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Association Between Depressive Symptoms and Negative Dependent Life Events from Late Childhood to Adolescence

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Abstract

The association between stressful life events and depression has been consistently supported in the literature; however, studies of the developmental trajectories of these constructs and the nature of their association over time are limited. We examined trajectories of depressive symptoms and negative dependent life events and the associations between these constructs in a sample of 916 youth assessed annually from age 9 to 16, using latent growth curve modeling. Youth depressive symptoms, as rated by youth, parents, and teachers, decreased from late childhood into adolescence, whereas rates of youth-rated life events did not change significantly over time. Initial levels of depressive symptoms were positively associated with initial levels of life events. Furthermore, after controlling for the initial association between the two constructs, increases in depressive symptoms (as assessed by parents and youth) were positively associated with increases in life events over time. The study builds on prior research by focusing specifically on negative dependent life events, examining results across multiple informants, and employing latent growth curve modeling to evaluate associations between trajectories of life events and depressive symptoms in a longitudinal adolescent sample. Additional studies employing latent growth modeling to examine the changes in this association during adolescence are needed.

Keywords

Depression; life events; adolescence; latent trajectories; stress generation

One of the most widely studied risk factors for major depression is the experience of a stressful life event (SLE) proximal to the onset of the depressive symptoms (e.g., Holmes & Rahe, 1967; Kessler, 1997). Many studies have found an association between the experience of life stress and several facets of depression, including symptom severity and duration, treatment response, and relapse (for reviews see Hammen, 2005; Monroe, 2008). Investigating the stress-depression association during adolescence has been of particular interest to developmental and clinical theorists. Marked increases in both life stress and depressive symptoms occur during the transition from childhood into adolescence, making their interrelationship critical to the understanding of youth psychosocial development (Hankin & Abramson, 2001; Rutter, 2007; Wagner & Compas, 1990).

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Conflict of Interest

The authors state that they have no conflict of interest.

Past research has focused on the experience of SLEs as a risk factor for depression and examined moderating factors of their association, most often using cross-sectional designs or prospective designs with two time points (Hankin & Abela, 2005). Only a small body of research has sought to identify the transactional nature of the stress-depression association in adolescent samples, and even fewer studies have examined the individual trajectories of these phenomena in adolescent samples. The current study sought to address these deficits in the literature by employing latent growth curve modeling of longitudinal data, which allowed us to investigate intraindividual change (i.e., change within individuals across time) as well as interindividual differences (i.e. individual differences in change across time) in SLEs and depressive symptoms.

Depression and life stress

Reviews of the literature have shown that as much as 70% of initial depressive episodes are preceded by a stressful event and severe life events play a role in the onset of up to 50% of depressive episodes (Hammen, 2005; Monroe & Harkness, 2005; Monroe & Reid, 2009). This evidence suggests a unidirectional influence of life stress on depression (i.e., "stress exposure"), in which SLEs increase risk for the onset of depression. There has also been accumulating evidence in support of a bidirectional (i.e. transactional) association between SLEs and depression. The stress-generation hypothesis postulates that individuals with depressive disorders (or vulnerabilities to depression) experience more episodic stressful life events that are due, at least in part, to their own characteristics and behaviors (i.e. dependent events) than do individuals without depression histories or vulnerabilities (Hammen, 1991; 2006). An example of a dependent life event would be the breakup of a relationship, whereas the death of a parent due to illness would be considered an independent event, as it is unrelated to an individual's behavior. In turn, these events, often of interpersonal nature, can trigger the onset of depressive episodes (for a review, see Liu & Alloy, 2010). Several studies have provided support for the stress generation hypothesis in clinical and non-clinical samples in adult and adolescent populations (e.g., Hammen, 1991; Kendler et al. 1999; Lakdawalla & Hankin, 2008). The distinction between independent and dependent life events has been identified as an essential component in understanding the reciprocal effects of depression and stress, as dependent events are associated with the characteristics and behaviors of the individual (Hammen, 2005; Liu & Alloy, 2010; Rudolph et al., 2000).

Although a few important studies have supported a bidirectional association between SLEs and depression in adolescents (Compas et al., 1989, Rudolph & Hammen, 1999; Rudolph et al., 2000), the majority of studies examining transactional theories have examined adult samples. The transition into adolescence is marked by increased SLEs and heightened risk for depression in many youngsters (for a review, see Compas et al., 1994; Hankin et al., 1998), as well as the emergence of gender differences in depression (higher rates in girls), making it of particular interest in understanding patterns of the disorder (Hankin & Abramson, 2001). Kercher and Rapee (2009) found evidence to support the stress generation hypothesis in adolescents in a prospective study of a large community sample of seventh graders. Both cognitive vulnerability to depression and depressive symptoms at the first time point predicted later dependent stressors, which in turn predicted increases in depressive symptoms 6 months later. Furthermore, an interaction between cognitive vulnerability and dependent stressors explained unique variance in depressive symptoms at time 2, over and above the effects of initial depressive symptoms. Thus, an adolescent with vulnerability to depression experienced more dependent stressors over time and reported more depressive symptoms following such stressors, suggesting a bidirectional association between these constructs. Cross-sectional and prospective studies using two time points have yielded similar results, providing support for stress generation in children and adolescents, ranging from age 10 to age 18 (Daley et al., 1997; Rudolph et al., 2000; Wetter & Hankin, 2009).

Multi-wave data and within-subjects analyses

Changes across a developmental period are most often thought of as occurring within individuals. Hence, developmental theorists have advocated examining intraindividual variation across time as well as individual differences in that variation (e.g., Nesselroade, 1991; Selig & Preacher, 2009). With the exception of a very small selection of studies, the body of research on SLEs, depression and their association has been limited to between-subjects designs, using cross-sectional data or prospective data with only two time points (Hankin & Abela, 2005). Examining stress and depression using latent growth modeling allows a robust analysis of the transactional association between these constructs over time. Furthermore, the use of multiple time points for each person is advantageous for testing causal explanations in developmental theory (Selig & Preacher, 2009).

A study by Ge and colleagues (1994) represents one of the few studies examining intraindividual changes in SLEs and depression in adolescence. This study examined the trajectories of self-reported depression and life stress over time during adolescence in order to evaluate the emergence of gender differences in depression that is thought to begin in adolescence. The authors followed preadolescents and adolescents (ages ranging from 9 to 17 years) for four years, collecting information on depressive symptoms and life events yearly. Results suggested that girls experienced a marked increase in depressive symptoms starting at age 13, after which the level of depression in girls remained higher than that in boys throughout adolescence. Moreover, increases in girls' depressive symptoms were strongly associated with increased environmental stress, but this association was not found in boys. The authors interpreted this result as evidence that girls' reactivity to stress may explain the emerging gender differences in depression during adolescence. A follow up study (Ge et al., 2001) suggested that pubertal status may influence this association, such that early-maturing girls who experience SLEs are more vulnerable to onset of depressive symptoms.

Garber and colleagues (2002) assessed individual trajectories of depressive symptoms and variables that may affect these trajectories, such as stressful life events and cognitive style, in children from 6^{th} to 11^{th} grade. Overall, trajectories of depressive symptoms were mixed in the sample; youths' self-rated symptoms showed a non-significant increase over time, whereas parent-rated symptoms showed a decrease from 6^{th} to 9^{th} grade, then a slight increase from 9^{th} to 11^{th} grade. Results indicated that although initial levels of SLEs were associated with higher initial levels of depressive symptoms, neither initial levels of SLEs nor change in SLEs impacted rates of change in depressive symptoms over time. In summary, results from the few studies that have assessed individual trajectories in depression and SLEs suggest a nuanced and complex association across adolescence, with conclusions differing across different methodological approaches (e.g., types of life events assessed, age range, multiple informants).

Adolescence marks a broad developmental period and results are mixed as to when increases in depression emerge, with some studies suggesting early adolescence as the period of significant increase (Ge et al., 1994, 2001; Lewinsohn et al, 1993) and others suggesting late adolescence (Hankin et al, 1998). In terms of SLEs, the type of stressors reported in adolescence differ from those reported in childhood and adulthood; children tend to report family stressors, adolescents report more interpersonal and peer difficulties, and adults tend to report achievement-related stressors (Rudolph & Hammen, 1999; Wagner & Compas, 1990). Taken together, this research suggests that adolescence is a developmental transition in which significant changes in rates of depression and stressors occur.

The effects of gender

Gender differences in depression are thought to emerge in adolescence and have been the focus of a large body of research (e.g., Ge et al., 1994; Hankin & Abramson, 2001; Wagner & Compas, 1990). Rates of depressive symptoms and diagnoses become more prevalent in females during adolescence, and this gender difference continues into adulthood, with women twice as likely as men to experience depression (Nolen-Hoeksema & Girgus, 1994; Twenge & Nolen-Hoeksema, 2002). The experience of and reactivity to stress may help to explain adolescent gender differences in depression (Ge et al., 1994; Rudolph, 2003; Rudolph & Hammen, 1999, Silberg et al., 1999). Specifically, girls report more dependent, interpersonal stressors during this developmental period, and individuals who report more of these types of stressors are more likely to experience depression, increases in symptoms, and a range of other negative outcomes (Hammen, 1991; Kendler et al., 1999). Furthermore, several studies have found the association between stress and depression to be more significant in girls (Bouma et al. 2008, Mezulis et al., 2010; Rudolph & Hammen, 1999). Therefore, gender may influence the association between SLEs and depression in adolescence and should be considered as a moderating variable.

The current study

The current study addressed several limitations found in the stress and depression literature. There is strong evidence for the transactional nature of stress and depression in adults (e.g., Hammen, 1991; Kendler et al. 1995;1999; Lakdawalla & Hankin, 2008); however, fewer studies in the developmental literature have assessed this bidirectional association longitudinally (e.g., Compas et al., 1989, Mezulis et al., 2010; Rudolph & Hammen, 1999; Rudolph et al., 2000). The present study examined the bidirectional association between depression and SLEs in a longitudinal preadolescent and adolescent sample. Importantly, we approached this question from an intraindividual perspective, using latent growth curve modeling. Additionally, given evidence for gender differences in the development of depression and life events in the literature, we assessed the impact of gender on the trajectories of depression and SLEs and their association.

The current study also sought to improve upon the methodology for studying SLEs and depression in adolescents. Although studies assessing SLEs and depression at one or two time points provide evidence for an association, the few longitudinal studies that have assessed trajectories of depressive symptoms and SLEs in adolescence have yielded inconsistent results. One possible explanation for these inconsistencies may be the operationalization of life events. Existing longitudinal studies have focused on uncontrollable (i.e., independent) life events (Ge et al., 2001; Ge et al., 1994) or examined a composite score that combined independent and dependent life events (Garber et al., 2002). As previously discussed, the distinction between independent and dependent life events is crucial when assessing the bidirectional association between SLEs and depression, with dependent events playing a more significant role. Thus, studies to date may have yielded mixed results due to their exclusion of dependent events or inclusion of independent events, which could obscure the association of depression and life events over time (Rudolph & Hammen, 1999). In contrast, the current study focused on negative dependent life events (NDLEs)1 in evaluating the stress-depression association. Furthermore, we examined a larger sample and a broader age range than many previous studies to increase statistical power and capture the developmental transition from childhood to adolescence.

[1]For clarity, "SLEs" (stressful life events) is used in this report as a general term in discussing the stress-depression literature, in order to encompass the various definitions of life events in the literature. “NDLEs” will be used to indicate a specific category of SLEs, negative dependent life events, as examined in the current study.

We hypothesized that results of latent growth curve modeling would support a transactional, bidirectional relationship, such that individuals with higher initial levels of depressive symptoms would have greater increase in NDLEs and individuals with higher initial levels of NDLEs would have greater increase in depressive symptoms over time. We also hypothesized that increases in NDLEs over time would parallel increases in depressive symptoms over time. We hypothesized that there would be a linear increase of NDLEs over time, such that as an individual transitioned from childhood into adolescence, he or she would encounter increasingly more NDLEs. We did not expect a systematic trend for depressive symptoms within subjects, but anticipated an increase in symptoms across subjects in adolescence. Finally, we hypothesized that the association between NDLEs and depression would be stronger for girls.

Method

Participants

The current study included 916 individuals (462 females; 454 males) from Colorado's Longitudinal Twin Study (LTS). The LTS is a sample of same-sex twin pairs recruited through the Colorado Department of Health born between 1986 and 1990 in Colorado. Of the parents initially contacted, more than 50% of the families who lived within a 2-hour drive of Boulder, Colorado enrolled in the study. The racial/ethnic composition of the sample was 86.6% Caucasian, 8.5% Hispanic, 0.7% African-American, 1.2% Asian, and 2.9% other. The racial and ethnic distribution of the LTS sample corresponds well to that reported for Boulder County, Colorado in the 1990 United States Census (89.5% Caucasian, 3.8% Hispanic, 0.9% African-American, 2.4% Asian, and 3.4% other, U. S. Census Bureau, 1990). The mean number of years of education was 14.29 years for mothers and 14.42 years for fathers. Of all parents, 5% did not complete high school, 29% completed high school without post-secondary education, 49% had some post-secondary education, and 17% had some graduate-level education. Further information on the sample and recruitment procedures can be found in Rhea et al. (2006).

Measures

Negative Dependent Life Events—The Life Events Scale for Adolescence (LESA; Graber, Brooks-Gunn & Warren, 1995) was used to measure NDLEs. This scale includes 54 questions about life events in the domains of family, school, and peer events and was administered to participants annually from ages 9 to 16. Participants were asked to indicate which life events had happened to them in the past year and to rate the impact of each event that had occurred to them on "how did you feel about it" using a 7-point rating scale (1 = very upset, 7 = very pleased). The internal consistency of the 54 items on the LESA was good (α = .80) in our sample and did not vary as a function of age.

The life events literature suggests that negative dependent life events have the strongest association with depression vulnerability and symptoms (Hammen, 2005). Dependency of events was assessed by a panel of raters using a Likert-type scale to determine the status of an event; 1 or 2 indicated that the event's occurrence was certainly or almost certainly independent of the participant's behavior; 3 indicated that the event was possibly dependent or at least partly dependent on the behavior of the participant; and 4 or 5 indicated that the event's occurrence was almost certainly or certainly due to the behaviors of the participant (Hammen, 1991). Items with a score of three or higher were given a rating of dependent. In total, 34 items were designated as dependent with good interrater reliability (kappa = .74).

Impact ratings of these 34 dependent items were assessed across participants to identify events that were consistently viewed as negative by adolescents. Using a method developed

by Trombello et al. (2011), 95% confidence intervals were calculated for each item based on responses from the entire sample, and items that had a confidence interval below 4 ("neutral") were deemed negative. This method resulted in 19 life events that were both dependent and negative (see Appendix 1 for the list of negative dependent life events) and the NDLE score was calculated as the sum of the endorsed items.

The distribution of the NDLE score was highly skewed, and the violation of the normal distribution assumption could not be addressed via transformation of the data. Thus, they were transformed into ordinal variables, with the number of categories chosen to avoid small cell sizes. This approach retains the statistical advantages conferred by the normality assumptions for the underlying liability, retains an explicit mapping between the underlying liability and observed behavior, and correctly recovers the underlying correlations and parameter estimates (Derks et al. 2004; Stallings et al. 2001). NDLEs were binned into an ordinal variable as follows; 0 events = 0; 1 or 2 events = 1; 3 to 5 events = 2; 6 or more events = 3. Table 1 shows the percentages in each category of the ordinal variable.

Depressive Symptoms—The Child Behavior Checklist (CBCL; Achenbach, 1991a) is a parent questionnaire designed to assess 8 problem behavior scales. The scale relevant to this study is that examining symptoms of anxiety and depression (Anxious/Depressed). One-week test-retest reliability for the Anxious/Depressed scale is good (r = .86) and interparent reliabilities for ages 12–18 are adequate (r = .70 for boys, .66 for girls) (Achenbach, 1991a). Construct validity is also good for this scale when compared to other measures of anxiety and depression in children, with Pearson correlations from .70 to .80 between the CBCL and other measures (Achenbach, 1991a). Furthermore, studies indicate that the CBCL performs adequately in predicting DSM-IV diagnoses (e.g. Kasius et al., 1997). The CBCL was administered annually from ages 9 to 16.

The Teacher's Report Form (TRF; Achenbach, 1991b) is a teacher questionnaire similar to the CBCL that also assesses 8 problem behavior scales and the Internalizing and Externalizing broadband scales. Psychometric properties of the Anxious/Depressed TRF scale have been similar to the CBCL (i.e., adequate to good in adolescent samples; Achenbach, 1991b). The TRF was administered annually from ages 9 to 15. Distributions of the average CBCL and TRF ratings were highly skewed and the violation of the normal distribution assumption could not be addressed via data transformation. Therefore, ordinal variables were created, with the number of categories chosen to avoid small cell sizes. The CBCL and TRF were binned into ordinal variables as follows: 0 symptoms = 0; 1 to 4 symptoms = 1; 5 or more symptoms = 2. Table 1 shows the percentage of the sample in each category of the ordinal variable.

The Kandel Depressive Mood Inventory (KDMI; Kandel & Davies, 1982) is a six-item self-report questionnaire that assesses symptoms of depression. Youth were asked to indicate the extent to which each item was true or untrue of their experience (1=not at all true; 5=really true), with total scores ranging from 6 to 30. An example item from the KDMI is, "I feel hopeless about the future." The six items in the KDMI were extracted from a longer questionnaire of general distress symptoms using factor analysis and represent a unidimensional measure of depressive symptoms with reliability of .82 (Paton et al., 1977). The KDMI was administered to participants annually from age 9 to 16. The distribution of KDMI scores was not normal (see Table 1), but after log-transformation, both skewness and kurtosis were below 1.

The Diagnostic Interview Schedule for Children—IV (DISC–IV; Shaffer, Fisher, & Lucas, 1997) was administered to the twins in the present study at age 12 and age 17 as part of another research study. The DISC is a structured, face-to-face psychiatric interview that

assesses *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [*DSM–IV*]; American Psychiatric Association, 1994) Axis I disorders. In the current study, information from the DISC was used to assess the presence of depressive symptoms and diagnoses of major depressive disorder in the 12 months prior to assessment.

Analyses

All analyses were conducted in Mplus (Muthén & Muthén, 1998–2010). The advantages of Mplus include the simultaneous analyses of ordinal and continuous data, its management of missing data (a source of concern in analyses of longitudinal data) and non-independence in data (which is relevant in the present study given that the participants were drawn from a twin sample). Drawing from Little and Rubin's (1987, 2002) theory, Mplus includes respondents with missing data using full information maximum likelihood (FIML) estimation, which treats missing data as missing at random and allows the use of all available data. When ordinal data are analyzed using the weighted least square mean and variance estimator, pairwise deletion is used. Given that the data from the two twins in each pair are correlated, the data were treated as non-independent and twins were considered as nested within twin pairs. Mplus takes into account non-independence of observations when computing standard errors and model fit (i.e., an alternative χ^2 that takes non-independence into account). The *p*-values are for the ratio of each parameter estimate to its standard error, which yields a *z*-statistic. Exceptions were cases where there was an inconsistency between the conclusion reached from the *p* value and the result of the chi-square difference test between the full model and the reduced model where the parameter estimate was dropped. In these cases, the parameter significance was determined by the chi-square difference test. Given that the χ^2 is sensitive to sample size, additional fit indices, including the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis index (TLI; Bentler, 1990), and the root mean square error of approximation (RMSEA; Browne & Cudeck, 1987). A CFI and TLI greater than .95 and RMSEA less than .06 indicate good model fit (Hu & Bentler, 1998).

Maximum likelihood with robust standard errors (MLR) estimation was used for analysis when possible. When it was not feasible in models with large numbers of ordinal variables (the LESA, CBCL, and TRF scores were transformed into ordinal variables due to significant skewness), the weighted least square mean and variance (WLSMV) estimator was used. MLR was used for all univariate analyses and the KDMI bivariate analysis, and WLSMV was used for the TRF and CBCL bivariate analyses. The DIFFTEST option was used when comparing the fit of alternative models when WLSMV was used. The TLI, CFI and RMSEA model fit indices are not available when using the MLR estimator, so the likelihood ratio chi-square was used to assess model fit.

Results

Descriptive Statistics

Table 1 provides the percentages of individuals in each category of depressive symptoms measured by the CBCL and TRF and NDLE ordinal variables at each age, the mean KDMI scores across time, and the number of participants completing each measure at each age. Attrition analyses were conducted and results provided no evidence that individuals who did not complete the last assessment had higher initial levels of life events or parent- or self-reported depressive symptoms than those who completed the last assessment. However, those who did not complete the last assessment of teacher-rated depressive symptoms had higher initial levels of depressive symptoms than those who completed the last teacher-rated assessment.

Table 2 provides the polychoric/polyserial correlations among all measures at each age. The correlations suggested weak to modest agreement among self-, parent-, and teacher-reported depressive symptoms. The average agreement over time between child and teacher (r = .12), child and parent (r =.20) and parent and teacher (r = .18) was slightly lower, but consistent with results from a meta-analysis (Achenbach et al., 1987) and qualitative reviews (e.g De Los Reyes & Kazdin, 2005) of the literature on informant discrepancies in child and adolescent psychopathology. Correlations within informants across age (CBCL: r = .42 – .63; TRF: r = .08 – .28; KDMI: r = .16 – .62) suggested some stability of depressive symptoms over time, in addition to substantial variance, consistent with the literature on child and adolescent depression (Costello et al., 2008; Tram & Cole, 2006)2. Likewise, correlations suggested some stability of NDLEs throughout childhood and adolescence (r = .26 – .53). Correlations indicated a generally positive, albeit often weak, association between depressive symptoms and NDLEs (r = −.06 – .36).

We first assessed gender differences in the level of NDLEs and depressive symptoms between boys and girls at all time points. A chi-square test was used for ordinal variables and an independent samples t-test was used for continuous variables. Results are presented in Table 3, and in general, indicated no consistent gender differences in these constructs. To examine gender differences in latent trajectories, all latent growth models were tested twice, with the first model allowing parameter estimates to be free across gender (i.e., allowing gender differences), and the second model constraining parameters estimates to be equal across gender (i.e., assuming no gender differences). Constraining parameter estimates to be equal across gender only led to a decrement in models examining the growth of depression assessed by the KDMI, suggesting significant differences between boys and girls in the models that examined self-rated depressive symptoms, but no gender differences in the models that examined parent- or teacher-rated depressive symptoms or NDLEs. Thus, models are presented for the entire sample, except in for models including the KDMI, where results are presented for boys and girls separately3.

Change in depressive symptoms and NDLEs from late childhood to adolescence

To assess individual trajectories of each variable over time, we conducted growth models for NDLEs (LESA) and the three measures of depressive symptoms (CBCL, TRF, KDMI) separately. These analyses tested whether there was significant variation in individual trajectories of depressive symptoms and life events from late childhood to adolescence. The loadings on the latent Intercept in these models was set to 1.0 at all time points, which reflects the assumption that the latent Intercept reflects the variance of depression or life events that is stable across time. The latent Slope reflects change in the variables over time, with the age 9 time point set to 0, the age 16 time point set to 1 (necessary for model identification), and other time points free to vary. Allowing the Slope loadings to be free rather than fixing them to a linear pattern allows the trajectory to be nonlinear and provides a more efficient model of nonlinear change rather than estimating additional Slope curve latent variables. In the models, the Intercept variables represent the variance that is stable with the initial levels of depressive symptoms and NDLEs4, and the Slopes represent how depressive symptoms and NDLEs change over time. Each Slope path coefficient represents

[2]Given the modest correlations across raters of depressive symptoms, we examined the possibility of creating a multiple indicator latent variable for depressive symptoms. However, measurement invariance across individual time points is a requirement for the creation of a multiple-indicator model (Muthén & Muthén 2003), and this was not achieved in our data.

[3]Models examining the CBCL and TRF were also conducted with girls and boys in separate groups, fixing parameter estimates to be equal across groups. The results were very similar to those from the models in which the entire sample was in one group, with the exception of the Slope-Slope correlation in the CBCL latent trait growth model. This parameter estimate was a similar value in both models, but was only statistically significant in the one-group model.

[4]For clarity and consistency, the phrase “initial levels” will be used herein to indicate the variance stable with initial levels of a construct (e.g. depressive symptoms or NDLEs).

the cumulative portion of total change that has occurred from the initial period to that specific time period (Bollen & Curran, 2006).

Parameter estimates from the growth models and Slope loadings at each time point are presented in Table 4. All growth models fit the data well (all CFIs and TFIs > .95; all likelihood ratio chi square values >.05, when appropriate) and fit statistics are presented in Appendix 3. In all four growth models, the Intercepts had variances significantly greater than zero, suggesting individual differences in initial levels of depressive symptoms and life events. The Slope latent variables of the depression measures (CBCL, TRF, KDMI) all had significant and negative mean values and significant variances, indicating that children's depressive symptoms decreased over time and that there were individual differences in rates of change. Across the sample, the level of NDLEs did not vary significantly over time, as indicated by the non-significant mean of the LESA Slope variable. However, the significant variance of the Slope suggests that there were substantial individual differences in change in NDLEs over time.

The correlations between the Intercept and Slope in the CBCL, TRF and KDMI growth models were all negative and significant, indicating that individuals with higher rates of depressive symptoms had greater decreases in depressive symptoms over time. In the case of self-rated depressive symptoms, the Intercept-Slope correlation was more negative in boys ($r = -.53$), than girls ($r = -.29$), suggesting that higher initial levels of depressive symptoms was associated with a greater reduction in symptoms over time in boys than in girls. Furthermore, a model fixing the Intercept-Slope correlation to be equal across gender resulted in a significant decrement in fit ($p = .01$), indicating that this gender difference was significant. The correlation between Intercept and Slope for life events was also negative and significant ($r = -.33$, df = 1, $p < .01$), indicating that those with higher initial levels of NDLEs had greater decreases in life events over time.

The decline in depressive symptoms in our sample was unexpected given the literature indicating increases in depression diagnoses during adolescence. However, evidence suggests that whereas empirically derived symptom measures such as the CBCL, TRF and KDMI converge and are correlated with DSM-IV based interviews (Krol et al., 2006), these two assessment methods (i.e., questionnaires assessing less severe symptoms and interviews assessing DSM-IV diagnoses) may measure two distinct, but related, constructs (Kasius et al., 1997; Lengua et al., 2001). Given that our use of empirically derived measures may capture a construct separate from depression diagnosis, we examined major depressive disorder symptoms and diagnoses from the Diagnostic Interview Schedule for Children (DISC; a DSM-IV based interview) collected at ages 12 and 17 in our sample. We first tested whether rates of depression diagnoses and symptoms according to the DISC differed between age 12 and age 17, to test whether the decline in depressive symptoms in our sample as assessed by empirically derived measures was also seen in the major depressive disorder symptoms and diagnoses. Results indicated that rates of depression diagnoses, although low at both time points, increased significantly from age 12 (0.7% of sample) to age 17 (3.0%; $\chi^2 = 23.27$, df = 1, $p < .01$) and the number of individuals experiencing DSM-IV symptoms of depression increased from age 12 (4.4%) to age 17 (8.9%), although this trend was not significant ($\chi^2 = 1.44$, df = 1, $p = .23$).

Next, we examined the association between DISC diagnoses and symptoms and intercept and slope of the CBCL, TRF, KDMI and LESA growth models. Results provided evidence of convergence between the different methods of depression assessment, with DISC symptoms and diagnoses generally positively associated with intercept and slope of the CBCL, TRF, and KDMI, suggesting that individuals who had DISC symptoms and/or diagnoses had higher initial CBCL/TRF/KDMI scores and had less decline in depressive

symptoms, with very few exceptions (see Appendix 2). Similarly, DISC symptoms and diagnoses were generally positively associated with the intercept and slope of NDLEs (see Appendix 2). These results suggest that in our sample, the empirically derived measures of depressive symptoms may indeed have measured a separate, albeit related construct to DSM-IV criteria for major depressive disorder.

The longitudinal association between depressive symptoms and NDLEs

Three latent growth curve models were conducted to examine the association between NDLEs and depressive symptoms assessed by self, parents, and teachers. All latent growth curve models fit the data well (fit statistics presented in Appendix 3). Figure 1 illustrates these models, in which the Intercepts reflect individual differences in initial levels of the variables and Slopes represent individual differences in change over time. In the models including the KDMI (self-rated depressive symptoms), fixing parameters to be equal across gender led to a significant decrement in fit. To examine gender differences further, we tested whether each parameter in this model differed across gender individually. In this analysis, we compared the model fit between a model in which all parameters were free to vary by gender and a model in which one parameter was fixed across gender, and all other parameters were free to vary. The one path with a significant gender difference was the regression of the NDLE slope on the NDLE intercept.

The correlation between the Intercept of depressive symptoms and Intercept of NDLEs was positive and significant in all three models, indicating that higher initial levels of depressive symptoms were associated with a higher initial number of NDLEs.

The Slopes for depressive symptoms and NDLEs were regressed on the Intercepts of these variables. The cross paths from Intercepts to Slopes indicate the extent to which the initial levels of one variable influence rates of change in the other variable (e.g., how rates of depressive symptoms at age 9 influence rates of change in life events over time), when controlling for the correlation between the Intercepts. These paths were significant in the model examining KDMI only. The first ($\beta = -.50$, $p = .01$ for girls; $\beta = -.29$, $p = .02$ for boys) suggests that children with higher initial self-reported rates of depressive symptoms had a greater reduction in NDLEs over time. The second cross path ($\beta = .38$, $p < .01$ for girls; $\beta = .17$, $p = .24$ for boys) suggests that higher initial levels of NDLEs was associated with less decline in depressive symptoms over time, but this parameter was significant only in girls.

The paths from Intercept to Slope within variables were negative and significant in the TRF and CBCL models. These results indicate that, when controlling for other parameters in the model, individuals with higher initial levels of NDLEs experienced a greater decrease in NDLEs over time, and individuals with higher initial levels of depressive symptoms experienced a greater decrease in depressive symptoms over time.

The correlations between the residual variances in the Slopes in these models reflect the associations between changes in depressive symptoms and changes in NDLEs over time. A positive association between slopes was significant in the KDMI model for girls ($r = .46$, $p < .01$) and boys ($r = .32$, $p = .03$), and in the CBCL model ($r = .18$, df = 1, $p = .04$). This association was not found in the TRF models ($r = -.09$, $p = .43$). Together, the results from the Slope correlations suggest that, after controlling for the association between the Intercept variables, increases in parent- and self-rated depressive symptoms over time were significantly associated with increases in NDLEs over time.

Discussion

The present study examined the trajectories of depressive symptoms and negative dependent life events from late childhood to adolescence. Using latent growth curve modeling, we examined the associations between both the initial levels of these constructs and change in these constructs from age 9 to 16 in a large, longitudinal sample of youth. The latent growth curve modeling approach allows the examination of intraindividual change (i.e., change within individuals) as well as interindividual differences (i.e. differences between individuals) across time.

Trajectory of depressive symptoms and NDLEs

With regard to depressive symptoms, data from all three informants – parent, self, and teacher – indicated similar results, with significant individual differences in symptom trajectories, and an overall decrease in symptoms from age 9 to 16. This result is not consistent with reports that depressive symptoms and diagnoses increase during adolescence (Compas et al., 1994; Costello et al., 2003; Ge et al., 1994; Larson & Ham, 1993), but is consistent with other longitudinal studies that have found no change or decreases in depressive symptoms during this time period (Garber et al., 2002; Ge et al., 2001; Hankin, 2008; Lewinsohn et al., 1993). The consistency of the results across three informants in our study reduces likelihood of methodological influences such as rater bias. Furthermore, our analysis of responses to a DSM-IV based interview (DISC) suggested trends of depressive symptoms and diagnoses in our sample paralleled those found in the literature, with an increase from age 12 to 17. These results suggest that the empirically derived symptom measures (CBCL, TRF, KDMI) capture a construct that is related to, but distinct from, DSM-IV criteria. Several other studies have yielded similar results (Kasius et al., 1997; Krol et al., 2006; Lengua et al., 2001). Both methods provide valuable information concerning adolescent depression; the increased variance in the questionnaire symptom measures provide an assessment of the individual differences in depressive symptoms and variability in symptoms over time, whereas the DISC interview captures clinically relevant symptoms. Despite differing trajectories, the symptom measures and the DISC interview were generally positively associated, and both symptom measures and the DISC interview were generally positively associated with NDLEs over time, suggesting this association is consistent across assessment methods for depression.

It is possible that the overall decrease in depressive symptoms (according to empirically derived questionnaire measures) in our sample could be due to individuals whose high initial depressive symptoms subsided over time. In fact, in the present study, for depressive symptoms assessed by all three informants, individuals with higher initial depressive symptoms had a greater decrease in symptoms. Although some studies suggest depressive symptoms are relatively stable in adolescence (e.g., Tram & Cole, 2006), most of these studies have assessed stability over shorter periods of time than the current study, which assessed depressive symptoms annually for eight years and might be better able to capture the change in symptoms over time. Another study using a large longitudinal sample (N=11,559) of adolescents and young adults (ages 12–25) found that the majority of their sample (88.1%) had few or no symptoms at all time points, a minority of the sample (9.4%) had high initial levels of symptoms that decreased over time, and an even smaller group had low initial levels followed by an increase in symptoms (2.5%) (Costello et al., 2008). That is, the largest group with a significant change in symptoms over time was the group of individuals who started with high levels of symptoms and decreased over time. Our results may reflect a similar trend, with individuals who initially had high symptoms having greater decrease in symptoms over time. High initial levels of symptoms being associated with a greater decrease in symptoms over time may also be due, in part, to the “floor effect.” That is, it is possible for individuals with high initial levels of depressive symptoms to experience

a decrease in symptoms over time, whereas individuals with low initial levels of symptoms cannot.

Although we did find significant individual differences in trajectories of negative dependent life events in our sample, the overall number of events did not change across time. We hypothesized that there would be an increase in events, given evidence of an increase in SLEs during the transition into adolescence in the literature (Compas, 1994; Garber, 2002; Ge et al. 2001; Larson & Ham, 1993). An important study by Hankin and colleagues (2007) suggested that this overall increase in SLEs might be driven by events in certain domains. The results of their study suggested that life events in adolescence, as well as their longitudinal association with depression, differed substantially depending on the contextual domain in which they occurred (family, peer relationships, achievement, etc). As noted, some studies have found peer stressors to be reported more frequently in adolescence than in childhood (Rudolph & Hammen, 1999; Wagner & Compas, 1990), and these types of stressors are strongly associated with depression in adolescence, particularly in girls (Hankin et al., 2007; Rudolph, 2002; Rudolph et al., 2000). Our measure of SLEs had only 4 items assessing events in peer relationships and included more items on family stressors, which may have limited our ability to examine changes in developmentally relevant contextual domains. However, our interest in intraindividual changes in SLEs and depression required consistency in our measure of SLEs from late childhood into adolescence. Considering the domains in which events occur will be an important consideration for future research in this area.

The association between depressive symptoms and NDLEs

We found that the initial levels in depressive symptoms were associated with the initial levels in NDLEs. This result was significant for depressive symptoms rated by all three informants. In general, we did not find clear evidence of a bidirectional association between depression and NDLEs, in that there weren't consistent associations between initial levels of NDLEs and change in depressive symptoms, nor between initial depressive symptoms and change in NDLEs. However, for parent- and self-rated depressive symptoms, increases in depressive symptoms were associated with increases in NDLEs after controlling for the association between initial depressive symptoms and NDLEs. This result provides further evidence for the association between stress and depression in adolescence, and builds on previous work by suggesting that this association is maintained over time and is captured in both parent and child report. Furthermore, our results are generally consistent with the few studies that have assessed individual trajectories in stress and depression longitudinally (Ge et al., 2001; Ge et al., 1994; Garber et al., 2002).

We did not find a consistent association between teacher-rated depressive symptoms (TRF) and NDLEs. One possible explanation for this null finding is the impact of attrition: we found that individuals who did not have the last TRF assessment had higher initial levels of depressive symptoms. This methodological limitation may have influenced the association between TRF ratings and NDLEs in our sample, and should be considered when interpreting our results.

Results also showed that higher initial levels of life stress were positively associated with change in self-rated depressive symptoms over time. That is, children experiencing greater stress at age 9 experienced more depressive symptoms over time (i.e. less decrease in symptoms over time). Although this result supported our hypothesis about the stress-depression association, the fact that we did not find evidence of this effect with other informants may raise concerns about source-related issues. This association could reflect method covariance, in that it may be inflated because both NDLEs and depressive symptoms were rated by the child/adolescent. However, given evidence that adolescent self-report is

the preferred measure of internalizing symptoms (e.g. De Los Reyes & Kazdin, 2005), and evidence that the stress-depression association has been shown to vary as a function of informant (e.g. Carter et al., 2006), it is possible that this positive association may reflect a clinically and developmentally valuable perspective on the prospective link between childhood stressors and depressive symptoms in adolescence.

Although there is clear evidence of a positive association between the life events and depressive symptoms in the literature (Compas, 1994; Hammen, 2005; Larson & Ham, 1993; Monroe and Harkness 2005; Monroe and Reid 2009), the few longitudinal studies that have examined associations between the intraindividual change in life events and depressive symptoms have yielded mixed results with regards to directionality of these effects. Whereas Ge and colleagues (1994, 2001) found evidence that initial levels of stressors predicted change in depressive symptoms, Garber et al. (2002) did not replicate this finding or find evidence of initial depressive symptoms predicting change in SLEs. The results of our study parallel these patterns in the literature. Our results provide further evidence that there is a robust association between SLEs and depressive symptoms across time and across different raters (parent and self-rated), but also suggest that additional variables may moderate or mediate this association. Rather than a bidirectional linear association between SLEs and depressive symptoms over time, their association may be one part of a network of risk factors for depression that interact via a more complex transactional process (e.g. Hankin & Abramson, 2001; Hyde et al., 2008).

Future research efforts may want to consider variables that moderate the SLE-depression association during adolescence. In the current study, we assessed dependent events – those that are related to characteristics of the individual – and there is substantial evidence that individual characteristics could account for, or influence, the association between life events and depression. For example, how a youth perceives an event and integrates it into his/her view of self, others, or the world, may determine whether it leads to a depressogenic reaction. In support of this theory, characteristics such as negative attributional style, tendency to ruminate, and personality traits (e.g., neuroticism) have been shown to moderate the association between life events and depression (Garber et al., 2002; Kendler, Kuhn & Prescott, 2004; Kercher & Rapee, 2009; Lakdawalla & Hankin, 2008). For example, Kendler and colleagues (1993) found that neuroticism moderated the association between SLEs and depression in adults, such that a depressogenic reaction to a stressful event was more likely in individuals who were high in neuroticism than those low in neuroticism. Additionally, evidence suggests that these factors also predict stress generation processes. For example, cognitive vulnerability and neuroticism have been shown to predict depressive symptoms as well as subsequent stressful events in youth (Gibb & Alloy, 2006; Hankin, 2010; Kercher & Rapee, 2009; Wetter & Hankin, 2009). Thus, the association between stress and depression may be stronger for youth with these vulnerabilities.

There are other possible reasons for the lack of consistent evidence of a bidirectional association in the present study. One may be the time windows in which we assessed NDLEs and depressive symptoms. Annual assessments may be too long a period for accurate recall of depressive symptoms and life events that may not have a sustained impact over many months. There are few studies that assess the temporal nature of transactional influences of stress and depression, and it is possible that more frequent assessments would provide a clearer picture of these processes in adolescence. Second, our use of a self-report checklist of life events may have influenced our results. Some evidence suggests that self-report measures of life events can lead to methodological problems, including disentangling subjective versus objective threat (e.g. Hammen & Shih, 2008). In this vein, the use of more objective interview-based assessments has been recommended, in which ratings of events are made by judges based on contextual information (i.e., *contextual threat*), rather than

based entirely on the individual's subjective report. In the current study we used an approach that defined NDLEs based on the means and confidence intervals of the entire sample, which increased objectivity of the LESA ratings and reduced the potential for biased reporting of events, which could be confounded with depressive symptoms. However, this approach limited our ability to capture the subjective and contextual experience of NDLEs for each individual, and thus may have influenced ratings of NDLEs and their association with depression. It is possible that use of a life events interview could yield different results. Finally, it may also be that the association between NDLEs and depressive symptoms begins earlier in childhood (i.e. before age 9; see Grant et al., 2004 for a review), and thus it was not captured in the current study. The potential influence of these methodological limitations should be considered when interpreting the results of our study.

The literature suggests gender differences in depressive symptoms and life events emerges in adolescence (Compas et al., 1994; Hankin et al., 1998; Hankin & Abramson, 2001), but the timing of these differences and their consistency is less clear. In our sample, we did not find consistent gender differences in mean levels of NDLEs or depressive symptoms. Although we found gender differences in the association between self-rated depressive symptoms and NDLEs in the latent growth model, the only model parameter with significant gender differences was the association between initial levels and rates of change in exposure to NDLEs. Therefore, although there is some evidence in the literature that suggests that girls are more likely to have a depressogenic reaction to SLEs than boys (Achenbach et al., 1995; Ge et al. 1994; Rudolph, 2002) and that SLE exposure may contribute to gender differences in clinical depression (Hammen, 2005; Hankin & Abramson, 2001), we did not find evidence of gender differences in this association in our sample.

Conclusions

There are several ways in which the current study builds on previous research and contributes to the literature on life events and depression in adolescence. First, our study focused on NDLEs, which are most likely to be a consequence of depression and have been shown to increase vulnerability to depression. Other longitudinal studies have examined general stressful events, which include independent and neutral/positive events that may obscure this association and prediction of risk over time. Isolating NDLEs and their longitudinal association with depressive symptoms provides a unique contribution to theories of stress generation and stress exposure. Second, our use of latent growth curve modeling enabled us to assess both intraindividual change and interindividual differences in trajectories of depressive symptoms and negative dependent life events from late childhood to adolescence. This approach is best suited to capture the complexity of developmental trajectories (Curran & Willoughby, 2003; Willett et al., 1998) and builds on prior research that has predominantly focused only on interindividual differences. Third, our assessments of depressive symptoms included three informants – self, teacher, and parent report – and clinical interview, and results were generally consistent across assessments. The consistency in the results suggests that the association between NDLEs and depressive symptoms is robust, and reduces concerns regarding the role of rater bias on the results. Finally, our examination of a broad age range and a large sample strengthened the power of our design to assess changes from late childhood to adolescence.

In conclusion, the current study found evidence for an association between initial levels of NDLEs and depression and evidence of parallel changes in NDLEs and depression during adolescence. Evidence of parallel changes in NDLEs and depression was consistent across parent and child ratings. We did not find consistent evidence of initial levels of NDLEs influencing change in depression or initial levels of depression influencing change in NDLEs. There is evidence suggesting that future studies should assess potential moderating

factors, including cognitive vulnerability, personality, pubertal transition, and genetic influences, in the association between SLEs and depression.

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Appendix 1. LESA items identified as negative and dependent

1	broke up with a boyfriend/girlfriend
2	falling out/broke up with a close friend
3	falling out/broke up with my best friend
4	physical fight with a friend
5	locked out of home/apartment
6	getting along worse than before with mother
7	getting along worse than before with father
8	getting along worse than before with brothers/sisters
9	had quarrels or disagreements with your parents about friends
10	had quarrels or disagreements with your parents about dress

11	had quarrels or disagreements with your parents about going places by yourself (like concerts, parties, the mall, etc.)
12	had quarrels or disagreements with your parents about staying out
13	had quarrels or disagreements with your parents about things you do at home (music you listen to, TV, telephone)
14	had quarrels or disagreements with your parents about cleaning up
15	had quarrels or disagreements with your parents about the way you talk (swearing, slang, talking back)
16	had a big disappointment at school
17	got in trouble with the teacher
18	got in trouble with the principal
19	parents were called about school problem

Appendix 2. Correlations between DISC (symptoms and diagnosis at age 12 and age 17) and growth models of depressive symptoms and life events

	Symptoms		Diagnosis	
	Age 12	**Age 17**	**Age 12**	**Age 17**
CBCL				
intercept	.05	.01	#	.17
slope	.29*	.45**	#	.22
TRF				
intercept	.12	.31*	#	.50*
slope	.1 7	.19	#	−.26
KDMI				
intercept	.26*	.09	.39	.16
slope	.00	.30**	−.18	.09
LESA				
intercept	.20*	.40**	.29	.35**
slope	−.16	.25**	.16	.14

Due to the low number of diagnoses at age 12, these models did not run.

* $p < .05$.

** $p < .01$.

Appendix 3. Fit statistics for growth models and latent growth curve models

Model	χ^2	df	p	CFI	TLI	RMSEA
Growth (Univariate)						
CBCL	2912.26	40740	1.0			
TRF	2057.04	13032	1.0			
LESA	2234.21	65250	1.0			
Latent Growth Curve (Bivariate)						

Model	χ^2	df	p	CFI	TLI	RMSEA
CBCL/LESA	333.43	253	<.01	.99	.99	.03
TRF/LESA	274.04	211	<.01	.98	.98	.03
KDMI/LESA	2637.21	130703	1.0			

Note. When using the MLR estimator, CFI, TLI and RMSEA are not available. The likelihood ratio chi-square is reported for models with categorical outcomes. Model fit indices are not available for continuous outcomes using MLR.

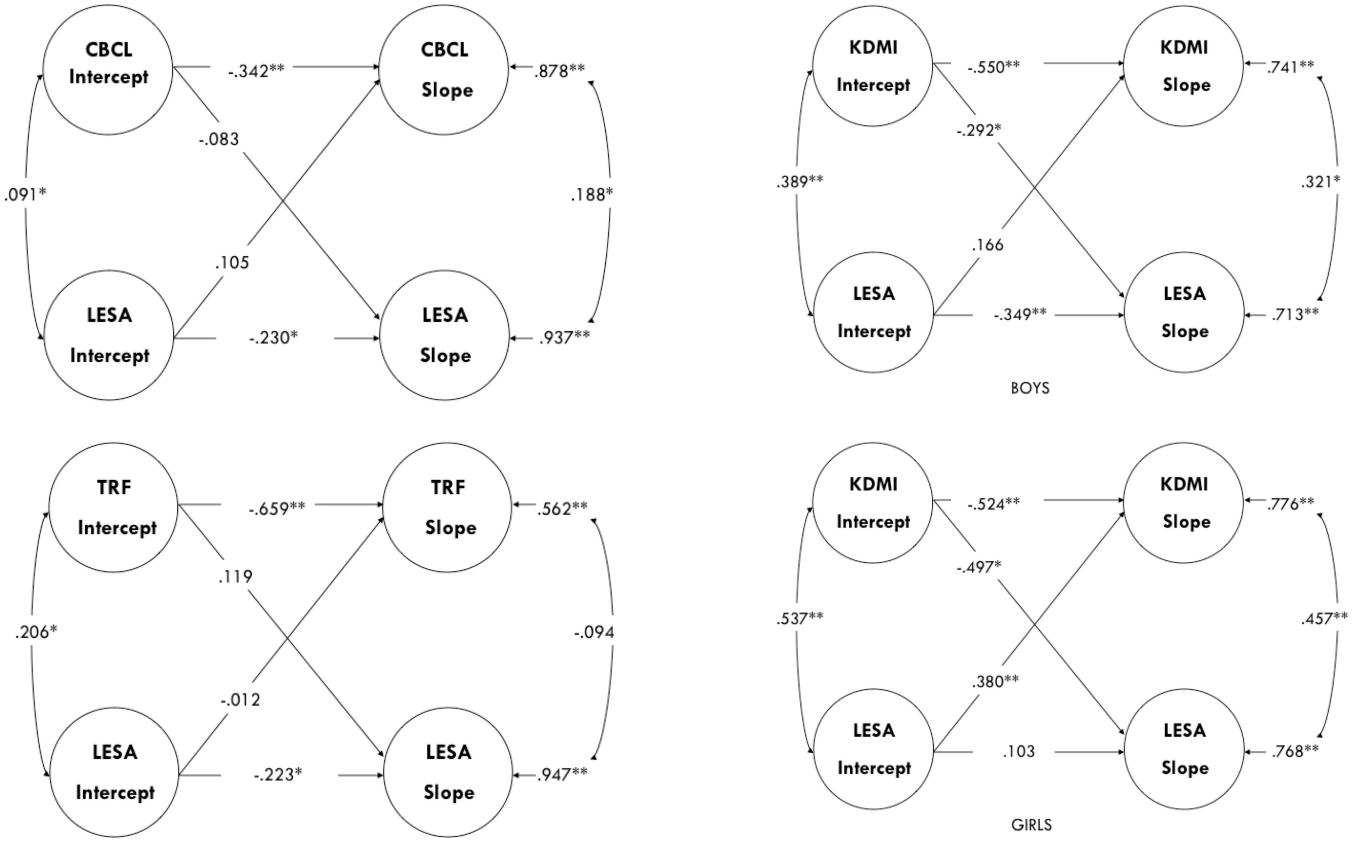

Figure 1.

Latent growth models of depressive symptoms and negative dependent life events (LESA). Top left- parent rated for entire sample (CBCL); Bottom left- teacher rated for entire sample (TRF); Top right- self rated for boys only (KDMI); Bottom right- self rated for girls only (KDMI). Standardized parameters are shown. $^{+}p < .10$. *p < .05. **p < .01

Table 1

Binned ordinal variables for parent rated depressive symptoms (CBCL); teacher rated depressive symptoms (TRF); negative dependent life events (LESA), percentages of sample in each bin and mean self-rated depressive symptoms (KDMI) at each age.

	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
CBCL	0 – 31.80%	0 – 28.40%	0 – 33.70%	0 – 31.40%	0 – 29.10%	0 – 35.40%	0 – 38.70%	0 – 33.70%
	1 – 45.50%	1 – 52.20%	1 – 48.80%	1 – 50.0 0%	1 – 49.70%	1 – 44.90%	1 – 49.00%	1 – 46.00%
	2 – 22.70%	2 – 19.40%	2 – 17.50%	2 – 18.60%	2 – 21.20%	2 – 21.20%	2 – 12.30%	2 – 20.30%
Total N	638	578	492	652	506	483	351	635
TRF	0 – 29.50%	0 – 29.20%	0 – 30.50%	0 – 27.20%	0 – 28.50%	0 – 34.10%	0 – 41.40%	
	1 – 41.70%	1 – 42.90%	1 – 45.30%	1 – 52.30%	1 – 49.80%	1 – 45.10%	1 – 42.20%	
	2 – 28.90%	2 – 28.00%	2 – 24.20%	2 – 20.50%	2 – 21.70%	2 – 20.80%	2 – 16.40%	
Total N	509	511	501	438	375	355	256	
LESA	0 – 10.80%	0 – 13.70%	0 – 13.20%	0 – 10.40%	0 – 14.00%	0 – 12.50%	0 – 17.30%	0 – 9.30%
	1 – 27.90%	1 – 34.40%	1 – 35.90%	1 – 29.30%	1 – 34.30%	1 – 31.00%	1 – 27.70%	1 – 29.40%
	2 – 33.20%	2 – 32.30%	2 – 30.90%	2 – 36.50%	2 – 34.30%	2 – 36.80%	2 – 35.30%	2 – 36.40%
	3 – 28.10%	3 – 19.50%	3 – 20.10%	3 – 23.70%	3 – 17.30%	3 – 19.80%	3 – 19.80%	3 – 24.80%
Total N	798	764	722	758	722	642	556	813
KDMI	14.91	13.89	12.71	11.96	11.28	11.39	11.31	11.45
Total N	769	741	707	755	710	617	526	806

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Table 2

Polychoric/Polyserial correlations (ages 9–16) between parent rated depressive symptoms (CBCL), teacher rated depressive symptoms (TRF), self-rated depressive symptoms (KDMI) and negative dependent life events (LESA).

	TRF	CBCL	KDMI	LESA
Age 9				
TRF	1.00			
CBCL	0.20*	1.00		
KDMI	0.06	0.14*	1.00	
LESA	0.11*	0.08*	0.23*	1.00
Age 10				
TRF	1.00			
CBCL	0.21*	1.00		
KDMI	0.15*	0.15*	1.00	
LESA	−0.02	0.06	0.29*	1.00
Age 11				
TRF	1.00			
CBCL	0.14*	1.00		
KDMI	0.10	0.20*	1.00	
LESA	0.04	0.08	0.36*	1.00
Age 12				
TRF	1.00			
CBCL	0.23*	1.00		
KDMI	0.10	0.22*	1.00	
LESA	−0.03	0.09*	0.27*	1.00
Age 13				
TRF	1.00			
CBCL	0.17*	1.00		
KDMI	0.14*	0.10*	1.00	
LESA	0.07	0.00	0.29*	1.00
Age 14				
TRF	1.00			
CBCL	0.19*	1.00		
KDMI	0.17*	0.21*	1.00	
LESA	−0.01	0.07	0.25*	1.00
Age 15				
TRF	1.00			
CBCL	0.17*	1.00		
KDMI	0.10	0.22*	1.00	

	TRF	CBCL	KDMI	LESA
LESA	−0.02	0.07	0.28*	1.00
Age 16				
CBCL		1.00		
KDMI		0.25*	1.00	
LESA		0.13*	0.31*	1.00

* p<.05.

Table 3

Gender differences in parent rated (3A), teacher rated (3B) and self rated (3C) depressive symptoms and negative dependent life events (3D).

3A. CBCL

	0		1		2				
	M	**F**	**M**	**F**	**M**	**F**	χ^2	**df**	**p**
Age 9	87	116	160	130	64	81	8.84	2	0.01
Age 10	73	91	156	146	50	62	2.91	2	0.23
Age 11	79	87	131	109	48	38	2.4	2	0.30
Age 12	97	93	157	167	58	80	2.70	2	0.26
Age 13	67	92	120	133	46	48	1.50	2	0.48
Age 14	79	92	108	109	36	59	3.75	2	0.15
Age 15	65	71	84	88	16	27	1.90	2	0.38
Age 16	122	92	136	156	55	74	8.25	2	0.02

3B. TRF

	0		1		2				
	M	**F**	**M**	**F**	**M**	**F**	χ^2	**df**	**p**
Age 9	65	85	111	101	72	75	2.87	2	0.24
Age 10	59	90	124	95	75	68	10.59	2	0.01
Age 11	80	73	102	125	70	51	5.62	2	0.06
Age 12	61	64	105	113	38	57	2.12	2	0.35
Age 13	53	49	91	105	28	49	4.35	2	0.11
Age 14	64	57	75	85	28	46	4.18	2	0.12
Age 15	53	53	45	63	22	20	2.10	2	0.35

3C. KDMI

	M	**F**	**t**	**df**	**p**
Age 9	2.98	2.95	1.76	767	0.14
Age 10	2.91	2.90	0.48	739	0.04
Age 11	2.86	2.80	2.55	705	0.74
Age 12	2.81	2.80	0.74	853	0.19

3C.	KDMI				
	M	**F**	**t**	**df**	**p**
Age 13	2.77	2.74	1.61	708	0.01
Age 14	2.77	2.76	0.09	615	0.77
Age 15	2.75	2.77	1.37	524	0.74
Age 16	2.74	2.79	2.96	804	0.32

3D.	LESA										
	0		**1**		**2**		**3**				
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	χ^2	**df**	**p**
Age 9	27	59	98	125	135	130	134	90	23.79	3	< .01
Age 10	47	58	129	134	132	115	75	74	2.42	3	0.49
Age 11	40	55	118	141	112	111	88	57	10.99	3	0.01
Age 12	36	43	112	110	130	147	92	88	1.34	3	0.72
Age 13	49	52	117	131	125	123	64	61	0.77	3	0.86
Age 14	34	46	109	90	116	120	51	76	7.86	3	0.05
Age 15	54	42	79	75	97	99	44	66	5.91	3	0.12
Age 16	44	32	124	115	139	157	86	116	6.90	3	0.08

Note. In panels A,B and D, values in the M and F columns represent the number of males (M) and females (F) in each category of the variable. In panel C, values in the M and F columns represent the mean score for males (M) and females (F) on the KDMI

Table 4

Results from growth models. Overall growth parameters (Panel A) and Slope loadings at each time point (Panel B).

Panel A.

	Variance of Intercept	Mean of Slope	Variance of Slope	Correlation between intercept and Slope
Depressive Symptoms				
CBCL	8.76**	−.47*	4.40**	−.35*
TRF	1.91**	−.46*	2.16**	−.69**
KDMI (boys)	.03**	−.24**	.04**	−.52**
KDMI (girls)	.03**	−.17**	.02**	−.29**
Life Stress				
LESA	2.98**	0.01	2.27**	−.33+

Panel B.

	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Depressive Symptoms						
CBCL	.25**	.25*	.60**	.35**	.81**	.91**
TRF	.05	.60**	.80**	.74**	.95**	1.0
KDMI (boys)	.37**	.59*	.72**	.88**	.95**	.98**
KDMI (girls)	.36**	.78**	.89**	1.24**	1.61**	1.03**
Life Stress						
LESA	−.06	.09	.49*	.70**	.87**	1.12**

Note. All parameters shown are unstandardized except for correlations between Slope and Intercept (standardized). In Panel B, the loading for Year 9 is fixed to 0 and for Year 16 it is fixed to 1.0.

+ $p < .10$.

* $p < .05$.

** $p < .01$.