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The Role of Bullying in Depressive Symptoms from Adolescence to Emerging Adulthood: A Growth Mixture Model

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Abstract

Background—The present study sought to identify trajectories of depressive symptoms in adolescence and emerging adulthood using a school-based sample of adolescents assessed over a five-year period. The study also examined whether bully and cyberbully victimization and perpetration significantly predicted depressive symptom trajectories.

Method—Data from a sample of 1,042 high school students were examined. The sample had a mean age of 15.09 years ($SD = 0.79$), was 56.0% female, and was racially diverse: 31.4% Hispanic, 29.4% White, and 27.9% African American. Data were examined using growth mixture modeling.

Results—Four depressive symptoms trajectories were identified, including those with a mild trajectory of depressive symptoms, an increasing trajectory of depressive symptoms, an elevated trajectory of depressive symptoms, and a decreasing trajectory of depressive symptoms. Results indicated that bully victimization and cyberbully victimization differentially predicted depressive symptoms trajectories across adolescence, though bully and cyberbully perpetration did not.

Limitations—Limitations include reliance on self-reports of bully perpetration and a limited consideration of external factors that may impact the course of depression.

Conclusions—These findings may inform school personnel in identifying students' likely trajectory of depressive symptoms and determining where depression prevention and treatment services may be needed.

Keywords

depression; adolescents; bullying; growth mixture modeling

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The World Health Organization estimates that Major Depressive Disorder (MDD) and Dysthymia are among the leading sources of mental health burden worldwide (Üstün et al., 2004). The lifetime prevalence rate of MDD and Dysthymia in adolescence has been estimated at 11.7% by age 18 years (Merikangas et al., 2010) and as many as 29.9% of high school students report feeling so sad or hopeless almost every day for two or more weeks in the past year that they stopped doing some usual activities (Centers for Disease Control and Prevention, 2014). These data demonstrate the substantial unmet mental health burden of depression symptoms and disorders in youths – and additional data demonstrate the high impact of adolescent depressive symptoms on academic, social, and physical functioning (e.g., Jaycox et al., 2009).

Adolescent-onset depressive symptoms are associated with a high rate of recurrence and may be indicative of a chronic course (Harrington & Dubicka, 2001; Dunn & Goodyer, 2006). Even so, depressive symptoms show considerable heterogeneity over time during adolescence and emerging adulthood, as evidenced in several recent studies (e.g., Brendgen et al., 2005; Hill et al., 2014; Rodriguez et al., 2005; Stoolmiller et al., 2005; Yaroslavsky et al., 2013). Yaroslavsky and colleagues (2013) identified three depressive symptom trajectories among adolescents, in which some adolescents reported elevated symptoms from mid-adolescence through age 30 years, while others reported moderate or mild symptoms that decreased across adolescence and emerging adulthood. Stoolmiller and colleagues (2005) identified four trajectories of depressive symptoms across adolescence and emerging adulthood, in which some adolescents reported elevated symptoms, others very few symptoms and some reported moderate or elevated symptoms that decreased over time. These studies identify significant variability in depressive symptoms across adolescence, with some adolescents demonstrating stable symptoms over time but others showing changing symptom trajectories. Previous work has identified a history of psychopathology, parental psychopathology, gender, and social variables as predictors of depressive symptom trajectories (Stoolmiller et al., 2005; Yaroslavsky et al., 2013). Despite these findings, additional work is needed to better understand factors associated with the heterogeneity of depressive symptoms across adolescence and emerging adulthood.

A more thorough understanding of depressive symptom trajectories in adolescent and emerging adult populations, as well as the factors that predict those trajectories, can assist mental health service providers in identifying adolescents at risk for increased depressive symptoms or major depressive episodes. The ability to predict likely symptom trajectories *a priori* would afford mental health service providers an opportunity to implement preventive interventions more efficiently. For example, identifying adolescents whose symptoms are likely to escalate over time may afford providers the opportunity to intervene early and provide prevention services closer to the onset of symptom course (e.g., Hill et al., 2014). Further, identifying which adolescents are most likely to maintain their depressive symptoms over time, as opposed to showing a more transitory symptom pattern, may allow service providers to selectively deliver more intensive prevention programs to adolescents in greatest need of them (Hill et al., 2015).

Increasingly, high schools are being utilized as a point of intervention for mental health services and often provide services directly (Wells et al., 2003). As such, school counselors and other school-based mental health professionals have an enormous opportunity to impact student mental health via early identification and treatment. School counselors and personnel are actively involved with students, are aware of social dynamics within the school setting, and therefore may be particularly adept at identifying adolescents at risk for depression. Identifying factors relevant to school personnel as well as their relation to adolescent depressive symptom trajectories is therefore critical to optimizing school-based intervention efforts.

Bullying and Victimization Impact Depressive Symptoms

A growing body of research suggests that various forms of bullying and victimization are associated with adolescent depressive symptoms both cross-sectionally (Klomek et al., 2007; Seals & Young, 2003) and longitudinally (Kaltiala-Heino et al., 2000, 2010). Bullying is defined as “any unwanted aggressive behavior(s) by another youth or group of youths...that involves an observed or perceived power imbalance and is repeated multiple times or is highly likely to be repeated (p. 7; Gladden, Vivolo-Kantor, Hamburger, & Lumpkin, 2014).” Craig and Pelter (2003) consider bullying as a relational problem between perpetrators and vulnerable victims. Both bully victimization and perpetration have been linked with elevated depressive symptoms in high school students (e.g., Klomek et al., 2007; Klomek et al., 2013; Hong, Kral, & Sterzing, 2014;), though some studies have failed to identify a link between bully perpetration and depressive symptoms (i.e., Perren et al., 2010).

Aside from traditional forms of bullying, such as physical and verbal bullying, cyberbullying has also been linked to depressive symptoms (Wang et al., 2011). Cyberbullying refers to aggressive, intentional acts using electronic forms of contact, such as messages sent via text, email, or social media, repeatedly and over time, against a victim who cannot easily defend him or herself (Smith et al., 2008; Vollink et al., 2013). Though cyberbullying may occur less frequently than traditional bullying, it appears to have similar adverse effects as traditional forms of bullying (Smith et al., 2008). Evidence demonstrating a link between cyberbullying and depressive symptoms has emerged in recent years, with a study by Perren and colleagues (2010) providing evidence that cyberbully victimization may predict depressive symptoms even after controlling for other forms of bully victimization. Evidence also indicates that individuals who are both cyberbully victims and perpetrators report greater depressive symptoms than those who are either perpetrators or victims alone (Kaltiala-Heino et al., 2000). Thus, cyberbullying may have especially profound effects on adolescents as compared to more traditional forms of bullying (Smith et al., 2008; Völlink et al., 2013).

With the increased focus on the impacts of bullying in schools, knowledge of the impact of various forms of bully victimization and perpetration on depressive symptom *trajectories* may help school personnel better identify at-risk individuals and provide prevention and intervention services more efficiently. To our knowledge, the potential impact of bully victimization and perpetration on depressive symptom trajectories has not yet been evaluated in the empirical literature. Existing studies provide evidence of overall linear associations

between depressive symptoms bully victimization and perpetration and depressive symptoms, but have not examined potential subgroups of adolescents who may be differentially impacted by bully victimization and perpetration, while examining symptom trajectories over extended longitudinal follow-ups. A more nuanced understanding of the impact of bully victimization and perpetration on changes in depressive symptoms over time may be useful for informing clinicians and researchers in providing and developing efficacious prevention services. For example, the ability to predict which adolescents with elevated depressive symptoms are likely to have consistently elevated symptoms over time, as opposed to time-limited elevations in symptoms, would allow clinicians to direct more intensive treatments to those whose symptoms are likely to be maintained. Alternatively, if it is possible to identify adolescents with minimal depressive symptoms but whose symptoms are likely to increase, clinicians could direct those adolescents to preventive interventions. Finally, examination of the differential impact of types of bullying on depressive symptom trajectories may direct researchers to the most salient forms of bullying for the development of targeted prevention efforts.

The Present Study

The present study sought to identify trajectories of depressive symptoms in adolescents and emerging adults using a school-based sample of adolescents assessed over a five-year period. Consistent with previous research, multiple trajectories were expected (e.g., Stoolmiller et al., 2005; Yaroslavsky et al., 2013). The present study then sought to assess whether bully victimization and perpetration –both in-person and cyberbullying – significantly predicted depressive symptom trajectories. Finally, given the known relations between hostility, gender, race, and depressive symptoms (Felsten, 1996; Nolen-Hoeksema et al., 1999; Saluja et al., 2004), these factors were included as covariates in all analyses. Both victims and perpetrators of bullying and cyberbullying express greater hostility than children not involved in bullying (Ireland & Archer, 2004; Völlink et al., 2013). In addition, hostility has been linked to depressive symptoms (e.g., Mao, Bardwell, Major, & Dimsdale, 2003) and thus hostility represents a potential confounding variable. Thus it was important to control for potential impacts of hostility on depressive symptom trajectories. Moreover, covarying for hostility (i.e., trait anger), helps differentiate between the adolescents' affective state (anger) and bullying behaviors. Utilizing covariates emphasizes the unique variance accounted for by bullying-related variables in the analyses.

Method

Participants and Procedures

Participants were 1,042 adolescents from multiple public high schools serving a large diverse metropolitan region (response rate 62%; the generally accepted response rate is 60% (Johnson & Wislar, 2012)). A majority of participants were 9th and 10th graders (75.0% and 24.0%, respectively). The sample had a mean age of 15.09 years ($SD = 0.79$), was 56.0% female, and identified their race/ethnicity as Hispanic (31.4%), White (29.4%), African American (27.9%), Asian/Pacific Islander (3.6%) and Other/Mixed Race (7.7%).

Data for the present study were drawn from an ongoing longitudinal study of adolescent health (Temple et al., 2013). This study was approved by the appropriate institutional review board. Recruitment specifically occurred during regular school hours within classes for which student attendance was mandated in an effort to ensure a representative sample. Research staff presented the study to students and answered any questions, and take-home packets with study information and parental consent forms were sent home with students. Students who returned with parental consent provided assent and completed assessments during school hours. Participants were compensated with \$10 (Times 1-3) and \$20 (Times 4-5) gift cards for participating.

Measures

Depressive symptoms—The Center for Epidemiologic Studies Depression Scale-10 item version (CES-D-10; Andresen et al., 1994) was used to measure past-week depressive symptoms. The CES-D-10 was developed using the original 20-item CES-D (Radloff, 1978) to address concerns regarding questionnaire length by researchers and clinicians. Items are rated on a 4-point Likert scale (0 = *rarely or none of the time* through 3 = *all of the time*) with higher scores indicating greater severity of depression. Sample items include “I felt that I was just as good as other people,” “I felt hopeful about the future,” and “I felt that people dislike me.” The reliability and validity of the CES-D has been supported in both adult and adolescent samples (Björgvinsson et al., 2013; Bradley et al., 2010). Internal consistency in the present study as measured by Cronbach's alpha (α) was ranged from .71 to .79 across assessment points.

Bullying—Bullying was framed broadly to respondents and included various forms such as: saying or doing nasty and unpleasant things to another student; taking away, destroying, or hiding another student's possessions; and hitting or pushing another student. It was specifically stated that bullying does not occur when two students are of about the same strength, instead one of the students is usually unable to defend him or herself. Two questions were posed to identify the severity of victimization or perpetration as rated on a 4-point Likert scale, with responses ranging from *Never* to *Many times*: “How often have you been bullied in the past 12 months?” and “How often have you bullied other teens in the past 12 months?”

Cyberbullying—Respondents answered “yes” or “no” to four questions to determine whether they were victims and/or perpetrators of cyberbullying over the past year. Perpetration was endorsed by a “yes” response to the following item: “Have you used the internet, e-mail, or text messaging to threaten, harass, or embarrass another teen by posting information or sending messages about them?” In turn, victimization was endorsed via a “yes” response to one or more of the following: “Have you felt worried or upset because other teens were purposefully bothering you either on the internet, e-mail, or through text messaging?”; “Has anyone used the internet, e-mail, or text messaging to threaten, harass, or embarrass you by posting information or sending messages about you?”; and “Has anyone posted a message on your personal website (Facebook or other website) to threaten, harass, or embarrass you?”

Hostility—The Symptom Checklist-90 Revised version (SCL-90-R; Derogatis & Unger, 2010) is a 90-item self-report measure of psychological distress across a range of domains which include hostility. The hostility subscale is composed of 6 items rated on a 4-point Likert scale assessing the frequency of hostile thoughts, feelings and behaviors with response choices ranging from *never* to *most of the time*. For instance, items included how often the respondent “felt easily annoyed or irritated,” “had temper outbursts s/he cannot control,” and “shouted or threw things.” The SCL-90-R is one of the most widely used measures of symptom burden for a range of mental disorders (Prinz et al., 2013). Internal consistency for the hostility subscale in the present study was $\alpha = .82$.

Data Analysis

Data were collected at five annual time points from Spring 2010 (Time 1; T1) through Spring 2014 (Time 5; T5). Missing data for depressive symptoms was present at each wave, with 0.5% ($n = 5$) missing at T1, 7.8% ($n = 81$) at T2, 14.4% ($n = 150$) at T3, 25.9% ($n = 270$) at T4, and 33.9% ($n = 353$) at T5. Missing data was assessed by computing a dummy variable representing the presence or absence of missing data for each variable. This dummy variable was then correlated with demographic variables, as well as hypothesized predictor variables. Significant correlations were observed between age at first assessment (T0) and the likelihood of missing data from T2 through T4, such that older adolescents were less likely to provide follow-up data, indicating the potential for bias due to missing data. Age was thus included as a covariate/predictor in all growth mixture models (GMM) in which class membership was predicted. Full information maximum likelihood (FIML) was used to estimate missing data; FIML can effectively recover parameter estimates with missing data (Collins et al., 2001; Enders, 2011).

Prior to analysis, the data were evaluated for multivariate outliers by examining leverage indices for each individual and influence values for each predictor and individual. An outlier was defined as a leverage score four times greater than the mean leverage or a $df\beta$ greater than an absolute value of one for any variable. No cases were identified as statistical outliers using these criteria.

As outlined by Jung & Wickrama (2008), an unconditional latent growth curve model was first fit to the data. A cubic growth model, with quadratic and cubic variances fixed to zero to achieve a positive definite psi matrix, was used as a basis for subsequent analyses. Though the model provided good overall fit ($\chi^2(8) = 20.50, p = .008$; RMSEA = .04, CFI = 0.99, TLI = 0.99, standardized RMR = .05), examination of points of ill fit in the model revealed significant variances for the intercept (variance = 15.95, $p < .001$) and linear slope (variance = 0.85, $p < .001$), indicating that the single-class model did not adequately account for variation in individuals' depressive symptom trajectories.

Next, a series of GMMs estimating 1-6 classes were employed to explore the presence of subgroups with distinct symptom trajectories. For GMM models, means and slopes (linear, quadratic, and cubic) were allowed to vary between classes and means and linear slopes were allowed to vary within classes, with quadratic and cubic slope variances fixed to zero within classes for the purpose of model estimation (Jung & Wickrama, 2008). Each k -class model was compared to a $k - 1$ class model with respect to sample-size adjusted BIC (adj.

BIC), Vuong-Lo-Mendell-Rubin (VLMR) and Bootstrap (BLRT) likelihood ratio tests, and with respect to parsimony and interpretability (entropy, average latent class probabilities, and class size; Jung & Wikrama, 2008; Nylund et al., 2007; Tofghi & Enders, 2007). Lower adj. BIC values are indicative of better model fit. Significant VLMR and BLRT tests favor the k class model over the $k - 1$ class model. Higher entropy and latent class probabilities indicate greater parsimony. Once the optimal model was selected, predictors of latent class membership were entered into the model.

Results

Descriptive statistics for all study variables, as well as the correlations between them are provided in Table 1. Participants were categorized into groups based on the presence of any self-reported history of bully and cyberbully victimization and perpetration. Three mutually exclusive groups were defined, separately for bullying and cyberbullying: perpetrators, victims, and joint victim-perpetrators. Table 2 presents differences across bullying and cyberbully groups with regard to demographic and clinical characteristics. With regard to bullying, victims reported significantly greater baseline depressive symptoms and were more likely to be female than bully perpetrators. With regard to cyberbullying, victims reported significantly less trait hostility than either perpetrators or joint victim-perpetrators. In addition, cyberbully victims were more likely to be female than joint victim-perpetrators.

Identification of Depressive Symptom Trajectories

A quadratic growth model was used to estimate GMMs with 1-6 latent classes, relative fit indices for all models are presented in Table 3. Adj. BIC indicated gains through a 6-class model, VLMR values indicated preference for the 1-class or 4-class solution and BLRT values indicated preference for at least 6 classes. Average latent class probabilities and entropy values indicated support for a 4-class solution as containing the most clearly delineated classes. The interpretability of more than 4 classes was limited due to small class sizes (< 5% of the sample) for solutions beyond a 4-class solution. Taken together, a 4-class solution was retained.

Figure 1 presents the depressive symptoms trajectories of the 4-class solution. The first class ($n = 777$) demonstrated a mild trajectory of depressive symptoms with a significant mean intercept (16.81, $SE = 0.16$, $p < .001$), and with significant linear (0.96, $SE = 0.35$, $p < .01$), quadratic (-0.62 , $SE = 0.24$, $p = .01$), and cubic slopes (0.10, $SE = 0.04$, $p = .02$). The second class ($n = 77$) demonstrated an increasing trajectory of depressive symptoms with a significant mean intercept (18.61, $SE = 0.63$, $p < .001$), and with significant linear (9.24, $SE = 1.90$, $p < .001$) and quadratic (-3.03 , $SE = 1.40$, $p = .03$) slopes, but a non-significant cubic slope (0.23, $SE = 0.23$, $p = .33$). The third class ($n = 92$) demonstrated an elevated trajectory of depressive symptoms with a significant mean intercept (26.20, $SE = 0.72$, $p < .001$), but with non-significant linear (0.16, $SE = 1.52$, $p < .92$), quadratic (-0.46 , $SE = 1.18$, $p < .70$), and cubic slopes (0.12, $SE = 0.22$, $p = .60$). The fourth class ($n = 95$) demonstrated a decreasing trajectory of depressive symptoms with a significant mean intercept (27.78, $SE = 0.75$, $p < .001$), and with significant linear (-12.17 , $SE = 1.87$, $p < .001$), quadratic (5.09, $SE = 1.16$, $p < .001$), and cubic slopes (-0.64 , $SE = 0.19$, $p = .001$).

A comparison of baseline depressive symptoms across symptom trajectory classes revealed symptom severity differences among the classes at baseline: Participants in the decreasing and elevated classes were not significantly different at baseline, Wald $\chi^2(1) = 2.09, p = .15$, though all other symptom classes differed significantly with regard to baseline depressive symptoms, Wald $\chi^2(1) = 6.68-240.94, p < .01$.

Predictors of Depressive Symptoms Trajectories

Predictors of latent classes were then entered into the 4-class model, including age (centered at 13 years), gender, race/ethnicity, bully victimization and perpetration, cyberbully victimization and perpetration, and hostility. The model provided good overall classification, with average latent class probabilities of 0.94, 0.82, 0.81, and 0.80 respectively. Table 4 provides the means and standard deviations of all predictor variables for each class, based on extracted most likely latent class membership.

With regard to bully victimization, participants in the mild and decreasing symptom classes reported significantly less bully victimization than participants in the increasing and elevated symptom classes (mild vs. increasing $b = -0.61, SE = 0.19, p = .001$; mild vs. elevated $b = -0.88, SE = 0.20, p < .001$; decreasing vs. increasing $b = -0.51, SE = 0.25, p = .04$; decreasing vs. elevated $b = -0.79, SE = 0.30, p < .01$).

With regard to cyberbully victimization, participants in the mild symptom class were significantly less likely to be cyberbully victims than participants in the elevated and decreasing symptom classes (mild vs. elevated $b = -0.91, SE = 0.37, p = .02$; mild vs. decreasing $b = -1.03, SE = 0.36, p < .01$).

With regard to hostility, participants in the mild symptom class reported significantly less hostility than participants in the increasing, decreasing, and elevated symptom classes (mild vs. increasing $b = -0.19, SE = 0.05, p = .001$; mild vs. decreasing $b = -0.32, SE = 0.05, p < .001$; mild vs. elevated $b = -0.32, SE = 0.05, p < .001$). In addition, participants in the increasing symptom class reported significantly less hostility than participants in the decreasing and elevated symptom classes (increasing vs. decreasing $b = -0.14, SE = 0.06, p = .02$; increasing vs. elevated $b = -0.14, SE = 0.07, p = .04$).

With regard to gender, participants in the mild symptom class were significantly less likely to be female than participants in the increasing and elevated symptom classes (mild vs. increasing $b = -0.69, SE = 0.34, p = .04$; mild vs. elevated $b = -1.56, SE = 0.49, p < .001$). Finally, with regard to ethnicity, participants in the mild symptom class were significantly more likely to be Hispanic than participants in the elevated symptom class ($b = 0.95, SE = 0.48, p = .049$).

Bully perpetration, cyberbully perpetration, and age were not significant predictors of latent class membership.

Discussion

The present study examined differences between bully and cyberbully victims, perpetrators, and joint victim-perpetrators. This study then identified trajectories of depressive symptoms

in adolescence and emerging adulthood using a school-based sample of adolescents assessed over a five-year period. The study also examined whether bully and cyberbully victimization and perpetration significantly predicted depressive symptom trajectories. Consistent with previous research, multiple trajectories of depressive symptoms were identified across late adolescence (e.g., Stoolmiller et al., 2005; Yaroslavsky et al., 2013). Specifically, four depressive symptoms trajectories were identified in this sample including those with a mild trajectory of depressive symptoms, an increasing trajectory of depressive symptoms, an elevated trajectory of depressive symptoms, and a decreasing trajectory of depressive symptoms.

Regarding differences among bullying groups, bully victims reported significantly greater baseline depressive symptoms than bully perpetrators, though the absolute value of this difference was quite small. In contrast, there were no significant differences among cyberbully victims, perpetrators, and joint victim-perpetrators with respect to baseline depressive symptoms. Thus, differences in baseline symptoms do not appear clearly distinguished between bully or cyberbully groups. However, cyberbully victims reported less hostility than either cyberbully perpetrators or joint victim-perpetrators. One possible explanation for the difference in hostility associated with cyberbullying groups is that individuals who engage in cyberbully perpetration experience elevated levels of anger or aggression in a variety of contexts and utilize cyberbullying as a coping mechanism for expressing hostility. There were also significant differences with regard to gender, such that girls were more likely to be bully and cyberbully victims, indicating that particular attention should be paid to victimization among adolescent girls.

Regarding depressive symptom trajectories, adolescents who reported a mild trajectory of depressive symptoms constituted nearly three-fourths of the sample and reported a low rate of bully and cyberbully victimization, low levels of hostility, and were more likely to be male compared to adolescents on other trajectories. As expected, the majority of adolescents reported few depressive symptoms across the duration of the study and reported being neither the victims nor perpetrators of bullying. This is consistent with previous literature with regard to the role of bullying and its relation to depressive symptoms (e.g., Klomek et al., 2007). It is also consistent with the higher rate of depressive symptoms among females, as compared with males, that emerges in adolescence (e.g., Ge et al., 2001).

The remaining one-fourth of adolescents comprises the three remaining depressive symptom trajectories. Approximately 7% of adolescents reported an increasing trajectory of depressive symptoms. These adolescents had similar baseline levels of depressive symptoms as those adolescents on the mild symptom trajectory, but showed significant elevations in depressive symptoms over time. Adolescents on the increasing symptom trajectory were more likely to be victims of bullying, showed greater trait hostility, and were more likely to be female as compared with individuals on the mild trajectory. These adolescents were not more likely to report cyberbully victimization relative to other groups. It is worth noting that the increasing trajectory of depressive symptoms was curvilinear, with symptoms peaking at Time 3 and showing moderate decreases at Times 4 and 5. This may imply an adolescent-limited symptoms course, though without additional data it is not possible to determine how the depressive symptoms of those on the increasing symptom trajectory would progress over

time. Educators, school counselors, and other school personnel who identify adolescent bully victims, even without the presence of elevated depressive symptoms, should be aware that an increasing trajectory of depressive symptoms may result. In addition to taking action against bullying, school personnel may wish to direct victims to depression prevention services.

A third group of adolescents reported a consistently elevated trajectory of depressive symptoms across adolescence, with elevated baseline depressive symptoms that remained elevated over time. Adolescents on the elevated symptom trajectory reported significantly greater levels of bully and cyberbully victimization than those on the mild symptom trajectory, but not compared with those on the increasing symptoms trajectory. Adolescents on the elevated symptom trajectory were distinguishable from those on the increasing symptom trajectory based on their elevated depressive symptoms and higher levels of hostility at baseline. In terms of service delivery, adolescents who are the victims of both bullying and cyberbullying, and report elevated depressive symptoms, may be at risk for maintained elevations in depressive symptoms over time and should be directed toward more intensive interventions. Although speculative, the elevated levels of trait hostility associated with this trajectory also suggests more complex interpersonal relations for these adolescents where the experience may interact or be mediated by trait hostility, thereby maintaining high levels of depressive symptoms and potential social isolation.

The fourth and final class of adolescents reported a decreasing trajectory of depressive symptoms over time, beginning with a sharp decline over the first year of the study. Adolescents on the decreasing symptom trajectory reported significantly lower levels of bully victimization than adolescents on either the increasing or elevated symptom trajectories. They did, however, report greater cyberbully victimization than adolescents on the mild symptom trajectory. Those on the decreasing symptom trajectory can be distinguished from those on the elevated symptom trajectory based on the rate of bully victimization they reported at baseline. This distinguishing characteristic may assist school personnel in correctly distinguishing between adolescents likely to show consistently elevated depressive symptoms versus those likely to show decreases in symptoms over time.

These data appear to indicate a pattern in which greater cyberbully victimization is associated with elevated depressive symptom levels at baseline. Individuals on the elevated and decreasing symptoms classes, who showed elevated baseline depressive symptoms, reported greater cyberbully victimization than adolescents on the mild trajectory. It may be that cyberbully victimization is particularly pernicious at a younger age, resulting in depressive symptoms occurring in early-to-mid adolescence, coinciding with the baseline evaluation in the present study. In contrast, the data indicate that greater bully victimization is associated with elevated depressive symptoms at later assessment points. That is, adolescents on the increasing and elevated trajectories, whose depressive symptoms were elevated at later time points, were also those who reported greater bully victimization at baseline. This may indicate that bully victimization, distinct from cyberbully victimization, becomes increasingly associated with depressive symptoms during late adolescence. Taken together, this indicates the possibility that bully and cyberbully victimization may have

differential impacts across adolescence, a point that future research should examine more thoroughly.

Future research should critically examine possible differences between bullying and cyberbullying that may help to explain the apparent differential relationship between types of bullying and trajectories of depressive symptoms. Cyberbullying may qualitatively differ from other types of bullying. For example, cyberbully via social media platforms may quickly spread one domain of social relationships (e.g., being bullied by classmates) to other domains (family, community groups, etc. may see it online). Thus cyberbullying has the potential to spread rapidly, impacting multiple areas of an adolescent's life. In contrast, physical bullying may be limited to one or two settings, such as a school or park. Thus, potential differences in the form of bullying should be explored, particularly as they relate to depressive symptoms in adolescence.

The data presented here also set the stage for future research that may impact the way in which adolescents are directed to depression prevention and treatment services. Future research should focus on the development screening algorithms based on bullying and cyberbullying constructs to predict adolescent depressive symptom trajectories. Knowing *a priori* which symptom trajectory an adolescent is most likely to follow would allow school mental health personnel to direct that adolescent to depression prevention services (in the event of an increasing trajectory) or depression treatment (in the event of an elevated trajectory).

Strengths and Limitations

The findings of this study should be considered in light of the study's strengths and limitations. The data are based on adolescents' self-reports of bully victimization and perpetration. Although participants were instructed that a certificate of confidentiality protected their answers, social desirability may have impacted self-reports of bully perpetration. Alternatively, adolescents may not always recognize their own behaviors as bully perpetration and so may not self-identify as bullies, which may explain the limited findings with regard to bully perpetration. In addition, the definition of bullying used in this study did not differentiate between verbal, physical, and relational forms of bully perpetration and victimization, which limits the ability of the study to examine differential impacts of these forms of bullying on depressive symptoms trajectories. Despite the fact that various forms of bullying were predictive of class membership, there are other factors contributing the onset, maintenance, or remission of depressive symptoms that went unmeasured. To this end, this study only examined specific forms of negative peer relations in adolescent depression. Future studies may benefit from also examining parental relations in this bullying context as some work has shown that parental support can mitigate the effects of peer problems on adolescent depressive symptoms (Stice et al., 2004). Finally, while the response rate for the study around the generally accepted cutoff for studies of this type (Johnson & Wislar, 2012), it is possible that self-selection biases may be present in the data.

Conclusions

The present study identified trajectories of depressive symptoms in adolescents and emerging adulthood using a school-based sample of adolescents assessed over a five-year period. Four trajectories of depressive symptoms were identified, including those with a mild trajectory of depressive symptoms, an increasing trajectory of depressive symptoms, an elevated trajectory of depressive symptoms, and a decreasing trajectory of depressive symptoms. The study also examined the role of bully and cyberbully victimization and perpetration as predictors of depressive symptom trajectories. Results indicated that bully victimization and cyberbully victimization differentially predicted depressive symptom trajectories across adolescence, though bully and cyberbully perpetration did not. These findings may inform school personnel in identifying students' likely trajectory of depressive symptoms and determining where depression prevention and treatment services are indicated.

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Highlights

Bully/cyberbully victimization, not perpetration, predict depression trajectories.

Findings assist school personnel in identifying students' depression trajectories.

Four depression trajectories identified across adolescence and emerging adulthood.

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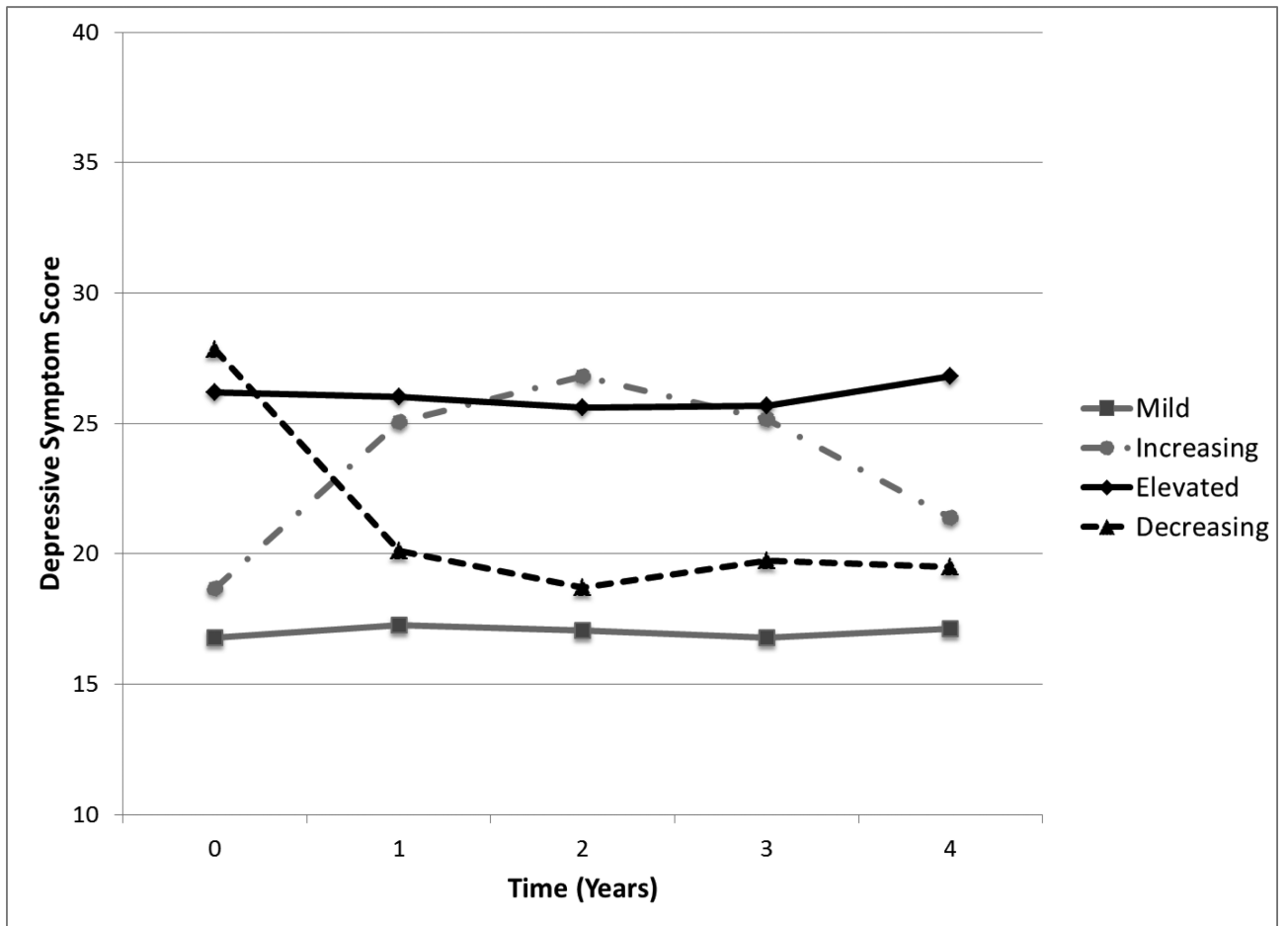


Figure 1.
“Depressive Symptom Trajectories.”

Table 1

Descriptive Statistics of Study Variables and Correlations between Them

	1	2	3	4	5	6	7	Mean	(SD)	%
1. Depressive symptoms	--							18.88	(5.17)	
2. Bully perpetration	.11**	--						1.50	(0.75)	
3. Bully victimization	.26***	.37***	--					1.53	(0.85)	
4. Cyberbully perpetration	.10**	.26***	.13***	--				--	--	11.3%
5. Cyberbully victimization	.23***	.15***	.28***	.38***	--			--	--	28.0%
6. Hostility	.45***	.28***	.21***	.23***	.14***	--		11.71	(3.76)	
7. Participant sex	.19***	-.08*	-.02	-.01	.10**	.11***	--	--	--	55.9% (Female)
8. Age (in years)	.06	-.04	-.08*	-.00	.02	.04	.03	15.09	(0.79)	

Note.

All variables measured at Time 1

* $p < .05$

** $p < .01$

*** $p < .001$

Table 2

Comparison of Bully and Cyberbully Perpetration and Victimization Groups

Bully Group:	Perpetrators	Victims	Victim-Perpetrators	X² or F-statistic	p-value
<i>n</i> (percent)	136 (27.0%)	131 (26.0%)	237 (47.0%)		
Participant sex (% female)	46.3% ^a	61.8% ^a	52.3%	$\chi^2(2) = 6.58$.04
Participant age	15.12 (0.78)	14.98 (0.81)	14.99 (0.77)	F(2,501)=1.41	.25
Baseline depressive symptoms	19.19 (5.67) ^a	21.02 (5.63) ^a	20.10 (5.25)	F(2,501)=3.75	.02
Hostility	12.89 (4.04)	12.40 (3.60)	12.90 (3.79)	F(2,504)=0.80	.45
Bully Group:	Perpetrators	Victims	Victim-Perpetrators	X² or F-statistic	p-value
<i>n</i> (percent)	29 (9.1%)	202 (63.3%)	88 (27.6%)	--	--
Participant sex (% female)	62.1%	69.3% ^a	52.3% ^a	$\chi^2(2) = 7.76$.02
Participant age	15.14 (0.79)	15.19 (0.74)	15.07 (0.80)	F(2,316)=0.21	.81
Baseline depressive symptoms	18.97 (6.47)	20.83 (5.57)	20.85 (5.48)	F(2,305)=1.45	.24
Hostility	14.44 (4.95) ^a	11.96 (3.38) ^{ab}	14.02 (4.23) ^b	F(2,316)=12.26	<.001

Note. Identical superscripts denote significant differences, based on Scheffe's post-hoc tests and individual chi-squared tests with 1 degree of freedom.

Table 3

Relative Fit Indices for 1 through 6 Class Models

Number of classes	Adj. BIC	BLRT	VLMR	Entropy
1	25604.91	--	--	--
2	25485.48	138.29***	138.29	.766
3	25362.38	141.96***	141.96	.808
4	25277.98	79.40***	79.40**	.822
5	25252.51	68.19***	68.19	.780
6	25232.76	38.60***	38.60	.793

Note. Adj. BIC = sample size-adjusted Bayesian Information Criterion; BLRT = bootstrap likelihood ratio test; VLMR = Vuong-Lo-Mendell-Rubin likelihood ratio test

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Table 4

Means and Standard Deviations of Predictor Variables for Each Class at Time 1

	Class 1: Mild Symptom Class (<i>n</i> = 777)	Class 2: Increasing Symptom Class (<i>n</i> = 77)	Class 3: Elevated Symptom Class (<i>n</i> = 92)	Class 4: Decreasing Symptom Class (<i>n</i> = 95)
1. Depressive symptoms	16.82 (<i>3.16</i>)	18.94 (<i>3.24</i>)	26.50 (<i>3.26</i>)	28.34 (<i>3.48</i>)
2. Bully perpetration	1.46 (<i>0.73</i>)	1.58 (<i>0.74</i>)	1.61 (<i>0.84</i>)	1.65 (<i>0.79</i>)
3. Bully victimization	1.42 (<i>0.73</i>) ^{ab}	1.84 (<i>1.03</i>) ^{ac}	2.10 (<i>1.02</i>) ^{bd}	1.65 (<i>0.91</i>) ^{cd}
4. Cyberbully perpetration	9.4%	18.9%	17.2%	14.9%
5. Cyberbully victimization	22.8% ^{ab}	35.1%	50.5% ^a	42.6% ^b
6. Hostility	10.92 (<i>3.24</i>) ^{abc}	12.95 (<i>4.05</i>) ^{ade}	14.50 (<i>3.92</i>) ^{bd}	14.55 (<i>4.44</i>) ^{ce}
7. Age (in years)	15.08 (<i>0.79</i>)	15.07 (<i>0.83</i>)	15.06 (<i>0.78</i>)	15.12 (<i>0.75</i>)
8. Participant sex (% female)	51.28% ^{ab}	64.86% ^b	75.27% ^a	68.09%
9. Ethnicity (%Hispanic)	30.77% ^a	31.08%	29.03% ^a	25.53%
10. Race (% Black)	34.49%	32.43%	23.66%	29.79%

Note. All variables measured at Time 1; identical superscripts denote significant differences.

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