of individual and ecological assets inside and outside of school (Thomson et al., 2015). We expand on this research by focusing on critical relationship experiences in school (i.e., peer belonging, peer victimization, relationships with adults) and by drawing from a population-level sample of early adolescents in Grades 4 and 7 (i.e., ages 9 and 12). Second, the longitudinal design allows us to examine whether earlier relationship experiences in school are linked to later optimism. Further, while previous research has made progress in explaining early adolescents' optimism through individually perceived assets (Thomson et al., 2015), little is known about the link between the collectively experienced social relational climate in school and students' optimism. Using multi-level modeling provides the opportunity to simultaneously take into account individual and school-level factors. Hence, it allows the examination of collective experiences of social relationships at the school level and individual relationship experiences when predicting early adolescents' optimism. This can uncover whether the contextual climate in which students are embedded in school is related to their positive mental health—over and above their individual experiences. The present study also has practical relevance; it can identify relationship experiences that are strongly associated with early adolescents' optimism, hence informing the development and implementation of school-based interventions to promote early adolescent mental health and well-being.

1.1. Optimism: a positive mental health indicator in childhood and adolescence

The study of optimism in relation to school-based experiences in childhood and adolescence is theoretically informed by positive psychology (Clonan et al., 2004; Huebner and Gilman, 2003; Seligman and Csikszentmihalyi, 2000) and developmental systems theory (Theokas and Lerner, 2006). Rather than solely focusing on adversity and risk prevention, positive psychology researchers strive to understand the assets and strength factors in everyday life that enable young people to flourish (Seligman and Csikszentmihalyi, 2000). The goal of bringing positive psychology into schools is to create an environment that promotes developmental health and thriving in all children and adolescents (Clonan et al., 2004). Developmental systems theory views human development as a bidirectional, individual ⟷ context relational process; an adaptive regulation between individual and context is imperative for positive development and thriving (Lerner and Castellino, 2002). The school is considered a core context that can contribute to healthy and positive developmental trajectories in youth (Theokas and Lerner, 2006).

Much of the empirical evidence documenting the benefits of dispositional optimism for health and success in life stems from research with adult samples (e.g., Andersson, 1996). Emerging empirical evidence, however, also suggests benefits of optimism for positive development in adolescence. Specifically, optimism in adolescence has been shown to be related to higher levels of psychological and subjective well-being (Monzani et al., 2014; Vacek et al., 2010), fewer depressive symptoms (Murberg, 2012), and more adaptive health behaviors (Jones et al., 2008). Yet, research on optimism during the key transitional period of early adolescence is largely missing.

A vast majority of optimism researchers have studied the ways in which dispositional optimism predicts positive development and health outcomes in life, and what are the underlying mechanisms that help to explain this link; optimism has also recently been studied as an important outcome in itself in indicating positive mental health (Gillham and Reivich, 2014). This research approach reflects the perspective taken in the present study. Specifically, we focus on understanding social relationship factors in school that may be linked to children's optimism during the developmental stage of early adolescence.

1.2. Supportive relationships in school and positive mental health in early adolescence

Children in the US and Canada spend an average of 900–1000 h in school every year (Hull and Newport, 2011; OECD, 2012). Research has consistently shown that young people's social relationships with peers and adults in school are linked to their mental health and well-being. For instance, children and adolescents who feel like they belong to a peer group and are accepted by their peers in school also report higher levels of life satisfaction (Proctor et al., 2009), self-esteem (Arslan, 2009), and adjustment to school (Bond et al., 2007; Kingery et al., 2011). In contrast, peer rejection and victimization have been associated with lower levels of well-being (Guhn et al., 2013), higher levels of internalizing problems and somatic health problems (Gini and Pozzoli, 2009), and school drop-out (Cornell et al., 2013). Especially during early adolescence, when young people are increasingly seeking to form social connections outside the home, belonging to a peer group becomes an important source of support and approval that is linked to young adolescents' mental health and well-being (Connell and Wellborn, 1991; Steinberg and Morris, 2001).

In addition to relationships with peers, the quality of student-teacher and student-staff relationships has been associated with positive adjustment to school (Jerome et al., 2009). A nurturing and caring relationship with a classroom teacher is fundamental for well-being, especially for students during the elementary and middle school years (Wentzel, 2002). Having a teacher who conveys support and acceptance is associated with early adolescents' well-being and success in school and serves as a protective factor for those who experience mental health problems and distress (Hamre and Pianta, 2006; Jennings and Greenberg, 2009; Pianta and Hamre, 2009). Positive relationships with school staff (e.g., principal, secretary, school counselor) can also offer an important source of support for early adolescents (Hall, 2010). Hence, several researchers have suggested that positive and supportive relationships with adults in school more generally (rather than a sole focus on student-teacher relationships) need to be considered when assessing students' school-based social support (Chu et al., 2010).

The quality of individual relationships within schools contributes to schools' overall social relational climate. School climate is based on people's experiences of school life; it reflects interpersonal relationships among students, teachers, and staff, and the perceived values, practices, and organizational structures (Thapa et al., 2013). The collective social interrelations among students, teachers, and staff in schools play a particularly important role in the school climate; they reflect the degree of connectedness students experience in their school and act as an important asset for positive development and resilience (Blum et al., 2004; Libbey, 2004). Over the past two decades, extensive cross-

sectional, longitudinal, and experimental research has shown that the social relational climate in school has an impact on students' developmental outcomes in school (Cohen, 2012). For example, a positive social relational climate has been linked to social-emotional and mental health outcomes in children and adolescents, including higher self-esteem (Hoge et al., 1990; Way et al., 2007), more happiness at school (Zullig et al., 2011), and fewer depressive symptoms (Shochet et al., 2006). A positive climate further has been associated with lower rates of "school disorder," including substance use rates in school and school absenteeism (Gottfredson et al., 2005; LaRusso et al., 2008). Scholars and practitioners have therefore concluded that considering schools' social relational environment is key when understanding and promoting students positive mental health (Thapa et al., 2013).

In sum, schools carry a prominent role in cultivating positive mental health in students. Positive psychology scholars have recommended creating school environments that foster individual assets, including optimism, in all children and adolescents. In order to achieve this goal, research needs to identify key social relationships in school that are associated with positive mental health and that can be fostered through programs and interventions.

2. The present study

Our goal was to investigate the relation of early adolescents' social relationships in school (i.e., peer belonging, peer victimization, supportive adult relationships) to their dispositional optimism, both individually and at the level of the school context, as well as concurrently and over time (i.e., from 4th grade to 7th grade). Based on previous research, we hypothesized that peer belonging and supportive relationships with adults in school would be positively and significantly related to optimism, while being victimized would be negatively and significantly related to optimism in 4th grade students. We further sought to examine these two research questions: 1) when examined at the level of the school context, are collective perceptions about social relationships (i.e., school-wide perceptions of peer belonging and supportive adults, school-wide victimization experiences) associated with early adolescents' optimism over and above individual perceptions of these relationships? And 2), do relationship experiences with peers and with adults in Grade 4 predict optimism in Grade 7?

3. Method

3.1. Sample

The sample consisted of 4393 4th grade students in 164 elementary schools in 10 public school districts in British Columbia (BC), Canada, who completed a population-level measure assessing a wide corpus of dimensions of students' supportive relationships with peers and adults, well-being, and resiliency inside and outside of school (i.e., the *Middle Years Development Instrument* or MDI, Schonert-Reichl et al., 2013a). Because multilevel modeling (MLM) was employed as an analytic approach (i.e., students nested within schools), schools in which less than 15 students completed the MDI within a school were excluded from analyses to avoid biased findings (Snijders and Bosker, 1993). Typically, those were schools in rural areas with a small student population. The final sample for analyses with Grade 4 students was $N = 4101$ students in 105 schools across seven urban and suburban school districts.

Longitudinal analyses included a subsample of students who attended schools in districts in which the MDI was administered to the same cohort of students in Grades 4 and 7. Only those students who attended the same school at both times points were included in these analyses given the inclusion of school-level variables in our analyses. The final dataset for longitudinal analyses contained 1943 students across 59 schools from five districts.

Ages ranged from 8.00 to 11.00 (*Mean age* Time 1 = 9.22;

$SD = 0.57$) in Grade 4 and from 10.84 to 13.79 (*Mean age* Time 2 = 12.01; $SD = 0.47$) in Grade 7. Forty-nine percent of children were female. Twenty-one percent listed a language other than English as their first language learned at home. Median equivalized disposable income at census enumeration area (see further information below) was used as an approximation of families' socioeconomic background (Guhn et al., 2010). It ranged from CA$3400 to CA$77500 (*Mean* = CA$28670, $SD = 9943$) in the final sample. In schools that were excluded from analyses due to $N < 15$ students participating the MDI, the average income was CA$25590 ($SD = 11896$). This difference in income was statistically significant ($t(3,785) = 3.40$, $p < .01$). However, the size of the effect was small ($d = 0.13$) (Cohen, 1988).

3.2. Measures

All self-report measures were assessed with the MDI in Grades 4 and 7. The complete MDI contains six demographic questions and 72 items on social-emotional development, social relationships with peers and adults, school experiences, health, and well-being, and constructive use of time during the after-school hours (Schonert-Reichl et al., 2013a; Thomson et al., 2018). The MDI is based on previously validated and well-established scales and items. Research has documented the psychometric properties of the MDI, indicating evidence for its scales' reliabilities, factor structure, and convergent and discriminant validity, as well as construct validity (Guhn et al., 2013; Schonert-Reichl et al., 2013b). The MDI-subscales included in the present study are described below.

3.3. Self-report measures

Demographics. All students completed a short demographic section, reporting birth date, sex, family composition, and first language learned at home.

Optimism. Optimism was assessed with the Optimism subscale from the Resiliency Inventory (Noam and Goldstein, 1998). The adapted version of this scale consisted of three items (e.g., "More good things than bad things will happen to me") on a five-point Likert-type scale (1 = *Disagree a lot* to 5 = *Agree a lot*). During the first MDI-4 wave in 2009–2010, students rated the items of the optimism subscale on a scale from 1 = *Not at all like me* to 5 = *Always like me*. Excluding data from this wave, the pattern of findings remained stable. Reliability was acceptable for 4th grade students ($\alpha = .67$) and satisfactory for 7th grade students ($\alpha = .75$) and comparable to those found in previous research (Thomson et al., 2015).

Peer Victimization. Victimization was measured with four items, drawn from the *Safe School Student Survey* (Vaillancourt et al., 2008). On a five-point Likert type response scale (1 = *Not at all this school year* to 5 = *Several times a week*), children were asked about the frequency of experiencing physical, social, verbal, and cyber bullying. Reliability was satisfactory for 4th grade students ($\alpha = .75$) and 7th grade students ($\alpha = .77$).

Peer belonging. Peer belonging was measured with the peer belonging subscale of the *Relational Provisional Loneliness Questionnaire* (Hayden-Thomas, 1989). Students rated three items (e.g., "I feel part of a group of friends that do things together") with a five-point Likert-type response format (1 = *Disagree a lot* to 5 = *Agree a lot*). Reliability was satisfactory for 4th grade students ($\alpha = .81$) and 7th grade students ($\alpha = .81$).

Adult support in school. Students' perception of supportive adults in their school was assessed via a subscale of the School Support subscale of the *California Healthy Kids Survey* (CHKS) (WestEd, 2005). The adapted version of the scale that is included in the MDI consists of three items (e.g., "… there is a teacher/adult who really cares about me") and is rated on a four-point Likert-type format (1 = *Not at all true* to 4 = *Very much true*). Reliability was satisfactory for 4th grade students ($\alpha = .71$) and 7th grade students ($\alpha = .80$).

Socioeconomic status. Socioeconomic status (SES) data were obtained from 2006 tax filer data through Statistics Canada. The variable median equivalized disposable income at census enumeration area (i.e., six-digit postal code level) was used as an approximation of family SES. The variable represents the equivalized disposable income per person within a given enumeration area. Median equivalized disposable income is equivalized according to (a) family size (because the living costs of a household do not linearly increase with increasing family size) and (b) the age of the family members (because children and teenagers have lower living costs than adults on average) (Guhn et al., 2010). Statistics Canada provides such data only at an aggregated enumeration area code level (e.g., postal code). Enumeration areas can range from block size in densely populated areas to larger areas in sparsely populated areas and coincide with the area captured by the six-digit postal code.

A representative Canadian study has shown that the six-digit postal code income information in fact serves as a reasonable proxy for family level income (Mustard et al., 1999). The study compared statistical analyses using the actual family level income to those using the aggregated six-digit postal code average income in predicting the same outcome variables and found comparable patterns of results. Based on these findings, several population-level studies have used income at the level of enumeration area as a proxy for individual family income (Oliver et al., 2007).

3.4. Procedure and data linkage

The MDI survey was administered by educators during the school years 2009–2010, 2010–2011, and 2011–2012 to students in Grade 4 and during the school years 2012–2013, 2013–2014, 2014–2015 to students in Grade 7. Survey administration took place after the winter break (i.e., in January to February). On average, 94% of schools participated in the MDI within each district. Within participating schools, all students were included in the study unless parents/guardians chose to withdraw their children/adolescents. Parents/guardians were informed of the study and opt-out procedures through information letters available in multiple languages. Student participation rates ranged from 82% to 97% across schools. Teachers obtained student assent and implemented the MDI (electronically or paper-based) using an implementation manual. All items were read out aloud. Post-data collection analyses found no differential item functioning and no significant differences in missingness between data collected via paper versus electronic administration. MDI data are stored at PopData BC, a secure data storage and linkage facility at The University of British Columbia, Canada; linkages of data files were performed by a data steward via unique identifiers. This research was approved by the university's human subjects institutional review board and by each School Board administration.

3.5. Analytic approach

MLM was conducted using the SPSS-mixed procedure (Hayes, 2006; Peugh and Enders, 2005). Students' optimism was modeled as a linear function of student-level and school-level variables. Student-level variables were group-mean centered, and school-level variables were grand-mean centered, as recommended when comparing the contribution of a predictor variable at the individual level and at the group level to the outcome of interest (Enders and Tofighi, 2007). Student-level variables of main interest were perceptions of peer belonging, peer victimization, and adult support in school. Student-level control variables were age, sex, English as a second language status (ESL), and SES. School-level social relational climate variables were obtained by aggregating peer belonging, peer victimization, and adult support at the level of each school. This procedure has been used in previous research to obtain indicators for school-wide perceptions and school climate (Oberle et al., 2011). Missing data ranged from 2% to 11% across all

individual level variables. Restricted maximum likelihood (REML) was chosen as estimation method in all models because it produces variance estimates that are less biased (Peugh, 2010). First, an unconditional model was built with no predictors (Model 1). Second, a conditional model was built with the student-level control variables, student-level predictors of interest, and school-level predictors as fixed effects (Model 2). The estimated parameters and variance explained in Model 2 were compared to those in the unconditional model.

4. Results

4.1. Preliminary analyses

Means, standard deviations, and inter-correlations of all variables are presented in Table S1. Preliminary analyses indicated that the assumptions for MLM were fulfilled.

4.2. Predicting optimism in grade 4

Unconditional model (Model 1). First, the proportion of variation in students' optimism scores between schools was tested. Parameter estimates and the results of the hypotheses tests are reported in Table 1. Significant variability in optimism scores was found within schools ($\sigma^2 = .72$, $Z = 44.29$; $p < .001$) and between schools ($\tau_{00} = .05$, $Z = 5.22$; $p < .001$). The intraclass correlation coefficient (ICC) indicated that 6.5% of the variability in optimism scores were due to the school context in which students were embedded (Bickel, 2007). Even a small amount of variability in Level 2 units can result in invalidated hypotheses tests, confidence intervals, and biased parameter estimates, supporting the use of MLM in this study (Kreft and de Leeuw, 1998).

Conditional model (Model 2). In the next step, perceptions of having been victimized (victim), peer group belonging (peer), and supportive adults (adult) in the school were entered as student-level variables. We controlled for gender, age, ESL, and SES because of intercorrelations with predictor and outcome variables of interest (see Table 1). School-wide perceptions (i.e., individual level variables aggregated at the school level) of victimization (SW-victim), peer group belonging (SW-peer), and adult support (SW-adult) were added as school-level variables.

At the student-level, victimization was negatively related to optimism [$\gamma_{50} = -.07$, $t(1, 3326.70) = -4.53$, $p < .001$]; peer group

Table 1
Parameter estimates and model fit predicting optimism from student- and school-level variables in Grade 4.

Fixed Components		Model 1		Model 2	
		Estimate	se	Estimate	se
Intercept	γ_{00}	3.90***	.03	4.06***	.05
Sex (1 = Female, 2 = Male)	γ_{10}			-.12***	.03
Age	γ_{20}			.05	.05
ESL (1 = English, 2 = ESL)	γ_{30}			-.01	.03
SES	γ_{40}			< .001	< .001
Victimization	γ_{50}			-.07***	.02
Peer Belonging	γ_{60}			.31***	.02
Adult Support	γ_{70}			.22***	.02
School-Mean Victimization[a]	γ_{01}			-.01	.12
School-Mean Adult Support[a]	γ_{02}			.32*	.10
School-Mean Peer Belonging[a]	γ_{03}			.65***	.11
Variance of random components					
School-level	τ_{00}	.05***	.01	.02**	.01
Student-level	σ^2	.72***	.02	.57***	.01
ICC		6.5%		2.6%	
Deviance (-2LL)		10,257.53		7788.11	

Note. *$p < .05$; **$p < .01$; *$p < .001$; [a]$p < .10$.
[a] School-level variables are computed as aggregated student-level variables within each school.

belonging was positively related to optimism [γ60 = .31, *t*(1, 3363.18) = 19.15, *p* < .001]; and adult support was positively related to optimism [γ70 = .22, *t*(1, 3364.72) = 10.35, *p* < .001] (see Table 1). Girls scored significantly higher on optimism than boys [γ10 = −.12 *t*(1, 3325.17) = −4.56, *p* < .001]. At the school-level, school-wide perceptions of peer group belonging [γ02 = .65, *t*(1, 103.49) = 6.17, *p* < .001] and school-wide perceptions of adult support [γ03 = .32, *t*(1, 102.57) = 2.74, *p* = .01] were positively related to optimism. This means that a 1-point increase in average peer belonging in a school was associated with a 0.65-point increase in individuals' optimism, and a 1-point school-wide increase in average adult support in a school was associated with a 0.32 increase in individuals' optimism. School-wide victimization levels were not significantly related to students' optimism in Grade 4.

Despite the addition of Level 1 predictors, there was still statistically significant variability in optimism (σ^2 = .57, *Z* = 40.33, *p* < .001) at the student-level. However, computing a Pseudo-R^2 (Peugh, 2010) by comparing Model 2's individual-level-variance in optimism (σ^2 = .58) to the variance in the unconditional model (σ^2 = .72), revealed that adding the control variables and the three student-level predictors lead to 20.8% reduction of Level 1 variance in optimism. After entering the school-level predictors, the ICC in Model 2 indicated 2.6% unexplained variability in optimism due to the school contexts in which students were embedded (compared to 6.5% in the unconditional model); thus, the unexplained variance was reduced by more than half. Last, comparing the deviance in the unconditional model (-2LL = 10257.53) to the deviance in the full model (-2LL = 7288.11) indicated a deviance reduction of 2969.42. Given that Model 2 and Model 1 differed by 10 parameter estimates, the difference between these deviances is distributed as a chi-square statistic with 10 degrees of freedom: $\chi^2(10)$ = 2969.42, *p* < .001, indicating a significant reduction in deviance in Model 2 compared to Model 1.

4.3. Predicting optimism from grade 4 to 7

Based on a linkage of students' MDI data in Grades 4 and 7, we built a longitudinal model to investigate whether school-level peer belonging in Grade 4 would predict optimism in Grade 7. We focused on school-wide peer belonging because it was the strongest school-level predictor in the cross-sectional analyses within Grades 4 and 7. We could not enter all student- and school-level variables from the Grade 4 and 7 because of multi-collinearity. Control variables were optimism in Grade 4, SES, ESL, age, gender, student-level victimization, peer belonging, adult support in Grade 7, and school-level peer belonging in Grade 7 (see Table 2).

The zero-order correlations between optimism in Grades 4 and 7 [*r* (1726) = .23, *p* < .001], school-wide peer belonging in Grade 4 and optimism in Grades 7 [*r*(1750) = .12 *p* < .001], and school-level peer belonging in Grades 4 and 7 [*r*(1,943) = .17 p < .001] were significant and positive. The ICC in the unconditional model indicated that 3.5% variability in 7th Grade optimism were due to the school context in which students were embedded. In the full model, control variables student-level optimism in Grade 4 [γ10 = .116, *t*(1, 1318.62) = 5.01, *p* < .001], being bullied in Grade 7 [γ60 = −.08, *t*(1, 1315.78) = −2.79, *p* < .01], peer belonging in Grade 7 [γ70 = .35, *t* (1, 1306.47) = 14.09, *p* < .001], adult support in Grade 7 [γ80 = .27, *t*(1, 1314.69) = 9.09, *p* < .001], and school-wide peer belonging in Grade 7 [γ01 = .89, *t*(1, 22.02) = 7.37, *p* < .001] were significantly related to Grade 7 optimism. Computing a pseudo-R^2 indicated that entering these student-level predictors reduced the unexplained Level-1variance in Grade 7 optimism by 29.3% in the full model (from σ^2 = .68 to σ^2 = .483).

Further, after taking into account these variables, school-wide peer belonging in Grade 4 was significantly and positively linked to higher levels of optimism in Grade 7 [γ02 = .36, *t*(1, 25.28) = 3.14, *p* < .01]. Thus, higher levels of school-wide peer belonging in Grade 4 were

Table 2
Parameter estimates predicting optimism over time from Grade 4 to 7.

Fixed Components		Model 1		Model 2	
		Estimate	se	Estimate	se
Intercept	y_{00}	3.86***	.029	3.87***	.13
Optimism Grade 4	y_{10}			.12***	.02
Sex (1 = Female, 2 = Male)	y_{20}			.03	.04
Age	y_{30}			-.01	.05
ESL (1 = English, 2 = ESL)	y_{40}			-.03	.04
SES	y_{50}			< .001	< .001
Victimization Grade 7	y_{60}			-.08**	.03
Peer Belonging Grade 7	y_{70}			.35***	.03
Adult Support Grade 7	y_{80}			.27***	.03
School-Mean Peer Belonging Grade 7[a]	y_{01}			.89***	.12
School-Mean Peer Belonging Grade 4[a]	y_{02}			.36**	.12
Variance of random components					
School-level	τ_{00}	.03**	.01	< .001	.01
Student-level	σ^2	.68***	.02	.48***	.02
ICC		3.5%		0.01%	
Deviance (-2LL)		4347.17		2952.25	

Note. **p* < .05; ***p* < .01; **p* < .001; [a]*p* < .10.
[a] School-level variables are computed as aggregated student-level variables within each school.

related to an increase in optimism from Grade 4 to 7 in students. Specifically, a 1-point increase of school-level peer belonging in Grade 4 was associated with a 0.361-point increase in optimism in Grade 7.

The unexplained school-level variance in the full model without school-wide peer belonging in Grade 4 was 1.2%. Compared to the unconditional model, the model deviance was significantly reduced [from -2LL = 4347.17 to 2958.31; $\chi^2(8)$ = 1388.86, *p* < .001]. Adding school-wide peer belonging in Grade 4, the ICC further dropped from .012 to < .001, almost fully explaining school-level variability in optimism in Grade 7; the addition of Grade 4 school-level peer belonging led to a small but further significant reduction in model deviance [from -2LL = 2958.31 to -2LL = 2952.25; $\chi^2(1)$ = 6.06, *p* < .05].

5. Discussion

In light of growing school-related stress and mental health problems in young people (Kann et al., 2014), identifying assets for positive mental health during childhood and adolescence has become increasingly important over the past decade (Clonan et al., 2004). Optimism is an important marker of positive mental health that can be fostered and cultivated in individuals (Carver et al., 2010). The goal of the present study was to identify in what ways early adolescents' relationship experiences in school and the social school climate were linked to their optimistic outlook in life. Investigating this question is critical as it identifies the social domains that school-based interventions can target.

As expected, we found that early adolescents who belonged to their peer group, had supportive adults in school, and experienced less victimization by peers in school also reported higher levels of optimism in Grade 4. These findings are in line with previous research that has identified a positive link between indicators of well-being and peer acceptance (Bond et al., 2007; Gifford-Smith and Brownell, 2003; Kingery et al., 2011), and adult support in school (Chu et al., 2010; Hall, 2010; Hamre and Pianta, 2006; Thomson et al., 2015; Wentzel, 2002). They also align with the well-established finding that being bullied is associated with lower levels of well-being and more mental health problems (Gini and Pozzoli, 2009; Guhn et al., 2013). Replicating these patterns of results in a population-based sample is important as it supports the stability of the findings in the population at large by taking into account demographic characteristics that also relate to well-being in childhood and adolescence.

Beyond those individual relationship experiences, our study also revealed that being embedded in a school context with a more supportive social climate—marked by higher average levels of peer belonging and adult support in school—was positively related to optimism in Grade 4. This finding is important for two reasons. First, the growing field of research on school climate has traditionally focused on linking climate indicators to students' academic adjustment in school (Way et al., 2007). The present study is an expansion of this research by showing that a positive social climate in school is also related to optimism and is an important indicator of students' positive mental health. Second, this finding highlights the importance of the larger social climate in schools in which students are embedded, in addition to students' personal relationship experiences with peers and adults (Thapa et al., 2013). Some scholars have argued that school climate is a particularly important asset for students at risk and those who are struggling in their personal relationships with peers and adults; school provides them with a safe environment and opportunities for social and emotional learning (Gifford-Smith and Brownell, 2003). Interestingly, the variable of negative social school climates (i.e., lower levels of school-wide victimization) was not significantly related to optimism in the present study. Applying this finding to school policy and practice, it can be speculated that decreasing school-wide victimization (e.g., via anti-bullying initiatives) may be a necessary step but one that is not sufficient in creating a nurturing school climate that fosters positive mental health and well-being. In other words, restricting children's and adolescents' unacceptable behaviors may be an important foundation in schools; yet, in the context of positive mental health promotion, strategies need to expanded through activities and practices that cultivate *positive* relationships and a climate of belonging and support in school (Orpinas and Horne, 2006).

Peer belonging was the strongest contributor to optimism at the student-level as well as the school level in Grade 4. Findings from the longitudinal analysis expanded this cross-sectional link; higher levels of school-wide peer belonging in Grade 4 were also linked to an increase in optimism from Grade 4 to Grade 7 in students, over and above individual relationship experiences and school-wide peer belonging in Grade 7. The longitudinal link is particularly important because it underlines the importance of school climate for positive developmental trajectories of well-being.

The findings in the present can inform schools' strategic planning of school-wide programming (Devaney et al., 2006; Oberle et al., 2016), suggest prioritizing strategies and interventions that support early adolescents in forming prosocial relationships with adults in school and with each other, and, in particular, support the creation of a climate of peer acceptance and belonging in school. Therefore, of practical interest is the question how these relationship assets can be promoted in schools. Based on a meta-analytic review of 147 research studies conducted with middle school students, creating goal structures that are cooperative in schools (e.g., classroom goals that can be achieved by all students working together) rather than competitive or individualistic goal structures contributes to enhancing positive relationships among peers (Roseth et al., 2008). Further, several social-emotional learning intervention evaluations have found specific classroom-based and school-wide programs to be effective in improving relationships among peers and between students and adults in school. For example, prior research has shown that peer acceptance levels in early adolescence increased for those who were prompted to engage in acts of kindness in school, compared to their control counterparts (Layous et al., 2012). Positive relationships and acceptance among peers also increased in those early adolescents who participated in social-emotional learning interventions, compared to their comparison groups who received the usual school curriculum (Schonert-Reichl et al., 2015). Intervention evaluations of RULER—a school-wide socio-emotional learning program—have found the program to be effective in improving the social climate, social relationships among students, and student-teacher relationships (Rivers et al., 2013). Overall, scholars agree that the

planning and implementation of strategies and interventions to promote positive social, emotional, and mental well-being in schools needs to take place at a systemic level to ensure the consistency, continuity, and feasibility of school-based mental well-being promotion (Weare and Nind, 2011).

5.1. Limitations and future directions

Several limitations need to be considered. With regards to the measurement of family income, we could only obtain a proxy of family income (i.e., income information at the 6-digit postal code level) due to Canadian privacy guidelines. Even though previous research has supported the validity of this variable (Mustard et al., 1999), over or under representation of low-income families for some residential blocks cannot be ruled out entirely. This research project was conducted at the population level and therefore offers a broad and general overview of the link between social experiences and optimism in school. The present study is therefore limited by specific experiences that were measured. For example, based on this study, it remains unknown to what degree peer belonging was influenced by early adolescents' engagement with their school peers outside of the school setting (e.g., in after-school activities and through play time outside of school). Furthermore, children's attachment to a primary caregiver has been shown to affect the development of children's peer relationships (Groh et al., 2014). Thus, a nurturing home environment may be a common cause of both optimism and positive peer relationships, which needs to be examined further in future research. Another unmeasured but potentially valuable variable for understanding positive mental health is parents' involvement and engagement in their child's school. It is plausible that parents' engagement and involvement in their children's school life (e.g., through parental volunteering) is linked to mental health and that such involvement could also shape the child's sense of belonging in perceived support by adults in school. Future research needs to be conducted to gain a holistic understanding for how in-school and out-of-school environments may interact in contributing to early adolescents' positive mental health.

Future research also needs to investigate relations between social relationships and positive mental health at school in specific sub-populations (e.g., high risk populations) to identify possibly diverging patterns of findings. Further, the school climate measures in our study focused on social relationships and did not take into account other school climate components, such as school norms and policies; the relation between other aspects of the school climate and positive mental health needs to be explored.

5.2. Concluding remarks

The present study confirms that belonging to a peer group and experiencing adult support in school is significantly related to optimism—a dimension of positive mental health—in the population of early adolescents. Based on our findings, positive relationships with peers and adults in school can be considered key development assets for fostering positive mental health. Hence, explicit and intentional efforts to promote students' positive and supportive social relationships with both peers and adults in schools should be heralded as a fundamental component in school systems.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2018.06.041.

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