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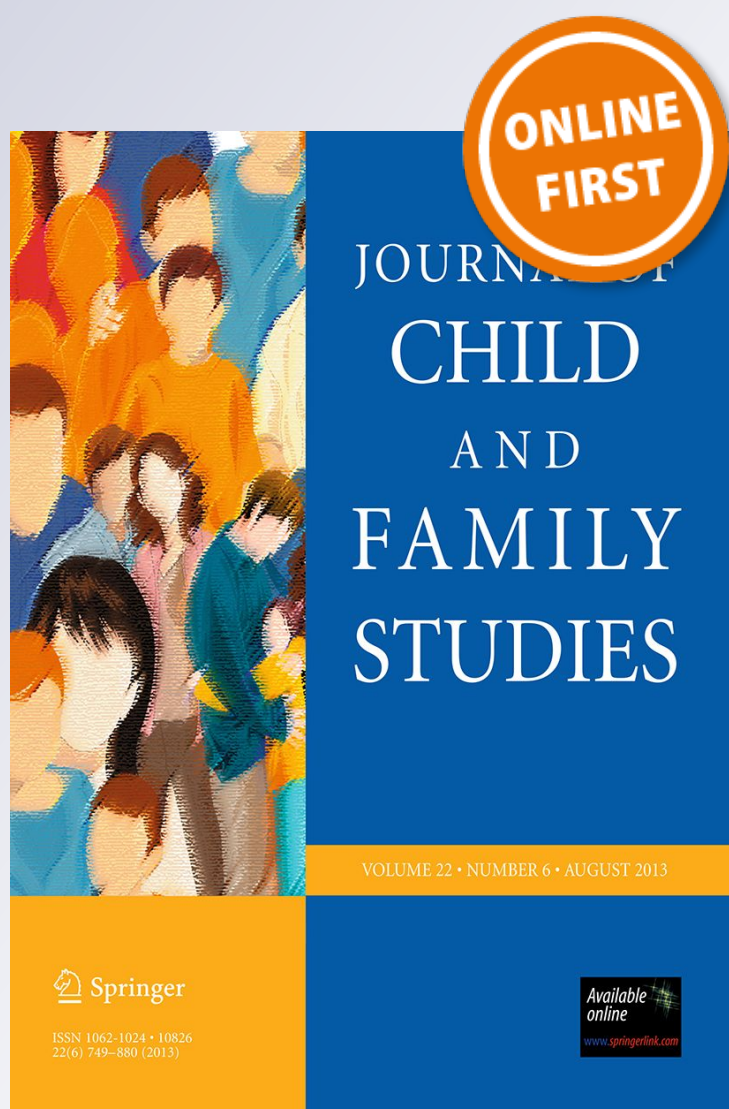
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Examining Pathways between Bully Victimization, Depression, & School Belonging Among Early Adolescents

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Abstract

Objectives The relationship between bully victimization and depression has been examined extensively with prior research showing long-term cascade of problems stemming from both exposure to victimization and depressive symptomology. However, prior research has failed to consider how protective factors may mitigate these long-term problems. Three theoretical models were tested: the interpersonal risk model, symptom driven model, and transactional model.

Methods The present study employs a novel statistical technique to explore longitudinal reciprocal associations among bullying, depression, and school belonging in a sample of 2177 middle school students (ages 11 to 15) in a Midwestern state. We used a model building process to explore the overall association between bully victimization, depression, and school belonging as well as a multi-group model in which models were estimated for boys and girls, separately.

Results In our overall model, results indicated support for both symptom driven and interpersonal risk models. However, we did not find any significant buffering effect of school belonging. In our multi-group model, we found support for a buffering effect of school belonging for girls, but not boys. School belonging buffered long term problems associated with experiences of bully victimization via reductions in depression.

Conclusions Our findings point to the broader concept of school structure being differentially supportive and protective for various demographic groups and the need to consider the entire social ecology of a school when planning and implementing prevention interventions.

Keywords Internalizing symptoms · Major Depressive Disorder · Victimization · Abuse · Longitudinal

Introduction

Bullying among school-aged youth is a persistent adolescent health issue. The National Center for Education Statistics reported that, in 2015, 21% of U.S. students ages 12 to 18 were bullied at school, with sixth graders reporting the highest rates (31%) of bullying followed by seventh (25%) and eighth (22%) graders (Musu-Gillette et al. 2017). Further, depression is one of the most common mental health disorders with a lifetime prevalence of 13% (3.5 million adolescents) among youth aged 12 to 17 (Ahrnsbrak et al. 2017). With such a high prevalence, it is important to understand what factors both contribute to increases in depressive symptomology as well as mitigate the development of depression during adolescence. In general, victims of bullying often experience co-occurring challenges in several social, emotional, academic, and health domains; one of those being heightened depressive symptomology (Copeland et al. 2014; Davis et al. 2018; Ttofi et al. 2011; Wang et al. 2014). For example, prior research has found consistent associations between experiences of peer victimization (e.g., bully victimization) and mental health issues (i.e., depression, social anxiety, low self-esteem) (Cook et al. 2010; Davis et al. 2018; Vaillancourt et al. 2013). Further, prior literature has identified a multitude of protective factors for both bullying

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victimization and depression such as high quality relationships, lower anxiety, supportive parenting, and sense of belonging (Baldry and Farrington 2005; Cairns et al. 2014; Stadler et al. 2010).

Unfortunately, while several studies have investigated reciprocal associations between bully victimization and depression (e.g., cross-lagged models), few have integrated protective factors into these developmental models. Of relevance, school belonging has been identified as a protective factor that intervenes at several points during the complex pathways between peer aggression and internalizing symptoms. School belonging has been conceptualized as a student's sense of being accepted, respected, and included by peers and adults in a school community (Goodenow 1993a). This construct is often referred to by other names, or names of overlapping constructs (e.g., school membership, perceptions of school climate, school connectedness), demonstrating its multidimensional and broad nature and lack of consensus in the field (Reaves et al. 2018; Wang and Degol 2016). Notably, it consistently buffers against internalizing symptoms among youth, generally (Eisenberg and Resnick 2006; Elmelid et al. 2015), and, specifically, symptoms that stem from exposure to aggression (Flaspohler et al. 2009). Additionally, several researchers have found positive sense of school belonging to be inversely associated with involvement in aggression at school, citing commitment to close interpersonal relationships and perceived clarify and fairness of rules as potential mechanisms (Gottfredson et al. 2005; Reaves et al. 2018; Wilson 2004). However, to understand how peer victimization and depression are related over time *and* how school belonging may be protective, we must utilize existing theoretical models. There are three theoretical models most frequently used to understand the association between peer victimization and depressive symptomology: (1) symptom-driven models where depressive symptoms precede peer victimization, (2), interpersonal risk models where peer victimization precedes depression, and (3) transactional models where peer victimization and depressive symptoms are reciprocally associated and exacerbate one another over time.

Symptom driven models posit that the behavioral profile common to depressed or anxious individuals drive experiences of peer victimization. That is, individuals who endorse depressive symptomology are at heightened risk for maladaptive interpersonal outcomes such as peer victimization, isolation, and exclusion (Kochel et al. 2012). Symptom driven models are situated among theories of depression and psychopathology. For example, the scar hypotheses of depression posits that youth who have experienced one or more episodes of depression will experience long lasting problems (Lewinsohn et al. 1981; Rohde et al. 1990). Examples of symptom driven models are abundant in the literature, with prior research showing being a victim of bullying is predicted by endorsement of

internalizing symptoms such as depression and anxiety (Arseneault et al. 2010). Some have noted that youth who are less aggressive and display internalizing symptoms are easy targets for bullies lending support for symptom driven models (Schwartz et al. 2015). Other longitudinal studies have found that parent and teacher reported depressive symptomology was predictive of peer-related victimization one year later (Kochel et al. 2012). Prior literature has also linked depressive symptomology in childhood to increased prevalence of peer victimization during adolescence (Sourander et al. 2000). Fewer studies have examined gender differences, but recent work has called for examination of gender differences within symptom driven models as girls are nearly two times more likely to be depressed than boys (Krygsman and Vaillancourt 2017).

The interpersonal risk model implicates peer relations in fostering and sustaining internalizing symptoms (Hammen 1992), and, posits that unsupportive and conflictual social interactions give rise to internalizing psychopathology by depraving the individual of the basic human need to belong (Baumeister and Leary 1995). Several studies among adolescent samples have found empirical support for an interpersonal risk models (Cole et al. 2014; Niemelä et al. 2011; Schwartz et al. 2015; Stapinski et al. 2015), including meta-analyses showing small to moderate effect sizes linking exposure to victimization and internalizing symptomology such as depression and anxiety (Reijntjes et al. 2010). Early research has found that exposure to peer victimization (e.g., bullying) was linked to both concurrent and longitudinal depressive symptomology (Schwartz et al. 2005); Vaillancourt et al. 2013). Others, have attempted to tease apart the temporal nature of this association with mounting evidence leaning toward interpersonal risk models (Cole et al. 2014; Niemelä et al. 2011; Schwartz et al. 2015). For example, studies have linked sustained peer victimization (e.g., continued victimization over time) with depression among early and late adolescents (Sweeting et al. 2006; Zwierzynska et al. 2013), with some studies showing this pattern varied by gender (Bond et al. 2001). Prior research has also found exposure to peer victimization to be associated with increased emotional psychiatric distress (Rigby 1999) and increased depressive symptomology (Bond et al. 2001; Patton et al. 2008; Paul and Cillessen 2003) among girls and others finding effects only for adolescent boys (Rothon et al. 2011).

The transactional model conceptualizes the aforementioned models in tandem by addressing the reciprocal influences of peer interactions and internalizing symptoms (Sameroff and Mackenzie 2003). The theory posits that individuals with internalizing symptoms engage in negative peer interactions like peer victimization, which in turn lead to social isolation that intensifies depressive symptoms (i.e., feelings of loneliness) further perpetuating the cycle (Frey et al. 2010; Sameroff and Mackenzie 2003) and creating an ongoing

culture of bullying and internalizing symptomology (Unnever and Cornell 2003). While several studies have found evidence of transactional models (see Reijntjes et al. 2010 for meta-analysis), others are inconsistent and only find evidence for a unidirectional path (Sweeting et al. 2006; Tran et al. 2012; Vaillancourt et al. 2013). Notably, prior research has examined the reciprocal associations between bullying perpetration, victimization, and social status using cross lagged panel models (Sentse et al. 2017). Across the two samples studied (with students in grades 3 to 6 and grades 7 to 9) victimization was reciprocally associated with peer rejection and the magnitude of the association was strong than perpetration. Differences by gender have been examined but are inconsistent and merit further exploration (Lester et al. 2012; Sameroff and Mackenzie 2003).

Despite longitudinal work that has investigated the association between bullying victimization, depression, and school belonging most are limited in their conceptual design and application of statistical methods. Further, many studies utilize unidirectional modeling approaches missing an opportunity to examine reciprocal processes over time. Even among the few studies that have examined reciprocal associations (Kochel et al. 2017) most rely on methods that yield estimates that are an amalgam of both between-person and within-person variance (e.g., Auto-Regressive Cross-Lag (ARCL) models). ARCL models are only plausible given the assumption of convergence (between- and within-person effects are identical). The most common statistical method for testing reciprocal relationships is the ARCL structural equation model; however, they yield estimates that are difficult (if not impossible) to interpret because they systematically ignore within-person variance (Selig and Little 2012). As such, prior research that has investigated reciprocal relationships between bully victimization, depression, or school belonging (either together or modeling specific relationships; e.g., Vaillancourt et al. 2013) may need some re-evaluation.

The auto-regressive latent trajectory model with structured residuals (ALT-SR) introduced by Curran and Colleagues (2014), can improve our ability to understand within-person cross-lagged or reciprocal relationships over time (Berry and Willoughby 2017; Davis et al. 2018; Merrin et al. 2016) while simultaneously considering between-person relations among more systematic or trait-like aspects of bully victimization, depression, and school belonging. This is important because within- and between-person variance carry very different meanings and need to be appropriately disaggregated and modeled separately (see Berry and Willoughby 2017; Hoffman 2015). *Within-person* effects refer to variation around an individual's own trajectory, and allow us to understand how increases in, say, bully victimization relative to an individual's *typical* level is associated with higher (or

lower) levels of, say, depression. *Between-person* effects refer to variation around the overall average and allow us to understand how higher average levels of bully victimization are associated with depression across middle school. Most studies that examine reciprocal associations use methods that examine between-person variations (e.g., how an individual's victimization score is related to the entire sample) to answer within-person questions about development (e.g., how an individual's victimization score is related to their own average). Thus, using the ALT-SR approach produces reciprocal relationships at a more meaningful level of analysis – *within person* and improves the internal validity as each individual serves as his/her own control.

In the current study, we extend prior research by testing three theoretical frameworks (interpersonal risk model, symptom driven model, transactional model) to understand the associations between bully victimization, depression, and school belonging by leveraging recent advances in modeling longitudinal relationships that disaggregate and model within- and between-person effects. We hypothesize that, (1) *among between-person associations* (e.g., initial levels (i.e., intercepts) and change processes (i.e., slopes)), we will find moderate to strong effects across all variables of interest. Specifically, we hypothesize that on average school belonging will be associated with lower initial levels and rate of change in depression and peer victimization. At the within-person level of analysis, Hypothesis 2 reflects an interpersonal risk model where we hypothesized that experiences of peer victimization will precede experiences of psychological distress (depression), and diminished school belonging. Further, within the symptom driven model, we hypothesize (Hypothesis 3) that psychological distress symptoms (e.g., depression) will precede exposure to victimization and negative behavioral outcomes such as mitigated school belonging. Finally, the transactional theory suggests that experiences of bullying victimization and depression are bi-directionally associated over time (Hypothesis 4). Transactional associations that emerged other than bullying victimization and depression are exploratory. Further, we hypothesize that school belonging will protect against victimization and depression experiences (Hypothesis 5). Finally, we hypothesize that the associations between victimization, depression, and school belonging will be more pronounced for females compared to males (Hypothesis 6).

Method

Participants

Participants included 2,177 students sampled from four middle schools in a Midwestern state that were followed

two years across four assessment points corresponding to the Fall and Spring semesters. At time 1 (T1), participants were age 11 to 13 [($M_{T1age} = 12.3(SD = 0.71)$], and at time 4 (T4) the participants were age 13 to 15 [$M_{age\ conclusion} = 13.8\ (SD = 0.72)$]. Regarding race/ethnicity the sample included 44.3% African-American, 29.2% White, 7% Hispanic, 3% Asian/Pacific Islander, and 16.5% Multi-Racial students (see Table 1 and Table 2 for more information).

Procedures

Human subject approval was obtained from the authors' University Institutional Review Board and the school district administration. A waiver of active consent was approved; parents received an informational letter that they signed and returned to school only if they *did not* want their child to participate. Student assent to participate in the study was obtained at each of the subsequent follow-up waves prior to the start of the survey. Nearly 98% of students participated in the study. Trained research assistants and a faculty member collected data. The surveys were completed in class during school hours. Students were asked to sit separately to ensure confidentiality. At least two individuals were present in the classrooms ranging in size from 10 – 30 students and the survey was read aloud to the students. The survey took students approximately 40 minutes to complete.

Measures

Demographic variables

All models controlled for participants' sex (female is reference group, except in multi-group model where sex is used as the grouping variable), baseline age, participants' race (non-White is reference group), mothers' education (high school or less was the reference group), and experience of childhood abuse or neglect. All covariates were regressed onto the intercept and growth factors.

Bully victimization

Bully victimization was assessed using the four-item University of Illinois Victimization Scale (UIVS; Espelage and Holt 2001). Students were asked how often the following things happened to them in the past 30 days: "*Other students called me names*," "*Other students made fun of me*," "*Other students picked on me*," and "*I got hit and pushed by other students*." Response options were on a 5 point-Likert

Table 1 Baseline demographics

	Total	Female	Male
Sex			
Female	1311 (48%)	—	—
Male	1407 (52%)	—	—
Age	11.23 (0.45)	11.19 (0.43)	11.26 (0.46)
Mother's Education	2.83 (1.39)	2.76 (1.41)	2.89 (1.38)
Family Violence	2.47 (1.40)	2.69 (1.36)	2.27 (1.54)
Child Maltreatment	0.39 (0.69)	0.39 (0.68)	0.41 (0.71)
Study Variables			
Bullying Victimization	0.76 (0.98)	0.70 (0.92)	0.81 (1.03)
Depression and Anxiety	1.22 (0.78)	1.34 (0.77)	1.11 (0.77)
School Belonging	3.03 (0.46)	3.08 (0.44)	2.99 (0.47)

Table 2 Correlation and means at each time point

	Dep_1	Dep_2	Dep_3	Dep_4	Dep_5	Bulv_1	Bulv_2	Bulv_3	Bulv_4	Bulv_5	Sch_1	Sch_2	Sch_3	Sch_4	Sch_5
Dep_1	1														
Dep_2	0.47	1													
Dep_3	0.42	0.51	1												
Dep_4	0.35	0.41	0.55	1											
Dep_5	0.28	0.35	0.43	0.58	1										
Bulv_1	0.33	0.25	0.19	0.14	0.16	1									
Bulv_2	0.28	0.36	0.25	0.17	0.13	0.54	1								
Bulv_3	0.23	0.28	0.34	0.21	0.17	0.44	0.55	1							
Bulv_4	0.22	0.26	0.28	0.36	0.28	0.39	0.45	0.55	1						
Bulv_5	0.11	0.17	0.21	0.25	0.35	0.20	0.26	0.33	0.45	1					
Sch_1	0.03	0.01	0.02	0.04	0.01	−0.02	0.01	0.03	0.02	−0.01	1				
Sch_2	−0.13	−0.14	−0.14	−0.08	−0.11	−0.16	−0.16	−0.13	−0.10	−0.08	0.35	1			
Sch_3	−0.11	−0.12	−0.15	−0.11	−0.11	−0.11	−0.09	−0.13	−0.09	−0.08	0.29	0.48	1		
Sch_4	−0.08	−0.11	−0.14	−0.13	−0.11	−0.11	−0.06	−0.09	−0.13	−0.10	0.20	0.40	0.46	1	
Sch_5	−0.09	−0.08	−0.15	−0.19	−0.26	−0.02	−0.02	0.01	−0.03	−0.12	0.13	0.26	0.33	0.41	1
Means	1.23	1.45	1.53	1.57	1.26	0.79	0.95	0.92	0.78	0.40	3.0	3.0	2.9	2.8	2.9

scale ranging from "*Never*" (0) to "*Almost Always*" (4) and higher scores indicated more self-reported victimization. Construct reliability and validity was supported through exploratory and confirmatory factor analyses and convergence with peer nominations of victimization in various samples (Espelage and Holt 2001; Espelage et al. 2003). Cronbach alpha coefficient ranged from 0.79–0.86 (M_{alpha} = 0.81) in the sample.

Depression

The six-item Orpinas Modified Depression Scale (Orpinas 1993) assessed how frequent an individual felt or acted in certain ways within the previous 30 days. Example items include "*Did you feel happy*?" and "*Did you feel hopeless about your future*?" Response options were on a 5 point-Likert scale ranging from "*Never*" (0) to "*Almost Always*" (4) and higher scores indicated more depressive symptoms. The scale has demonstrated strong reliability and validity through factor analyses and good internal consistency (α = 0.74) when administered to adolescents (Orpinas 1993) and across various samples (Yabko et al. 2008). The Cronbach alpha coefficients ranged from 0.81–0.82 (M_{alpha} = 0.82).

School Belonging

Perceived school belonging was assessed with 4 of the 20 items from the Psychological Sense of School Members Scale (Goodenow 1993b). Students were asked how much they agreed with the following statements: 1) "*I feel proud of belonging to this school*," 2) "*I am treated with as much respect as other students*," 3) "*The teachers here respect me*," and 4) "*There is at least one teacher or other adult in this school I can talk to if I have a problem*." A 5-point response scale ranged from "*Strongly Disagree*" (0) to "*Strongly Agree*." (3). The Cronbach's alpha ranged from 0.68 to 0.74 (M_{alpha} = 0.72).

Data Analyses

We fit a taxonomy of auto-regressive latent trajectory with structured residuals (ALT-SR) models (Curran et al. 2014) to examine the simultaneous between- and within-person associations between bully victimization, depression, and school belonging across middle school. Between-person effects are captured by correlating our latent intercepts and growth parameters (represented by $\phi_{standarized}$). We specified all latent growth factors as linear functions and examined whether the variance should be freely estimated (or constrained) across participants. We examined whether the growth parameters should vary randomly by comparing them to a constrained model using likelihood ratio tests. Including random slopes for bullying victimization, school

belonging, and depression significantly improved model fit. The latent intercepts represent the estimated sample mean level and (residual) between-person variance of the given variable at Time 1, and the latent slope factor represent the between-person variance associated with rate of change of a given variable. By correlating the intercepts and slopes, the remaining within-person variance is "pushed" into the structured residual portion of the model (within-person auto-regressive and cross-lags).

In our model building process we first examined within-person autoregressive associations among our variables of interest and between-person intercepts and slopes (Model 1) to establish a measurement model with good fit. Next, we examined reciprocal associations between bully victimization, depression, and school belonging (Model 2). Model constraint tests examined if a model with constrained cross-lagged effects significantly fit the data worse than a freely estimated model. Results of our model building process revealed significantly better model fit when all auto-regressive, within-time correlations, and cross-lagged effects were constrained to be equal over time. Finally, we assessed how associations between bully victimization, depression, and school belonging differed by sex (Model 3) using a multi-group approach. Various fit statistics were used to assess model fit that included Comparative Fit Index (CFI) of 0.95 or greater, Root Mean Square Error of Approximation (RMSEA) of 0.05 or less, and Standardized Root Mean Square Residual (SRMR) of less than 0.08.

To address missing data (between 0 to 30% over the five waves), we used full information maximum likelihood (FIML) estimator in *Mplus* 8 (Muthén and Muthén (1998–2017)). A brief missing data analysis was conducted. We found no differences across our variables of interest by participant age, race/ethnicity, or mothers education. We also did not find any differences across our variables of interest for participant gender, except males had significantly more missing data on depression items than females. FIML treats all observed predictors as a single-item latent variable; therefore, each individual contributes the data they have available to the likelihood function without removing individuals through list-wise deletion. Under the assumption that data are missing at random (MAR), or are conditionally random after adjusting for other variables in the model (MCAR), estimates and standard errors are unbiased by the missing data (Enders 2011).

Results

Below we report unstandardized estimates as well as standardized estimates (β; which are not found in the tables or figures). Between-person correlations are represented by $\phi_{standarized}$ below.

Overall Growth Trajectories

Overall mean level change (e.g., slopes) showed small, but significant decreases in bully victimization ($\mu = -0.11$, $SE = 0.003$, $p < 0.001$), depression ($\mu = -0.01$, $SE = 0.003$, $p < 0.001$), and school belonging ($\mu = -0.05$, $SE = 0.002$, $p < 0.001$) over time. Our final model resulted in adequate model fit (CFI $= 0.94$, RMSEA $= 0.08$, SRMR $= 0.08$).

Between-Person

In our final model (see Table 3) we found small to moderate associations between our variables of interest. Specifically, on average youth who reported higher initial levels of bully victimization reported higher initial levels of depression ($\phi_{standardized} = 0.28$, $p = 0.03$), and lower levels of school belonging ($\phi_{standardized} = 0.39$, $p = 0.03$). The association between initial levels of depression and school belonging was not significant.

Within-Person Associations

Below, we present our overall model and our multi-group model. To interpret results from Table 3, the "within-person cross-lag" portion of the model represents all unidirectional pathways. Variable names to the left of "on" represent the dependent variable. For example, $Dep_{t+1} onBullyVict_t$ represents the effect of bullying victimization at time t on depression at time $t + 1$.

Overall Model

First, we estimated a model that constrained cross-lag associations to be equal over time (throughout middle school). The final within-person cross-lag portion of our model is presented in Fig. 1 (for all estimates, see Table 3, Model 2). All *significant* paths are represented in Fig. 1, which demonstrate the lagged effects of each variable over time for our overall model.

From an interpersonal risk perspective, we found support for our hypotheses (Hypothesis 2). That is, youth who reported higher bully victimization than their own *typical* level at Time 1 reported higher depressive symptomology at the next time point ($b = 0.13$, 95% CI [0.09, 0.17]; $\beta = 0.23$). Continuing, this heightened depressive symptomology was associated with diminished school belonging at the next time point.

From a symptom driven perspective, we found support for our hypotheses (Hypothesis 3). For example, beginning with depressive symptomology at time 1, we can see that youth who reported higher depression than their *typical* level reported higher bully victimization than their *typical* level at the next time point ($b = 0.18$, 95% CI [0.11, 0.26];

$\beta = 0.10$). Similarly, individuals that reported higher depression than their *typical* level also reported lower school belonging than their *typical* level at the next time point ($b - 0.08$, 95% CI [-0.12, -0.03]; $\beta = -0.12$). Interestingly, if we follow the paths from depression, we find that higher depression at Time 1 is associated with higher bullying victimization at Time 2, which, in turn predicts higher depression at Time 3. The cascade of symptom driven effects eventually lead to diminished school belonging at Time 4.

We also found support for a transactional model (Hypothesis 4), such that we found a full cross-lagged effect between bullying victimization and depressive symptomology. This indicated that bullying victimization and depression drive each other over the course of middle school such that higher bullying victimization leads to increased depressive symptomology and, in turn, reporting more depression than one's *typical* level leads to heightened experiences of bullying victimization.

Contrary to our hypotheses surrounding school belonging (Hypothesis 5), we did not find that school belonging was associated with bully victimization or depression. That is, school belonging did not act as a protective factor against depression or bully victimization. In fact, we found support for both symptom driven and interpersonal risk models that eventually lead to decreased sense of school belonging.

Multi-Group Model: Variation by Sex

Results indicated significantly improved model fit ($\Delta - 2LL = 550.48$, $df = 15$, $p < 0.01$) when constraining our effects to vary by sex compared to the full model.

For females (see Table 3 "Multi-group model" and Fig. 2), similar to the overall model we found support for an interpersonal risk model for females such that reporting higher bully victimization than one's *typical* level is associated with higher depressive symptomology at the next time point ($b = 0.14$, 95% CI [0.09, 0.20]; $\beta = 0.23$). The heightened depressive symptomology is in turn associated with diminished school belonging ($b = -0.10$, 95% CI [0.15, 0.05]; $\beta = -0.15$).

We found support for a symptom driven model. Similar to the overall model, we found that female adolescents who report higher depression than their *typical* level report higher bullying victimization ($b = 0.25$, 95% CI [0.15,0.34]; $\beta = 0.23$) and lower school belonging ($b = -0.10$, 95% CI [-0.15, -0.05]; $\beta = 0.23$) at subsequent time points.

Interestingly, while we found support for our transactional hypotheses (e.g., depression and bully victimization) among females, we also found support for our buffering hypothesis for school belonging among female adolescents. That is, we found that individuals (females) who report

Table 3 Associations between bully victimization, depression, and school belonging. Full and multi-group models

	Full Model[a,b]	Multi-Group Model[c]	
		Female	Male
Within-Person Cross-Lags			
$Dep_{t+1}onBullyVict_t$	0.13 (0.02)*	0.14 (0.03)*	0.14 (0.03)*
$BullyVict_{t+1}onDep_t$	0.18 (0.04)*	0.25 (0.05)*	0.18 (0.05)*
$Sch.Bel_{t+1}onBullyVict_t$	0.003 (0.02)	−0.01 (0.02)	0.01 (0.02)
$BullyVict_{t+1}onSch.Bel_t$	0.01 (0.06)	−0.05 (0.07)	0.03 (0.06)
$Dep_{t+1}onSchBel_t$	−0.06 (0.04)	−0.17 (0.05)*	0.02 (0.05)
$Sch.Bel_{t+1}onDep_t$	−0.08 (0.02)*	−0.10 (0.03)*	−0.05 (0.03)
Auto-Regressive			
$BullyVict_{t+1}onBullyVict_t$	0.53 (0.05)*	0.54 (0.05)*	0.42 (0.07)*
$Dep_{t+1}onDep_t$	0.23 (0.03)*	0.37 (0.05)*	0.18 (0.05)*
$Sch.Bel_{t+1}onSch.Bel_t$	0.36 (0.05)*	0.35 (0.05)*	0.17 (0.04)*
(Co) Variances (between-person)			
$BullyVict_{int}withDep_{int}$	0.28 (0.07)*	0.23 (0.03)*	
$BullyVict_{int}withSch.Bel_{int}$	−0.39 (0.07)*	−0.36 (0.05)*	
$Dep_{int}withSch.Bel_{int}$	−0.14 (0.10)	−0.12 (0.10)	
$BullyVict_{int}$	0.97 (0.43)*	0.95 (0.34)*	
Dep_{int}	0.44 (0.36)	0.47 (0.39)	
$Sch.Bel_{int}$	3.89 (0.24)*	3.88 (0.24)*	
Residual (Co) Variances			
$Bully Vict_{\epsilon it1-\epsilon it5}$	0.99 (0.04)*	165.7 (5.89)*	
$Dep_{\epsilon it1-\epsilon it5}$	0.40 (0.01)*	9.19 (0.63)*	
$Sch.Bel_{\epsilon it1-\epsilon it5}$	0.25 (0.01)*	60.6 (5.23)*	
Fit Statistics			
−2LL	58299.54	27908.25	
AIC	58435.54	28028.26	
BIC	58837.26	28338.97	
RMSEA	0.05	0.06	
SRMR	0.09	0.09	
CFI	0.96	0.94	

Parameter Estimate (*SE*)

Estimates for all control variables on all latent intercept, and linear growth parameters are not shown for readability

In the table above, subscripts identify time of measurement. For example, a single *t* indicates paths were constrained to be equal over time. Subscript *int* indicates latent intercept (mean level) to obtain between-person parameter estimates. Subscripts with an epsilon (*eit*) indicate residual variance measured from Time 1 to Time 7

Bully Vict Bully Victimization, *Dep* Depression, *Sch. Bel* School Belonging

[a]Model 1 is not shown, but included estimates for autoregressive paths only

[b]Model 2 included the full model with all possible estimates included. Here effects were constrained to be equal over middle school. Model building results indicated random linear slope variance for bully victimization and school belonging

[c]Model 3 included a multi-group model in which all within-person estimates were allowed to vary by gender. Between person estimates were constrained to be the same across groups

*p < 0.05

higher school belonging than their typical average at Time 1 also report lower depressive symptomology than their typical average at Time 2 ($b = -0.17$, 95% CI [−0.27, −0.06]; $\beta = -0.23$).

Because depressive symptomology is associated with increased bullying victimization we have an opportunity to investigate a post-hoc mediating pathway. To do this, we multiplied the *a* path (school belonging → depression) and
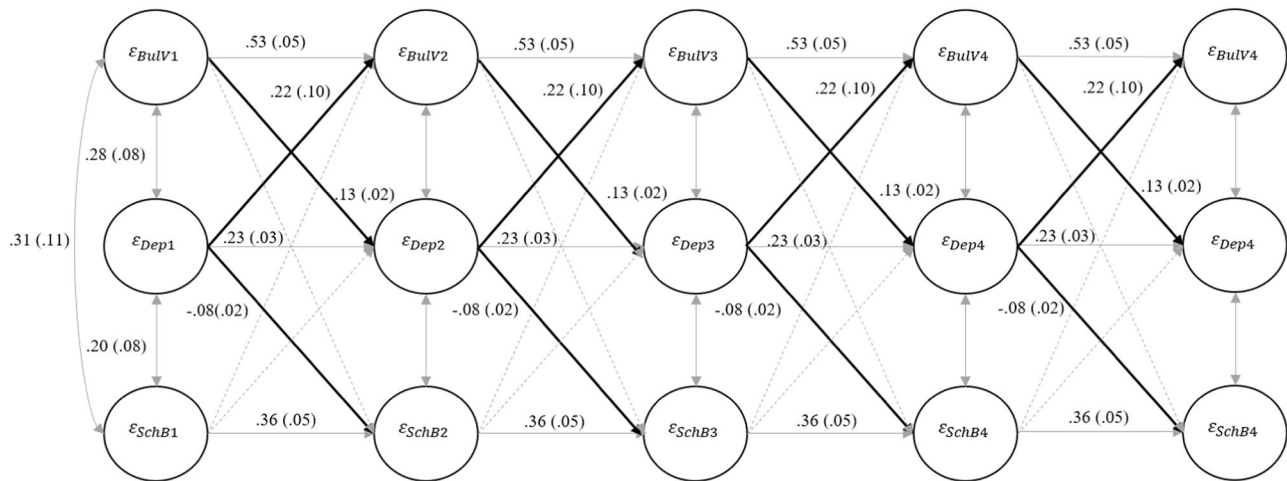
Fig. 1 ALT-SR final overall model. Bold lines indicate a significant path; grey dash lines indicate a non-significant path. All estimates can be found in Table 3. BulV Bully Victimization, Dep Depression, SchB School Belonging
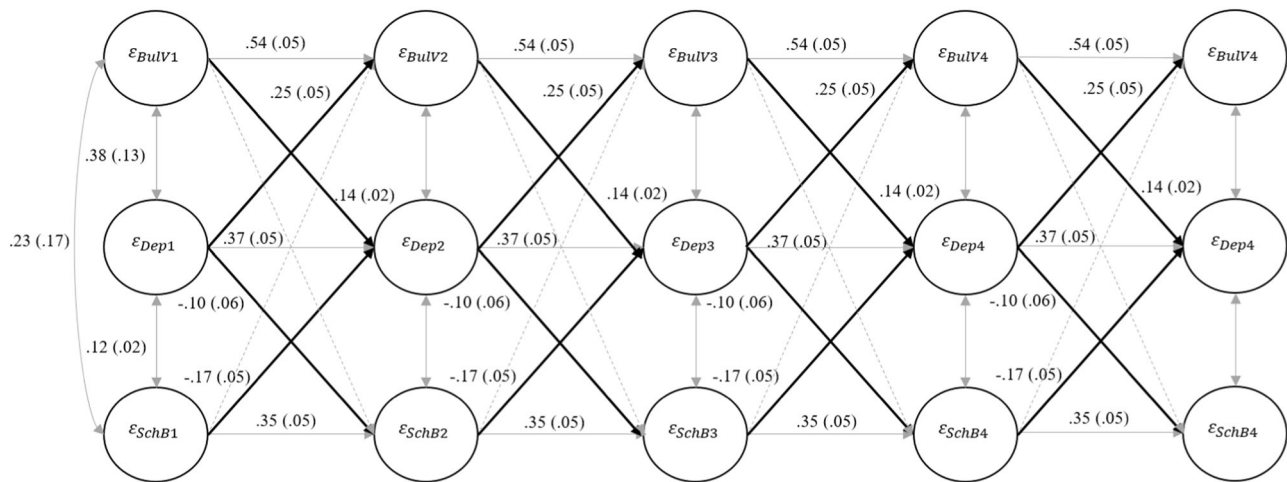

Fig. 2 ALT-SR final model for adolescent girls. Bold lines indicate a significant path; grey dash lines indicate a non-significant path. All estimates can be found in Table 3. BulV Bully Victimization, Dep Depression, SchB School Belonging

b path (Depression → bullying victimization) to determine if school belonging can buffer experiences of bully victimization via decreased depressive symptomology. Results indicated a small, yet statistically significant, indirect effect ($indirect effect = -0.05$, 95% CI [-0.07, -0.01]). Interpretation of a significant indirect effect would be a unit increase in *school belonging* (independent variable) is associated with a unit decrease in *bullying victimization* (dependent variable) via *depression* (mechanism).

For boys, we only found partial support for a transactional model (see Fig. 3) such that we found a full cross-lagged association between bullying victimization and depression. That is, male adolescents who reported higher bully victimization than their own average also reported higher depression scores than their typical average ($b = 0.14$, 95% CI [0.09, 0.18]; $\beta = 0.23$). Similarly, youth who

reported higher depression scores also reported heightened experiences of bully victimization ($b = 0.18$, 95% CI [0.09, 0.27]; $\beta = 0.10$). We found no support for a buffering effect of school belonging for boys.

Discussion

In the present study, we examined longitudinal between-person and within-person relationships among bully victimization, depression, and school belonging testing three theoretical frameworks: an interpersonal risk model, symptom driven model, and transactional model. Further, the current study advances our understanding of the developmental course of bully victimization, depression, and school belonging using nuanced longitudinal methods.
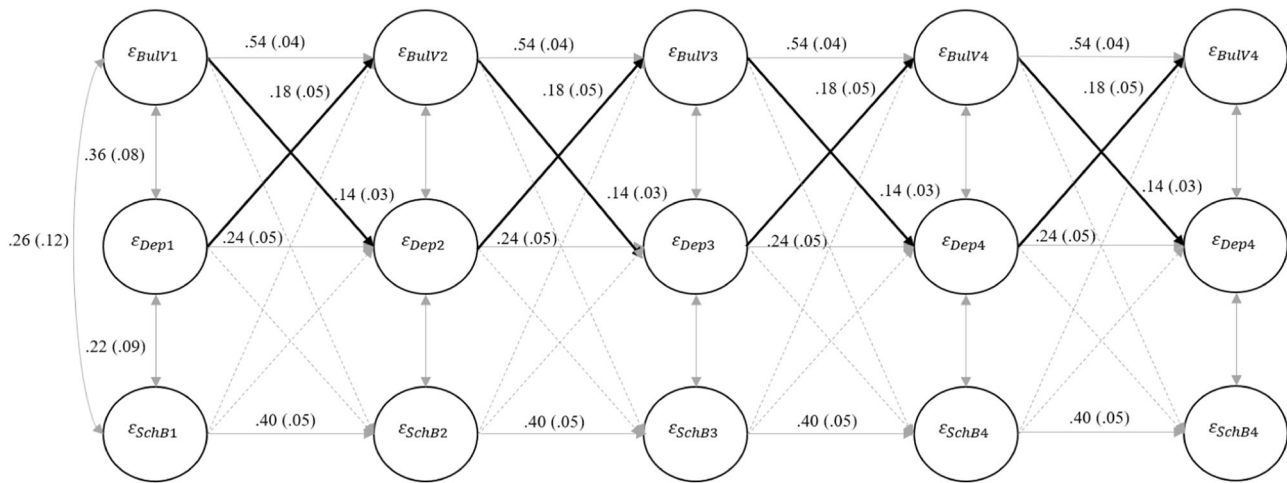
Fig. 3 ALT-SR model for adolescent boys. Bold lines indicate a significant path; grey dash lines indicate a non-significant path. All estimates can be found in Table 3. BulV Bully Victimization, Dep Depression, SchB School Belonging

The majority of studies which investigate the reciprocal associations between bully victimization and depression have failed to consider individual level change, have rarely assessed protective factors that may mitigate long term consequences of bully victimization and depression, and have not assessed potential sex differences. In the current study we addressed all three of these issues, utilizing the ALT-SR framework to understand pathways from a more developmentally appropriate level of analysis: within-person. In general, we found support for both inter-personal risk and symptom driven models and thus, the transactional model. That is, we found consequences stemming from both exposure to bully victimization (interpersonal risk) as well as higher depressive sympto-mology (symptom driven). Interestingly, when assessing gender as a moderator we found that school belonging buffered long term problems for girls, but not boys.

Between-Person Findings

Our between-person results found that youth who reported higher levels of bully victimization also reported higher levels of depression and lower levels of school belonging. This is consistent with empirical findings of higher levels of school belonging being inversely correlated with depression (Anderman 2002), and the intertwined associations that victimization, depression, and peer relations have (Kochel et al. 2012; Ladd 2006). Components of school belonging, friendship, peer acceptance, positive peer relationships, and large peer networks have been found to be protective as well. Friendship has been found to be a protective factor that mediates the relation between depression and victimization in early and late adolescence (Kochel et al. 2017). This finding has been replicated with peer acceptance, an overlapping construct, as the mediator in early adolescence (Kochel et al. 2017). Further, having positive relationships with peers and a large peer network buffers the deleterious effects of victimization (Kochel et al. 2017; Pellegrini and Bartini 2000). Others have found that when youth are repeatedly victimized by peers (i.e., endure many instances over time), they report lower school belonging than youth who have either never been victimized (Holt and Espelage 2007).

Testing Theoretical Models of Peer Victimization and Depression: School Belonging as a Buffer

A primary objective of the current study was to understand how bully victimization, depression, and school belonging were reciprocally related over time at the within-person level of analysis. In particular, we were interested in how perceived school belonging mitigated long term consequences of the bully victimization-depression relationship. In general, while some studies have investigated how school climate variables (e.g., school connectedness, school belonging, school orientation) can buffer the effects of bullying victimization, few have investigated these associations in the context of developmental theories. With prior studies primarily supporting interpersonal risk models, where exposure to bullying victimization precedes the development of depressive symptoms, understanding how these variables are associated with each other over time and how these associations vary by sex will aid in more targeted prevention interventions.

In our overall model we found, like prior research, a cascade of unfavorable outcomes stemming from experiences of both bully victimization and depression. From an interpersonal risk perspective, we found that exposure to

bullying victimization was associated with increased depression symptoms. In a review of prospective studies investigating effects of early exposure to victimization, McDougall and Vaillancourt (2015) found evidence of a direct effect between childhood peer victimization and poorer functioning in adolescence and young adulthood. In fact, across all the studies reviewed, over 60% of the studies included some form of internalizing mental health problem following exposure to peer victimization (McDougall and Vaillancourt 2015). We also found support for a symptom driven model, such that depressive symptomology was a driving factor in negative outcomes over time. Results are, again, consistent with prior theory and empirical work showing youth who have heightened internalizing problems report higher rates of bullying victimization and lower perceived school belonging (Kochel et al. 2012).

However, all three models we employed are traditionally risk-focused, and have been tested as such in the extant literature (McDougall and Vaillancourt 2015; Sentse et al. 2017). While it is critical to identify developmentally sensitive markers of future risk, the majority of literature surrounding youth violence takes this risk approach, leaving practitioners and policy makers with an understanding of what is negative but no pathway to an informed response to these known risks. It is then equally critical to understand protective factors so we can respond to, and mitigate, risks using empirically-informed strategies. There is a dearth of literature on the protective factors associated with the pathways between internalizing symptomology and bully victimization (Gillen-O'Neel and Fuligni 2013; Thapa, 2013). Though school belonging (and overlapping constructs) has demonstrated protective qualities in some samples (Gillen-O'Neel and Fuligni 2013), our results in the overall model did not support this hypothesis. That is, we did not find a buffering effect of school belonging in our within-person cross-lags. While this result was unexpected and inconsistent with previous literature, it may be that school belonging, in general, is primarily useful as a between-person construct. This is not to say that school belonging does not mitigate undesirable outcomes for individuals. Rather, it may be that assessing school belonging among students within schools across adolescence as a whole applies to more of a general individual difference trajectory (i.e., between person effect). Our gender moderation results support this exact response pattern.

Importantly, several researchers have obtained differential effects when assessing exposure to peer victimization and internalizing symptoms stratified by gender (Krygsman and Vaillancourt 2017; Lester et al. 2012). Regardless, researchers maintain that gender is a critical component of any discussion including a school climate variable, as male and female students are socialized differently with regard to

mental health, such that protective factors may vary (Krygsman and Vaillancourt 2018; Mirowsky and Ross 1995; Oliffe et al. 2017). Gender has been pinned as a strong correlate of bully victimization with boys at greater risk of both perpetrating and being victimized (Espelage and Holt 2013). There is also evidence that female adolescents may suffer a broader range of negative consequences following experiences of victimization. For example, some prior research has found that girls are more likely to experience negative psychological effects and more severe physical consequences of bullying victimization compared to boys (Gruber and Fineran 2016).

In the current study, we did not find support for symptom driven or interpersonal risk models for boys – only evidence of a transactional model where experiences of bully victimization were associated with increases in depression and vice versa. In contrast, we found support for symptom and interpersonal risk models for girls. Our results generally support prior research regarding effects of victimization on depression among adolescent boys. Early research has found that boys who report victimization in early adolescence also reported greater depression and negative self-esteem (Schwartz et al. 2015), heightened risk of anxiety problems (Copeland et al. 2014) and increased suicidal behaviors (Klomek et al. 2009).

Further findings from the transactional model are supported by Sweeting and colleagues (2006) which found that a transactional model was significant for adolescent males more so than females. In their study, at age 13 peer victimization predicted depression (and vice versa) for males and females, but at age 15 years depression predicted victimization only for males. Their interpretation considered that depressive symptoms portrayed by boys may make them a target of victimization. Depressive symptoms have also been found to predict unpopularity for males but not females (Malamut et al. 2017). Collectively, these findings point to societally determined gendered associations intervening in the bidirectional pathways between victimization and depressive symptomology.

More importantly, in the model for adolescent boys we did not find evidence of a direct or indirect buffering effect for school belonging. In contrast, among adolescent girls, school belonging acted as a buffer against long-term negative outcomes in middle school. In fact, we found that for female adolescents the effect of school belonging on peer victimization was mediated through reductions in depressive symptomology. One potential explanation for the contrasting findings between gender models is how we define school belonging. Most definitions include social support and the interaction that students have with staff and peers at the school, whereas some suggest it is better determined by other constructs such as academic achievement (Eisenberg et al. 2003). The present findings

conceptualized school belonging according to Goodenow's (1993a, b) definition which is rooted in interpersonal relationships. Findings from our model are supported by literature on the tendency for girls to report valuing interpersonal relationships more than boys, perhaps due to socialization (Broidy and Agnew 1997; Ma and Huebner 2008). Relatedly, evidence also suggests that girls report more stress stemming from interpersonal relationships than boys do (Kort-Butler 2009). Girls also tend to rely on interpersonal relationships for support much more than boys (Feingold, 1994). These findings suggest that the role of interpersonal relationships carries much more weight and may therefore be more determinant with regard to other relevant outcomes for girls. From this perspective, it makes sense that having strong, supportive, interpersonal networks, a core component of school belonging, is more protective for girls than boys (Kochenderfer-Ladd and Skinner 2002).

Together these findings point to important avenues for prevention. Given the strong association between peer victimization and depression in this and past studies, and the growing rates of depression and suicidal behaviors among youth who are bullied (Kaminski and Fang 2009), it is critical to continue to implement evidence-based bully prevention programs (Ttofi and Farrington 2011). In Ttofi and Farrington's meta-analysis of 44 programs, decreases in rates of victimization were partially associated with school-based programs where teachers worked with students to learn how to work cooperatively with their peers through role-playing activities. This appears to provide an avenue to promote peer connectedness and greater school belonging. Given our findings and other studies in the extant literature, it would be important to examine how the efficacy of these programs may differ for males and females. For males, it would be important to think of different protective factors, such as the use of coaches and mentors. Many school-based programs that address academic and social functioning are focused on direct instruction social-emotional competencies and social-cognitive interventions that target common risk and protective factors, including anger, empathy, perspective-taking, respect for diversity, attitudes supportive of aggression, coping, willingness to intervene to help others, and communication and problem-solving skills (Espelage and Hong 2019). Given that SEL-based not only reduce victimization and promote school belonging (Espelage et al. 2015; Espelage et al. 2015), it is likely that they may interrupt the victimization – depression link and should be evaluated for depression outcomes.

Limitations and Future Directions

Despite the strengths of this study, there are some notable limitations. First, this sample was drawn from several midwestern communities and do not necessarily represent demographics of all U.S. schools. Second, our measure of school belonging was somewhat limited in scope and did not capture the multidimensional nature of school connectedness and the various ways that schools can be protective for youth (e.g., academics, athletics, extracurricular). For example, we asked youth generally if they are treated with respect at school and if teachers respected them, as well as their sense of belonging and if they had a teacher or adult to talk to. Therefore, future research h would benefit from a more exhaustive and specific assessment of school belonging. Third, peer victimization was measured with self-report and no other informants provided information.

In conclusion, the current study extends and confirms long-lasting developmental theories relating experiences of peer victimization and depression, but adds to the literature by examining the role of school belonging as a protective factor. Our findings coupled with previous studies may be translatable to practice in schools, as school belonging is a malleable construct that schools can enhance. However, our findings points to the broader concept of school structure being differentially supportive and protective for various demographic groups, given needs determined by socialization and cultural context. Thus, future research and prevention efforts should consider the social ecology in which all individuals are operating to aid in the successful prevention of school bullying and associated internalizing psychopathology.

Compliance with ethical standards

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