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# Depression, Anxiety, and Peer Victimization: Bidirectional Relationships and Associated Outcomes Transitioning from Childhood to Adolescence

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## Abstract

Experiences of depression, anxiety, and peer victimization have each been found to predict one another, and to predict negative outcomes in the domains of school connectedness, social functioning, quality of life, and physical health. However, the common co-occurrence of depression, anxiety, and peer victimization experiences has made it difficult to disentangle their unique roles in these associations. The present study thus sought to characterize the precise nature of the bidirectional relationships between depressive symptoms, anxiety, and victimization over time, and to examine their unique sequelae during the transition from childhood to early adolescence. Longitudinal multi-informant (child-, parent-, and teacher-reported) data from a nationally representative sample were analyzed using path analysis when the study child was aged 10–11 ( $n = 4169$ ;  $M_{\text{age}} = 10.3$ ; 48.8% female) and aged 12–13 ( $n = 3956$ ;  $M_{\text{age}} = 12.4$ ; 48.2% female). Depressive symptoms, anxiety, and peer victimization had small but significant unique bidirectional relationships. All three constructs also uniquely and prospectively predicted poorer life functioning across all domains examined. These results demonstrate that current interventions should broaden their scope to simultaneously target depression, anxiety, and peer victimization, as

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### Authors' Contributions

MKF and RMR conceived of the study; MKF designed and conducted the statistical analyses, interpreted the results, drafted the Abstract, Method, Results, and Discussion, and revised the manuscript critically for intellectual content; SF wrote the first draft of the Introduction, and revised the manuscript critically for intellectual content; NRM wrote subsequent drafts of the Introduction, contributed to the revised discussion, and revised the manuscript critically for intellectual content; RMR participated in drafting all sections of the manuscript, and revised the full manuscript critically for intellectual content. All authors read and approved the final manuscript.

### Conflicts of Interest

The authors report no conflict of interest.

### Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

### Ethical Approval

The Longitudinal Study of Australian Children was approved by the Australian Institute of Family Studies Ethics Committee.

### Informed Consent

All individual participants provided informed consent.

### Data Sharing Declaration

The data that support the findings of this study were obtained from the Department of Social Services under license. Restrictions apply to the availability of these data, so they are not publicly available.

each of these experiences independently act as additive risk factors for subsequent negative outcomes.

## Keywords

Depression; anxiety; peer victimization; internalizing symptoms; longitudinal research

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## Introduction

Peer victimization is a prevalent and pervasive problem with substantial negative consequences (Craig et al., 2009). Approximately one third of all young people report experiences of physical, verbal, relational, or cyber victimization by peers (Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014). The peak prevalence of peer victimization is in early adolescence (11–14 years; Hymel & Swearer, 2015). This peak coincides, in many countries, with the transition from primary to secondary school as well as a sharp increase in the salience of peer relationships as young adolescents try to gain social status and acceptance from peers during the formation of new friendship groups (Sentse, Kretschmer, & Salmivalli, 2015). Further, adolescence is a key period of brain development as the brain regions involved in emotion regulation are underdeveloped and stress-reactivity is heightened (Spear, 2009). The onset of early adolescence is thus a key developmental period for experiencing peer victimization, and being particularly vulnerable to its negative consequences.

The psychosocial maladjustment associated with victimization is well established. Exposure to victimization predicts earlier onset (Snyder, Prichard, Schrepferman, Patrick, & Stoolmiller, 2004) and greater severity of psychopathology (Nanni, Uher, & Danese, 2012), higher comorbidity (Ranta, Kaltiala-Heino, Pelkonen, & Marttunen, 2009), and poorer treatment outcomes (Nanni et al., 2012), with the negative effects extending into adulthood (Arseneault, 2017). A substantial body of research has documented the association between experiences of peer victimization and internalizing psychopathology (e.g., symptoms of depression and/or anxiety) in particular (see Reijntjes, Kamphuis, Prinzie, & Telch, 2010 for a review). A meta-analysis of 18 longitudinal studies found evidence for a bi-directional relationship: Peer victimization predicted increases in internalizing problems over time, and internalizing problems also predicted increased risk of peer victimization over time (Reijntjes et al., 2010). These findings suggest a vicious cycle where children who are bullied not only experience internalizing distress, but may also be targeted as a result of how they manage these symptoms (Hunt, 2015).

Taken together, the current body of research indicates that internalizing symptoms act as both antecedents and consequences of peer victimization. Well-established developmental and cognitive theory suggests several possible mechanisms driving the associations between peer victimization and subsequent internalizing problems. For example, Wang (2011) proposed that victimization during adolescence would represent a significant life stressor in the cognitive model proposed by Beck and Carlson (2006), which over time results in some young people developing a distorted view of the self, the future, and the world around them.

A specific link with symptoms of depression may exist when repeated teasing and bullying creates a cognitive style that reinforces negative evaluations of the self (e.g., I am worthless, everyone hates me) and the future (e.g., my life will always be this bad; Wang, 2011). Further, persistent victimization over time may erode self-esteem and overall self-efficacy, leading to other negative cognitive styles, learned helplessness, and feelings of hopelessness (Besag, 1989). A specific link with anxiety may also manifest when repeated victimization leads to hypervigilance in social situations and the tendency to overestimate the level of threat in everyday situations (Espelage & Holt, 2001; Roth, Coles, & Heimberg, 2002). This sustained state of high alertness and increased physiological arousal may thus increase the risk of developing ongoing difficulties with anxiety.

Similarly, there are several theories that account for the links between internalizing behaviors and subsequent peer victimization. For example, children who engage in bullying often seek out targets they believe they can easily dominate (Juvonen & Graham, 2014). The increased emotionality and specific behaviors exhibited by depressed and/or anxious individuals (e.g., social withdrawal, fearfulness, avoidance, crying, and flat affect; Luchetti & Rapee, 2014) may therefore be especially likely to identify such individuals as targets because these behaviors signal emotional vulnerability to potential aggressors (Schacter & Juvonen, 2017). Reijntjes et al. (2010) similarly hypothesized that children experiencing internalizing difficulties may have more trouble defending themselves (e.g., standing up to the bully), which further solidifies their status as a victim by demonstrating to their attacker/s that they can be successfully dominated with few, if any, repercussions.

Depression and anxiety share a high level of concurrent and sequential comorbidity (Garber and Weersing, 2014), as well as phenomenological overlap (e.g., American Psychiatric Association, 2013) that is captured in the broad construct of internalizing problems. However, depression and anxiety are also empirically distinguishable from one another after early childhood (Trosper, Whitton, Brown, & Pincus, 2012) and may be independently associated with victimization. The fact that most studies have looked at either internalizing symptoms broadly (e.g., Kljakovic & Hunt, 2016) or at anxiety or depression in isolation (e.g., Sentse, Prinzie, & Salmivalli, 2017) means that the unique contributions of depression and anxiety to the cyclical relationship between peer victimization and maladjustment remain unclear (Hawker & Boulton, 2000). For example, existing research includes cross-sectional evidence that depression and anxiety are both related to peer victimization (Hawker & Boulton, 2000). Further, longitudinal self-report studies of adolescents have found that peer victimization uniquely predicts symptoms of both depression and anxiety 12 months later (Stapinski, Araya, Heron, Montgomery, & Stallard, 2015), and that depression and anxiety each have longitudinal associations with peer victimization when analysed separately (Sentse et al., 2017). These studies highlight the utility of examining depression and anxiety separately, but the question remains whether depression and anxiety have unique and prospective uni- or bi-directional relationships with experiences of peer victimization in adolescence. There is also preliminary evidence that gender may moderate the strength of these relationships over time, suggesting that anxiety may be a weaker predictor of subsequent peer victimization for boys compared to girls (Sentse et al., 2017). These relationships have not been untangled in the literature to date, which represents an important

next step to aid the development of more targeted and effective interventions for young people (Hamilton et al., 2016).

A related area for research is understanding whether experiences of depression, anxiety, and peer victimization have unique sequelae. For example, poorer school adjustment (Juvonen, Wang, & Espinoza, 2011), negative social outcomes (Hawker & Boulton, 2000), low self-efficacy (Kokkinos & Kipritsi, 2012), and poor physical health (Bogart et al., 2014) have all been associated with experiences of depression, anxiety, and peer victimization. However, studies have examined the impacts of these experiences either separately (e.g., Schwartz, Gorman, Nakamoto, & Toblin, 2005) or without controlling for the covariance among them (e.g., Moore et al., 2017). As above, the common co-occurrence of experiences of depression, anxiety, and peer victimization means that it remains unclear whether each of these experiences is *uniquely* associated with these negative outcomes. This too is critical for effective prevention, intervention, and treatment (Takizawa, Maughan, & Arseneault, 2014).

Finally, while much of the current research relies on self-report data, previous research has shown that multi-informant data including the self-, parent-, and teacher-reports each contribute valuable complementary sources of information in assessing peer victimization and maladjustment (De Los Reyes, Thomas, Goodman, & Kundey, 2013). Multi-informant data are also important to attenuate the self-presentation, social desirability, and mood-congruent recall biases that arise from the sole reliance on self-reported experiences of peer victimization and internalizing symptoms (Graham, Bellmore, & Juvonen, 2014).

## The Current Study

Existing literature suggests that depression and anxiety are related to experiences of victimization, but it remains unclear whether these relationships are with internalizing psychopathology in general (e.g., to the shared variance between depression and anxiety based on their overlap) or specific to depression and/or anxiety (e.g., to their unique variance based on the features that make them different). The unique prospective and bidirectional associations of depression and anxiety with experiences of peer victimization over time have not been tested to date. Further, the variety of negative well-being outcomes (i.e., poor school connectedness, social outcomes, quality of life, and global health) associated with depression, anxiety, and peer victimization are closely related, but it is still not clear which domains are driving these associations (i.e., whether all three domains uniquely predict each of the negative outcomes). Thus, the primary aim of the present study was to clarify these questions by examining the unique roles of depressive symptoms, anxiety, and peer victimization in predicting subsequent peer victimization and psychosocial maladjustment. A secondary aim was to examine whether these relationships differ by gender. There is some preliminary evidence that gender acts as a moderator (e.g., Sentse et al., 2017) but this question has not been tested regarding the unique roles of depressive symptoms, anxiety, and peer victimization over time. Finally, to overcome the limitations associated with self-report data, multi-informant (child, parent, and teacher reports) longitudinal data was used from a nationally representative sample during the key developmental period of early adolescence and the transition to high school.

## Methods

### Sample and Procedures

The Longitudinal Study of Australian Children (LSAC) was led by the Australian Institute of Family Studies (AIFS) and approved by the AIFS Ethics Committee. The relevant contents of the study are described below, and details of the methods have been described elsewhere (Soloff, Lawrence, & Johnstone, 2005). Briefly, LSAC provides a database to extend understanding of child development, including extensive evaluation of children's physical and mental health, education, and social, cognitive and emotional development. Data are collected using face-to-face and computer-assisted self-interviews of children and their parents in the home, and teachers' responses to paper questionnaires. LSAC has a multiple cohort cross-sequential design and is based on stratified two-stage cluster sampling (i.e., first selecting postcodes then children from the Australian Medicare database). Data were drawn from a nationally representative sample and were collected from two cohorts across all states and territories in Australia every two years starting in 2004. The present study focuses on the older cohort of children when they were aged 10–11 ( $n = 4169$ ) and aged 12–13 ( $n = 3956$ ). These samples represent 83.6% and 79.4% retention rates, respectively, from the first wave of the study when the children were aged 4–5. These samples and time lag were chosen to capture the important transition from childhood to adolescence, and from primary to secondary school, coinciding with the peak prevalence in peer victimization and early onset of internalizing disorders. Informed consent was obtained from all individual participants included in the study. Table 1 includes descriptive statistics for the sample; more detailed information on the sample is available elsewhere (Forrest & Edwards, 2015).

### Assessment

**Multi-informant depressive symptoms, anxiety, and peer victimization.**—Study informants included in the study were: children and their parents (resident and non-resident) and teachers. The methodological requirements to have all respondents answer the same questions (De Los Reyes et al., 2015) and to have consistent measures at each time point (Little, 2013) limited the available items for analyses. All informants completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) based on their knowledge of the study child. The SDQ is a 25-item measure of behavioral and emotional problems for children aged 3–16, which provides scores from “not at all true” (1) to “certainly true” (3) on five, five-item subscales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviors. The SDQ has been validated extensively (e.g., Muris, Meesters, & van den Berg, 2003) and has acceptable reliabilities for parent, teacher, and self-report versions (e.g., Goodman, Lamping, & Ploubidis, 2010). In the current study, the five items relating specifically to symptoms of depression (“often unhappy, depressed, or tearful”), anxiety (“many worries or often seems worried”; “many fears, easily scared”; “nervous or clingy in new situations, easily loses confidence”), and peer victimization (“picked on or bullied by other children”) were used to operationalize the three core constructs of interest, with higher scores indicating worse outcomes in each domain. The reliability of these items based on the multiple informants' responses is discussed in detail below.

### **Child self-reported depressive symptoms, anxiety, and peer victimization.—**

There were additional child self-report measures included at age 12–13 that offered more detailed measurement of experiences of depressive symptoms, anxiety, and peer victimization. These measures were analyzed as a follow-up to the multi-informant models.

**Depressive symptoms.:** The Short Mood and Feelings Questionnaire (SMFQ; Angold, Costello, Messer, & Pickles, 1995) is a 13-item measure of depressive symptoms over the past two weeks (e.g., “I felt miserable or unhappy”) rated from “true” (1) to “not true” (3). Items were reverse-scored so higher scores indicated more severe depressive symptoms. In the present study the SMFQ had acceptable internal consistency (Cronbach’s  $\alpha = .93$ ).

**Anxiety.:** The child self-report questionnaire also included eighteen items assessing anxiety that measured either the amount of worry about a topic (e.g., “terrorism or war”) rated from “not at all worried” (1) to “very worried” (4) or the frequency of specific types of anxiety (e.g., “I worry what others think of me”) rated from “never” (1) to “always” (4). Given the different measurement scales, these items were transformed into a count variable of significant worries based on the number of items about which the child reported feeling “fairly worried” or “very worried” or worrying about “often” or “always”. In the present study, these items had acceptable internal consistency ( $\alpha = .82$ ).

**Peer victimization.:** There were also seven items that asked about the frequency of experiences of peer victimization at school in the past month, rated from “never” (1) to “several times a week or more” (4). Three items asked about physical victimization (e.g., “kids hit or kicked me on purpose”), three items asked about relational victimization (e.g., “kids did not let me join in what they were doing”), and one item asked about cyber victimization (“kids send me a mean text or email, or posted mean things about me on the internet (e.g., on Facebook, MySpace”). These items were used to calculate three dichotomous (yes/no) variables of the experiences of physical, relational, and cyber victimization based on any of the relevant items being endorsed with a frequency of “about once a week” or more (Olweus, 1996).

### **School connectedness, social outcomes, quality of life, and global health.—**

Child self-report measures were also collected about school connectedness, social outcomes, quality of life, and global health at age 12–13. School connectedness was assessed based on school belonging and enjoyment: School belonging was measured using the Psychological Sense of Membership to the School (Goodenow, 1993), which is a 12-item scale (e.g., “I feel like a part of my school”) rated from “not at all true” (1) to “completely true” (5) ( $\alpha = .85$  in the present study). School enjoyment was measured using 12-items (e.g., “My school is a place where I feel happy”) rated from “strongly disagree” (1) to “strongly agree” (4) ( $\alpha = .90$  in the present study). Social outcomes were assessed using two subscales from the well-validated SDQ described above: First, the Peer Relationship Problems scale (e.g., “I would rather be alone than with people my own age”), excluding the peer victimization item described above to avoid confounding. This scale had low internal consistency in the present study ( $\alpha = .51$ ), regardless of whether the victimization item was included ( $\alpha = .57$  for the full scale). Second, the Prosocial Behavior subscale (e.g., “I usually share with others”),

which also had low internal consistency in the present study ( $\alpha = .66$ ). Quality of life was operationalized as self-efficacy and global happiness: Self-efficacy was measured using five items (e.g., “If I really try, I can do almost anything I want to”), rated from “false” (1) to “true” (5) ( $\alpha = .86$  in the present study). Children also rated their global happiness (“In general, I am happy with how things are for me in my life right now”) from “strongly disagree” (1) to “strongly agree” (5). Finally, global health (“In general, how would you say your current health is?”) was rated from “excellent” (1) to “poor” (5). To generate readily interpretable regression coefficients based on percentage change in each outcome, the total scores for these domains were all transformed to 0–100 point scales—with higher scores indicating better outcomes—based on the maximum possible range for each measure.

## Data Analysis

Multi-informant data were analyzed in the framework of the Operations Triad Model (De Los Reyes et al., 2013) examining the relationships among peer victimization, depressive symptoms and anxiety by modelling their natural variation over time. Predicting concordance among child, parent, and teacher reports, the analyses were approached testing for converging operations (i.e., similarity among respondents). De Los Reyes et al. (2013) recommended that if evidence for converging operations is found, then differences between informants should be treated as measurement error and the responses should be combined to strengthen the reliability of the measurement. While aggregation of informants is not particularly common in multi-informant research, it is well-suited to these analyses given extensive previous research has found convergent validity among parent, teacher, and child reports on the SDQ (e.g., Becker, Hagenberg, Roessner, Woerner, & Rothenberger, 2004) and because the difference between the informants’ ratings was not a focus (Homburg, Klarmann, & Totzek, 2012).

The recommendations from Homburg et al. (2012), Wagner, Rau, and Lindemann (2010), and LeBreton and Senter (2008) were followed to evaluate the multi-informant data: A combination of consensus checks (i.e., the level of agreement between informants) and reliability checks (i.e., the relative consistency of informants’ responses) was used to assess the quality of the multi-informant data. Given the study child was the subject of all informants’ responses, the within-group interrater reliability agreement index ( $r_{WG(j)}$ ) provides empirical evidence for whether the data are suitable to be aggregated to represent the constructs of interest (i.e., child symptoms of depression and anxiety, and victimization experiences; LeBreton & Senter, 2008). This index is standardized, and as conservatively suggested by Brown and Hauenstein (2005) values above .7 and .8 indicate moderate and strong agreement, respectively.

Average deviation from the mean ( $AD_M$ ) was also examined for each informant. Based on Burke and Dunlap’s (2002) guidelines, high agreement for three-point scales was indicated by  $AD_M$ s less than .48. Interrater reliability was measured using intraclass correlation ( $ICC$ ) measures  $ICC(3, 1)$  and  $ICC(3, k)$ . An analysis at an aggregate level is justified if the  $ICC(3, 1)$  is positive and significantly different from zero (Dixon & Cunningham, 2006). The  $ICC(3, k)$  indicates the reliability of the informants’ mean ratings. Based on the consensus and reliability checks, unreliable informants can be determined and should be eliminated if



they are unreliable on all core constructs (Homburg et al., 2012). Following consensus and reliability checks, the measurement models for combining the informants' responses were checked, and the responses were aggregated by taking the arithmetic mean of included informants, which gives the informants equal weight (Van Bruggen, Lilien, & Kacker, 2002).

Path analyses were conducted with the aggregated multi-informant depressive symptoms, anxiety, and peer victimization variables at both waves, and subsequently using the more detailed child self-report variables at age 12–13. Secondary path analyses examined the relationships between the aggregated multi-informant variables at age 10–11, and child self-reported school connectedness, social outcomes, quality of life, and global health at age 12–13. Depressive symptoms, anxiety, and peer victimization were included simultaneously as predictors and separate models were run for each type of outcome, controlling for gender. This allowed us to determine the independent predictive effects of depressive symptoms, anxiety, and victimization in each domain (e.g., the strength of the unique predictive effect of depressive symptoms for social outcomes, after controlling for anxiety and victimization). Gender was also examined as a moderator in all models. Significance levels of all path analyses were adjusted for a paper-wide false discovery rate of 5% using the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995). Where the strengths of path coefficients were compared, this was based on their 99% confidence intervals, but was not adjusted for multiple comparisons and so should be interpreted with caution.

Children were included in analyses if they had data for at least one variable in the model, which maximized the sample size for each analysis. Missing information was handled using full information maximum likelihood estimation (FIML) to avoid introducing bias by excluding respondents with missing data<sup>1</sup> (Enders, 2011). FIML uses all of the available data from each respondent to generate the most likely population parameter estimates without discarding incomplete cases or imputing values. Initial reliability and consensus checks for the multiple informants' responses were conducted in SPSS version 22. All other analyses were conducted in MPlus version 7 (Muthén & Muthén, 1998–2012).

## Results

### Consensus and Reliability Checks of Informants' Responses

Preliminary analysis of the item total correlations (ITCs) and  $AD_{MS}$ s suggested that nonresident parents were unreliable informants on all constructs: They consistently had the largest deviations from the other informants, had negative ITCs for all items, and were consequently excluded from all analyses. Based on the two resident parents, teacher, and child reported symptoms of depression, anxiety, and experiences of victimization, all items had 78–91% of  $r_{WG(J)}$  indices indicating strong agreement between informants (81–93%

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<sup>1</sup>Comparing participants with data at both waves (age 10–11 and age 12–13;  $n = 3862$ ) to those with data only at age 10–11 ( $n = 307$ ) suggested that the FIML assumption of missing at random was appropriate. Specifically, comparing the participants on all study variables at age 10–11 (see Table 2) showed that the two groups had no differences exceeding a small standardized effect size (Cohen's  $d$  and  $\phi_{df=1} = .1$ ). The proportion of participants who spoke English as their main language at home did differ significantly (90.1% of retained participants compared to 82.2% of attrited participants,  $\chi^2(1) = 18.44, p < .001$ ), but this difference was associated with only a small effect size ( $\phi = .067$ ). No other variables were associated with significant group differences.

indicating moderate to strong agreement), and 67–88% of AD<sub>M</sub>S indicated high agreement. *ICC*(3, 1) values were all positive and significant, and *ICC*(3, k) values indicated that the mean scores had fair to good reliability in distinguishing between children. The measurement models were checked for aggregating items across informants at each wave, and all models provided excellent fit (CFIs > .984, TLIs > .953, RMSEAs < .038, SRMRs < .016). Taken together, these results indicated that the informants' responses should be aggregated. The arithmetic mean of all four respondents for each item was taken at each wave to give all informants equal weight (Van Bruggen et al., 2002), and the three anxiety items were combined.

## Path Analyses

**Multi-informant depressive symptoms, anxiety, and peer victimization.**—The multi-informant path analyses showed that depressive symptoms and anxiety had small but significant unique bidirectional relationships with peer victimization, and all constructs also predicted their own change over time<sup>2</sup> (see Figure 1). The domains were also moderately correlated within each wave. There were no significant interactions between gender and depressive symptoms, anxiety, or peer victimization in predicting any of the dependent variables—indicating that the effects of these domains did not differ by gender (i.e., gender was not a significant moderator).

**Child self-reported depressive symptoms, anxiety, and peer victimization.**—Follow-up analyses were conducted using the multi-informant depressive symptoms, anxiety, and peer victimization variables at age 10–11 predicting the more extensive child self-reported measurement of these constructs at age 12–13 (see Figure 2). These analyses broadly replicated the path analyses based on multi-informant measures: Depressive symptoms and anxiety had small but significant bidirectional relationships with peer victimization, and all constructs also significantly predicted their own change over time. More specifically, multi-informant depressive symptoms at age 10–11 predicted self-reported physical and relational victimization at age 12–13, and multi-informant anxiety at age 10–11 predicted self-reported cyber victimization at age 12–13. Anxiety predicted later depressive symptoms, but depressive symptoms did not have a significant relationship with subsequent anxiety. Lastly, as expected, the direct effects between the waves were smaller than when the same measure was used at both waves; accordingly, the  $R^2$  values were also smaller. As for the multi-informant model, gender was not a significant moderator.

## Outcomes Related to Depressive Symptoms, Anxiety, and Victimization

Depressive symptoms, anxiety, and peer victimization at age 10–11 all uniquely predicted school connectedness, social outcomes, quality of life, and global health at age 12–13 (see Table 2). Depressive symptoms and anxiety both predicted a small but significant amount of

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<sup>2</sup>As a final check whether aggregation was appropriate, the 99% confidence intervals were compared for each path for the aggregated informants' reports of depression, anxiety, and peer victimization to the results analyzing the four informants separately (i.e., testing whether the paths differed significantly based on an uncorrected significance level of  $p < .01$ ). The results based on individual informants did not differ significantly from the aggregated reports for any of the cross-lagged paths. Children and teachers had significantly weaker autoregressive paths for anxiety and peer victimization compared to the aggregated response results, although these relationships did remain positive and statistically significant ( $p < .001$ ). The consistency in these analyses support the decision to aggregate.

change in school enjoyment, but peer victimization did not. Specifically, a one-point increase in multi-informant rated depressive symptoms or anxiety was related to a 3–4% decrease in self-reported school enjoyment at age 12–13. Depressive symptoms and anxiety also uniquely predicted small (2–3%) but significant decreases in prosocial behavior, but peer victimization did not. Beyond these differences, depressive symptoms, anxiety and peer victimization each uniquely predicted similar small (3.0–7.5%) but significant amounts of change in school belonging, peer relationship problems, and self-efficacy. Further, while there was some variation in the patterns of significance for the three predictors, the 99% confidence intervals of the effects overlapped within each outcome, indicating that the strength of the effects did not differ significantly. Models including two-way interactions among depressive symptoms, anxiety, and victimization were also analyzed, but none of the interaction terms reached significance, suggesting that the effects were additive. Finally, gender was not a significant moderator of any of the relationships.

## Discussion

Prior research has provided evidence that depression, anxiety, and peer victimization are closely related to one another (e.g., Hunt, 2015), as well as to poorer life functioning across multiple domains (e.g., Bogart et al., 2014; Hamilton et al., 2016; Juvonen et al., 2011; Moore et al., 2017). However, the specificity, strength, and direction of these relationships over time have not been disentangled to date, remaining obscured largely by the shared features and co-occurrence among experiences of depression, anxiety, and peer victimization. The three domains were analyzed together to disentangle their unique roles in these relationships using longitudinal multi-informant data from a nationally representative sample during the key developmental period of the transition from childhood to early adolescence.

### **Bidirectional Relationships between Depressive Symptoms, Anxiety, and Peer Victimization**

Depressive symptoms, anxiety, and peer victimization were related within and between waves. Bidirectional relationships between these domains over time were evident in the path analyses that used aggregated child self-reports along with resident parents' and teachers' reports of child depressive symptoms, anxiety, and victimization. For example, peer victimization at age 10–11 uniquely predicted both depressive and anxiety symptoms at age 12–13. The differences in the strengths of these relationships did not reach significance, but were in the same direction as prior research that found peer victimization to be more strongly linked to depression than anxiety (e.g., Hawker & Boulton, 2000). Similarly, depressive symptoms and anxiety at age 10–11 both uniquely predicted victimization at age 12–13 after controlling for the overlap between these domains.

Analyses including the more comprehensive child self-reports of depressive symptoms, anxiety, and peer victimization as the outcomes at age 12–13 converged on similar bidirectional relationships and provided more detail regarding the nature of these relationships. For example, while it was not a primary aim of this study, preliminary evidence was found that depression and anxiety may uniquely predict different types of peer

victimization. After controlling for concurrent peer victimization and anxiety, multi-informant reports of depressive symptoms at age 10–11 predicted higher odds of experiencing self-reported physical and relational (but not cyber) peer victimization at age 12–13. In contrast, anxiety was not a significant predictor of physical and relational peer victimization in these models, which is consistent with evidence that depression appears to be a stronger predictor of victimisation than anxiety (Hawker & Boulton, 2000).

However, after controlling for concurrent peer victimization and depressive symptoms, multi-informant reports of anxiety at age 10–11 predicted higher odds of experiencing self-reported cyber (but not physical or relational) victimization at age 12–13. This latter relationship is somewhat surprising given evidence that cyber victimization is typically thought to be an extension of traditional victimization (Modecki et al., 2014). It is possible that the overt features of depression (e.g., crying, flat affectivity) may trigger victimization where these behaviors can be observed in person (Luchetti & Rapee, 2014), whereas the relevant unique characteristics of anxiety (e.g., fearfulness) may be more easily detected in written responses in the online environment. Similarly, there may be specific features of both symptom domains that are consequences of victimization experiences. For example, as discussed earlier, peer victimization may have a specific link with depressive symptoms via the development of negative cognitive styles, learned helplessness, and hopelessness (Wang, 2011); and with symptoms of anxiety through a sustained state of hypervigilance to threats (Roth et al., 2002). It is also possible that early research showing a stronger link between victimization and depression than with anxiety reflects the use of measures of victimization that emphasize direct bullying, rather than cyber bullying. Such possibilities would need to be evaluated in future research.

While there was evidence of specificity in the relationships found in the path analyses, it is also important to note that the majority of the predictive relationships over time were through the overlap among the constructs, and the stability in each construct between waves. These results suggest that the bidirectional relationships over time are largely accounted for by the overlap between depression and anxiety that is captured in the broader construct of internalizing psychopathology. For example, neuroticism and emotional distress are often considered the core of internalizing problems (e.g., Griffith et al., 2010) and may represent characteristic responses to victimization as well as a group of behaviors or responses that may increase the likelihood of subsequent peer victimization. The stability of victimization from age 10–11 to age 12–13—when most children will have transitioned from primary to high school and moved to a new school—may also indicate that peer victimization is related to characteristics the child carries with them across contexts.

### **Outcomes Related to Depressive Symptoms, Anxiety, and Peer Victimization**

Multi-informant depressive symptoms, anxiety, and victimization at ages 10–11 also each predicted small but significant decrements in school belonging, positive peer relationships, self-efficacy, happiness, and global health. While these findings are consistent with existing literature that has found poor functioning in adolescents experiencing depression, anxiety, and peer victimization (e.g., Juvonen et al., 2011; Smith, Talamelli, Cowie, Naylor, & Chauhan, 2004), they also extend the current literature to highlight that all three domains

*uniquely* predict these outcomes over and above their shared variance (i.e., their co-occurrence and conceptual overlap). In other words, it is not internalizing symptoms *or* victimization that is predicting these outcomes, but each domain has an additive effect so that, for example, being anxious *and* being victimized is more detrimental than being anxious *or* being victimized. This is of considerable concern, given the common co-occurrence of these experiences and their strong inter-relationships.

### **Strengths, Limitations, and Future Directions**

The strengths and limitations of the study should be kept in mind when interpreting these results. The primary strength was the use of a large and nationally representative prospective longitudinal sample of children entering early adolescence. The primary limitation was the restricted item pool available for multi-informant assessment of the constructs of interest. While the reliability of the measurement in the multi-informant domains was limited by the number of items that were asked of all informants at both waves, the inclusion of four informants who knew the child well (i.e., resident parents, teachers, and the children themselves) likely strengthened the validity of the measurement through their complementary perspectives with important contextual information about the home and school environments (De Los Reyes & Kazdin, 2006). In contrast, the absence of peer reports in the LSAC data limited the completeness of the measurement of peer victimization in particular, which may not always be witnessed or acknowledged by parents and teachers (Salmivalli, 2010). Further, the aggregation of the informants' responses de-emphasized the differences in perspective between them—although the analyses indicated that aggregation was appropriate and ensured all informants were given equal weight.

There were also limitations in the child self-reported domains. For example, the SDQ subscales of peer problems and prosocial behavior—used to operationalize social outcomes—had low internal consistency, suggesting the potential for elevated measurement error in these constructs. However, the extensive validation of these scales (e.g., Goodman, 1997; Muris et al., 2003) combined with effect sizes and standard errors in line with the other outcomes increases confidence in the findings. Further, the detailed measurement of depressive symptoms, anxiety, and specific peer victimization experiences at age 12–13 was not conducted at age 10–11. This precluded the assessment of bidirectional relationships for specific types of peer victimization (i.e., physical, relational, and cyber victimization) with depression and anxiety, which would be an interesting avenue for future research. The small-to-moderate  $R^2$  values in the path analyses also highlighted that there are other influential factors accounting for changes in depressive symptoms and anxiety symptoms, and peer victimization experiences over time, which should be explored in future studies.

### **Conclusion**

This study adds to the literature by differentiating the unique effects of depressive symptoms, anxiety, and victimization during the transition from childhood to adolescence in a large, representative population sample. The findings suggested that depressive symptoms, anxiety, and peer victimization each uniquely and prospectively predict important outcomes—and that their shared features, co-occurrence, and stability over time cannot wholly

account for the observed associations. Specifically, unique, prospective, and bidirectional relationships were found between depressive symptoms, anxiety, and peer victimization over time. Further, depressive symptoms, anxiety, and peer victimization each independently and prospectively predicted poorer life functioning at age 12–13. Taken together, the results of this study paint a grim picture, as these prevalent and commonly co-occurring experiences each added to the negative effects of the others. The specificity of the relationships found here combined with their consistency across gender indicates the importance of early and broad interventions across all three domains.

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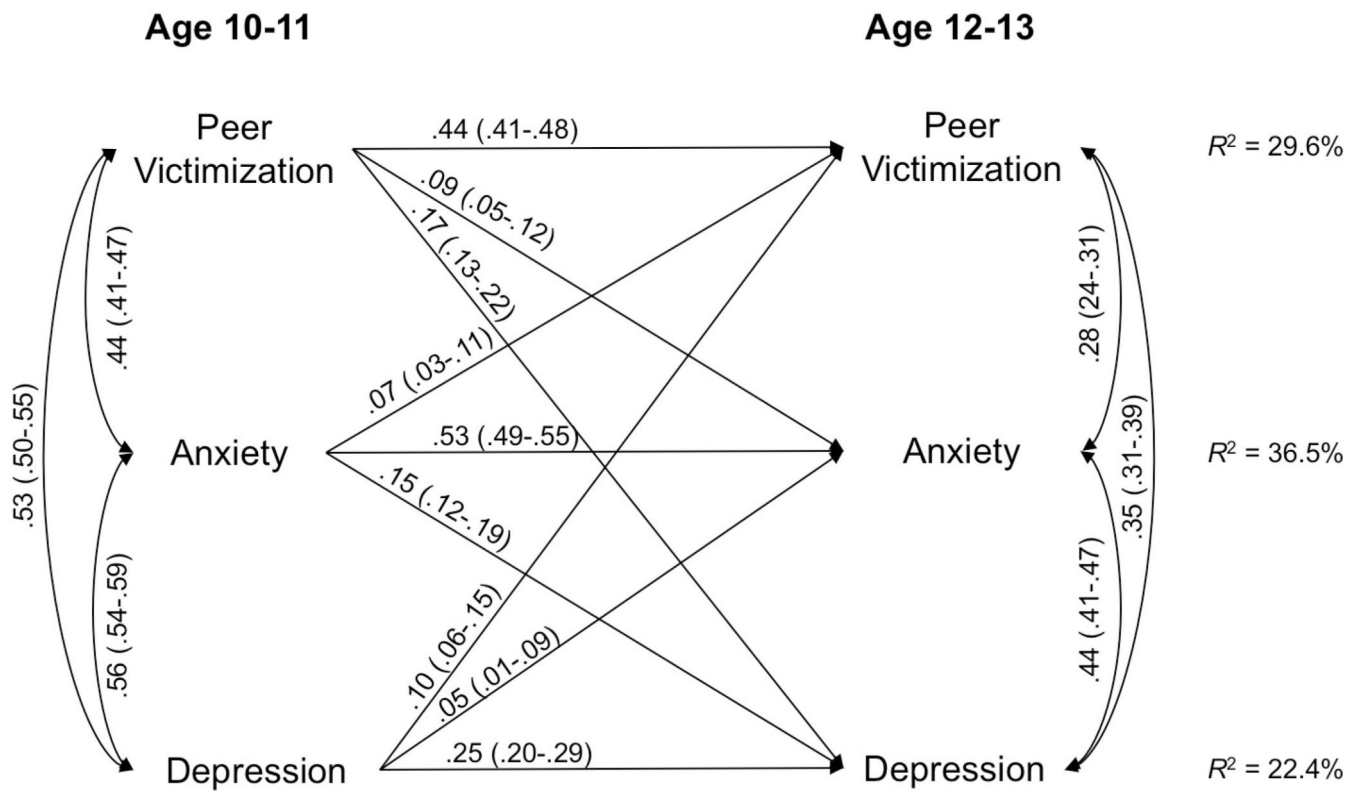
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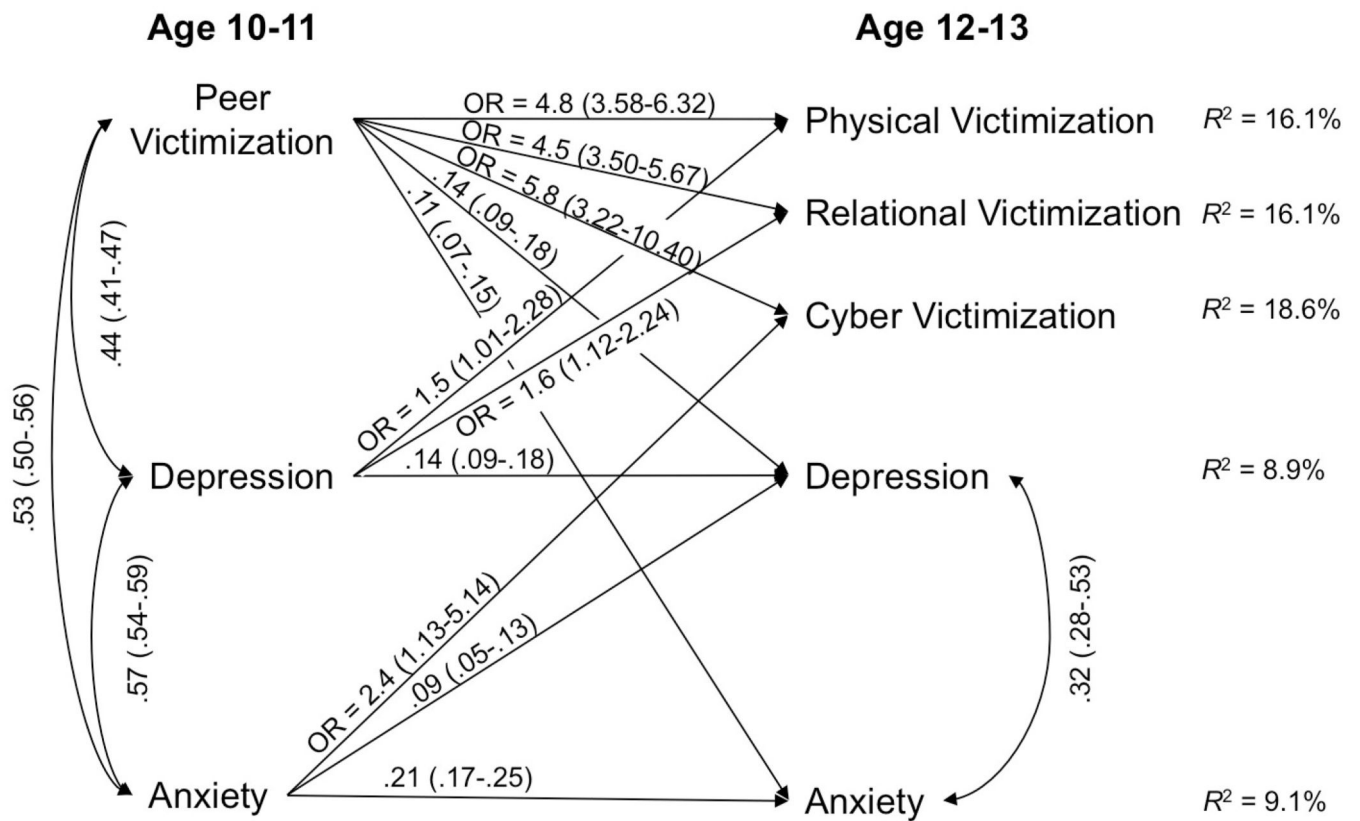
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**Fig. 1.** Standardized path coefficients from the path analysis based on multi-informant reported victimization, anxiety, and depression. Informants include resident parents, teachers, and child self-report ( $n = 4240$ ). All paths remained significant after adjusting for a paper-wide false discovery rate of 5% using the Benjamini-Hochberg (1995) procedure.



**Fig. 2.** Path analysis using multi-informant indicators at ages 10–11 to predict child-reported victimization, depression and anxiety at ages 12–13 ( $n = 4064$ ). The paths depict odds ratios (OR) and standardized path coefficients. Monte Carlo integration was used to include the categorical outcomes in the model. Only significant paths are shown, adjusting for a paper-wide false discovery rate of 5% using the Benjamini-Hochberg (1995) procedure.

**Table 1.**

Descriptive Statistics for the Sample at Age 10–11 (n = 4169) and Age 12–13 (n = 3956). Mean (Standard Deviation) or N (Valid %)

Domain (Range)	Age 10–11	Age 12–13
Gender - Female	2034 (48.8%)	1907 (48.2%)
Age	10.3 (.47)	12.4 (.49)
Main language spoken at home - English	89.4%	91.7%
Multi-Informant Assessment <sup>a</sup>		
Depression (1–3)	1.2 (.35)	1.2 (.32)
Anxiety (1–3)	1.5 (.34)	1.5 (.34)
Peer Victimization (1–3)	1.3 (.44)	1.2 (.39)
Child Self-Report		
Depression (0–26) <sup>a</sup>	-	4.1 (5.32)
Worry count (0–18) <sup>a</sup>	-	4.9 (3.68)
Experiences of peer victimization	-	585 (15.2%)
Physical victimization	-	287 (7.5%)
Relational victimization	-	513 (13.4%)
Cyber victimization	-	54 (1.4%)
School Connectedness <sup>b</sup>		
School belonging (0–100)	-	68.4 (14.73)
School enjoyment (0–100)	-	66.5 (16.09)
Social Outcomes <sup>b</sup>		
Peer relationship problems (0–100)	-	13.8 (15.63)
Prosocial behavior (0–100)	-	77.6 (17.64)
Quality of Life <sup>b</sup>		
Self efficacy (0–100)	-	77.0 (17.23)
Happiness (0–100)	-	74.6 (27.11)
Global health <sup>b</sup> (0–100)	-	81.9 (19.24)

Note.

<sup>a</sup> Scored so higher scores indicate negative outcomes.

Depression, anxiety, and peer victimization

<sup>b</sup> Scored so higher scores indicate positive outcomes.

Depression, anxiety, and peer victimization

**Table 2.**

Percentage points change (standard error) in the total score for each outcome at age 12–13 predicted by the unique variance of depression, anxiety, and victimization at age 10–11.

	<b>Depression</b>	<b>Anxiety</b>	<b>Victimization</b>
School Connectedness ( <i>n</i> = 4234)			
School belonging	−6.6 (.99) *	−4.2 (.92) *	−5.2 (.70) *
School enjoyment	−4.1 (1.15) *	−3.4 (1.03) *	−1.3 (.77)
Social Outcomes ( <i>n</i> = 4240)			
Peer relationship problems	4.9 (1.12) *	4.7 (1.03) *	7.5 (0.79) *
Prosocial behavior	−2.9 (1.14) *	−2.3 (1.07) *	0.2 (.84)
Quality of Life ( <i>n</i> = 4240)			
Self-efficacy	−3.0 (1.14) *	−4.0 (1.08) *	−3.5 (.83) *
Happiness	−8.7 (1.81) *	−3.7 (1.66) *	−3.7 (1.30) *
Global Health ( <i>n</i> = 4253)			
	−3.6 (1.31) *	−8.1 (1.17) *	−3.3 (.91) *

*Note.* All scores are scaled as a percentage of the maximum total range on the score, with higher scores indicating better outcomes. All models included gender as a covariate.

\* Statistically significant effects after adjusting for a paper-wise false discovery rate of 5% using the Benjamini-Hochberg (1995) procedure.