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Trajectories of Depressive Symptoms from Adolescence to Emerging Adulthood: The Influence of Parents, Peers, and Siblings

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Abstract

The primary purpose of this study was to examine whether social relationship factors are associated with trajectories of depressive symptoms from adolescence into emerging adulthood. Specifically, adolescent-parent communication with mothers and fathers, peer support, and sibling warmth and hostility were examined in relation to depressive symptoms for girls and boys. Adolescents ($N = 372$; $M_{age} = 16.09$; $SD = .69$; 55% female) from the Mid-Atlantic United States completed surveys in the spring of 2007, 2008, and 2009 and again in the fall of 2014 when they were emerging adults. Growth curve modeling results suggested that communication with mothers and fathers and peer support predicted lower levels of depressive symptoms in adolescence for girls. For boys, peer support predicted lower whereas sibling hostility predicted higher levels of depressive symptoms in adolescence. Further, adolescent-mother communication for girls and adolescent-father communication for boys predicted the decline in depressive symptoms into emerging adulthood. Both sibling warmth and hostility for girls, whereas only sibling hostility for boys, predicted less steep declines in depressive symptoms over time. Findings draw attention to differences in experiences with depressive symptoms by sex and the importance of social relationship factors in the lives of adolescents and emerging adults. Implications for intervention and prevention are discussed.

Keywords

adolescence; adolescent-parent communication; depressive symptoms; friend support; sibling relationships

Depression is one of the most commonly diagnosed psychological disorders in the United States (U.S.). In 2013, the Substance Abuse and Mental Health Services Administration [SAMHSA] conducted a national survey to examine health and substance use among U.S.

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citizens (2014). Results from this survey indicated that rates of major depressive episodes (MDE) were highest among young adults, with 8.7% of 18 to 25 year olds experiencing a MDE in the last year. Estimates were even higher for adolescents aged 12 to 17, with 10.7% of the adolescent population experiencing a MDE. Alarming, MDEs were noted to be on the rise compared to past cohorts. In addition to MDEs being more common among females than males in adolescence and emerging adulthood (SAMHSA, 2014), studies suggest sex differences in depressive symptoms increase throughout adolescence and into emerging adulthood (Girgus & Yang, 2015; Kim, McHale, Crouter, & Osgood, 2007). Further, subclinical depressive symptoms have been shown to adversely influence adjustment and may place individuals at risk for future depressive episodes (Bertha & Balázs, 2013; Wesselhoeft, Sørensen, Heiervang, & Bilenberg, 2013).

The high prevalence rates of depressive episodes and adverse outcomes associated with a range of subclinical depressive symptoms make adolescence and emerging adulthood particularly timely developmental stages for the examination of depressive symptoms. Concurrent with physical and cognitive changes, adolescents are engaging in new social relationships and settings at unprecedented rates and are experiencing fluctuations within existing relationships (Smetana, Campione-Barr, & Metzger, 2006). Substantial change continues into emerging adulthood as individuals explore romantic relationships and experience new freedoms within families and society (Arnett, 2000). Given these vast developmental and social changes, the potential vulnerability of adolescents and emerging adults to the development of adjustment disorders, such as depression, is evident. However, despite the expansive research, there are several important gaps within the literature pertaining to the effects of social relationship factors on individuals' experiences with depressive symptoms. Therefore, the present study aimed to extend the literature in two ways. First, this study sought to identify the trajectories of depressive symptoms from adolescence into emerging adulthood. Second, social relationship experiences with parents, peers, and siblings were explored as predictors of depressive symptom trajectories for girls and boys.

Depressive Symptoms

Sex Differences

Estimates suggest that girls and women are approximately two times more likely to develop depressive symptoms than boys and men (Girgus & Yang, 2015). In a review of 24 studies, one half found that being female was a risk factor for developing depressive symptoms among adolescents (Wesselhoeft et al., 2013). Data suggest similar patterns in emerging adulthood (Molina et al., 2014) with women being 2.5 times more likely than men to experience their first incidence of a major depressive disorder during this developmental period (Rohde, Lewinsohn, Klein, Seeley, & Gau, 2013). Although, research suggests that women's and men's experiences with depressive symptoms become more similar over time (Frye & Liem, 2011; Galambos, Barker, & Krahn, 2006), depressive symptoms still are more common among females during emerging adulthood (Girgus & Yang, 2015; SAMHSA, 2014).

Social factors have been implicated as potential drivers of sex differences in depressive symptoms (Girgus & Yang, 2015). In addition to the physiological changes associated with puberty (Altemus, Sarvaiya, & Epperson, 2014), individuals' perceptions about physical development and physical development relative to their peers predict depressive symptomatology (Girgus & Yang, 2015; Yuan, 2007). In adolescence, girls' greater exposure and reactivity to interpersonal stress may also explain sex differences in depression (Shih, Eberhart, Hammen, & Brennan, 2006). Further, low levels of closeness within the family are associated with greater depressive symptoms among girls (Lewis et al., 2015). Taken together, when examining sex differences in depressive symptomatology, the role of social relationships on should not be overlooked.

Trajectories of depressive symptoms

Typically, experiences with depressive symptoms begin during adolescence and continue into young and later adulthood (Eyre, & Thapar, 2014). Indeed, comparable depressive symptom trajectories have been documented throughout adolescence and emerging adulthood. For example, whereas girls' depressive symptoms increase throughout adolescence, boys' depressive symptoms remain low and relatively stable (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Kim et al., 2007). Similarly, studies suggest that throughout adolescence, the proportion of girls experiencing depressive symptoms increases steadily, whereas the proportion of boys experiencing depressive symptoms decreases from 11 to 16.5 years old, then increases until 19 years old (Bennik, Nederhof, Ormel, & Oldehinkel, 2014). Among emerging adults, depressive symptom trajectories have been shown to decline throughout the twenties (Galambos & Krahn, 2008). In addition, emerging adult women show steeper declines in symptoms relative to men (Meadows, Brown, & Elder, 2006). Studies also suggest that there are diverse trajectories of depressive symptoms during emerging adulthood, although most individuals report low stable depressive symptoms or decreasing depressive symptoms over time (Frye & Liem, 2011).

Although the aforementioned studies on depressive symptoms provide valuable insights into the experiences of adolescents and emerging adults, the conclusions that can be drawn are limited. First, the literature as a whole is restricted to the examination of cross-sectional samples (Bertha & Balázs, 2013), short-term longitudinal studies (Wesselhoeft et al., 2013), or proportional analyses (Bennik et al., 2014), limiting our understanding of depressive symptoms across developmental periods. Second, more research exploring depressive symptom trajectories from adolescence into emerging adulthood is needed (Meadows et al., 2006 is notable exception). As such, the current study aimed to extend the literature by exploring longitudinal trajectories of depressive symptoms from adolescence into emerging adulthood.

Social Relationships and Depressive Symptoms

Theory and research suggest that familial and extrafamilial relationships play important roles in influencing individual development. For example, bioecological systems theory attempts to organize the complex interactions between individuals and the environment (Bronfenbrenner, 1979). Bioecological theory suggests that relationships within individuals'

immediate contexts or their microsystems (e.g., family or peer networks), are particularly salient sources of influence. Similarly, family systems theory posits that the family is a hierarchically structured and organized whole with multiple connected parts (Cox & Paley, 1997). As adolescents and emerging adults have unique, yet interdependent relationships with their mothers, fathers, and siblings, this perspective calls for the exploration of the effect of multiple familial relationships on individuals' development. Evidence for the importance of family and peer relationships also has been found in research, especially as it relates to individual adjustment or development. Adolescents have been shown to simultaneously draw support from parents, peers, and siblings to handle a variety of adjustment issues, including depressive symptoms (e.g., Johnson et al., 2011). Similarly, emerging adults are most likely to seek support for mental health problems from their family and friends (Quinn, Wilson, MacIntyre, & Tinklin, 2009). Because theory and research have illustrated the importance of the multiple social relationships in adolescent and emerging adults' lives, the current study examined the associations between parental, peer, and sibling relationship factors and depressive symptom trajectories from adolescence into emerging adulthood.

Parents

Studies repeatedly have found links between a variety of parenting behaviors and practices and adolescent depressive symptoms (e.g., Guan & Fuligni, 2015; Johnson et al., 2011). One important element of the adolescent-parent relationship is communication (Cernkovich & Giordano, 1987; Kearney & Bussey, 2015). Poor communication between adolescents and their parents has been positively associated with depressive symptoms (Demidenko, Manion, & Lee, 2015; Yu et al., 2006), especially in the context of low social support and for girls (Landman-Peeters et al., 2005). Adolescent-parent communication also may serve as a protective factor in adverse contexts. Ohannessian (2011) found that the relationship between paternal problem drinking and depressive symptoms was moderated by open-communication with mothers and fathers. Similarly, Ohannessian (2012) found that adolescent-mother communication mediated the relationship between maternal problem drinking and adolescent depressive symptoms. Importantly, the moderating and mediating roles of communication were found only for girls. These findings draw attention to the importance of considering both adolescent and parent sex when examining depressive symptoms.

Relative to the literature within adolescence, less is known about how adolescents' experiences with parents influence depressive symptoms in emerging adulthood. In one study, Meadows et al. (2006) found that both maternal and paternal support were negatively associated with depressive symptoms during adolescence, but not during emerging adulthood. However, others have found that authoritative parenting in adolescence predicted lower levels of depressive symptoms in emerging adulthood, highlighting the long-term impact of parenting practices (Liem, Cavell, & Lustig 2010). Nevertheless, there is a gap in the literature of studies exploring the impact of adolescent-parent communication on trajectories of depressive symptoms across developmental periods.

Peers

Given the centrality of peers in adolescents' lives (Poulin & Chan, 2010), it is not surprising that these microsystem relationships have been linked with depressive symptoms (Johnson et al., 2011). Research has repeatedly shown an inverse relationship between social support and adolescent depressive symptoms (e.g., Burton, Stice, & Seeley, 2004; Nilsen, Karevold, Røysamb, Gustavson, & Mathiesen, 2013) and has positioned peer support as a buffer for stress interpersonal relationships with parents or other peers (Cooley, Fite, Rubens, & Tunno, 2015; Auerbach, Bigda-Peyton, Eberhart, Webb, & Moon-Ho, 2011). Notably, girls and boys are differentially affected by experiences with peers as girls a) tend to worry more about peer approval and their peer relationship status and b) are more susceptible to interpersonal stress and relational victimization (Rose & Rudolph, 2006).

During emerging adulthood, experiences in both platonic and romantic relationships have been related to depressive symptoms. Social support from friends (Jenkins, Belanger, Connally, Boals, & Durón, 2013) and satisfaction with social support (Wright et al., 2013) have been negatively associated with emerging adult depressive symptoms. In romantic relationships, partner support negatively predicts depressive symptoms (Cramer, 2004). However, some elements of romantic relationships may enhance depressive symptoms, such as distress over a recent breakup (Field, Diego, Pelaez, Deeds, Delgado, 2009). Examining romantic relationships are important when studying peers as emerging adults frequently list their romantic partner as their close friend (Shulman & Connolly, 2016). Although peers and romantic partners play a central role in emerging adults experiences with depressive symptoms, studies examining longitudinal associations are limited. This is particularly true for research that examines how peer support in adolescence predicts depressive symptoms trajectories into emerging adulthood.

Siblings

During adolescence, siblings serve as important socialization agents and sources of support within the family system (Feinberg, Solmeyer, & McHale, 2012). For example, sibling support negatively predicts concurrent depressive symptoms, particularly for girls (Johnson et al., 2011). Longitudinally, sibling relationship characteristics are important predictors of adolescent depressive symptoms (Kim et al., 2007), even after controlling for parental and peer relationship factors (e.g., Padilla-Walker, Harper, & Jensen, 2010). A 30-year prospective study of men showed that closeness and rivalry with siblings before age 20 predicted occurrences of major depression in later adulthood (Waldinger, Vaillant, & Orav, 2007). Milevsky (2005) found that emerging adults who reported higher levels of support from their siblings had lower levels of depressive symptoms and that support from siblings compensated for low levels of support from mothers. Sibling support also may be important in the transition to emerging adulthood, as yearly increases in sibling support predict decreases in depressive symptoms, especially for girls (Guan & Fuligni, 2015).

Of note, in addition to relationship experiences, it is important to consider various structural characteristics of the sibling dyad, such as sibling sex, the age gap between siblings, and birth order. For example, the sex composition of the sibling dyad has been shown to influence individuals' level of intimacy, conflict, and affection toward siblings in both

adolescence and emerging adulthood (Harper, Padilla-Walker, & Jensen, 2014; Milevsky, Smoot, Leh, & Ruppe, 2005). Individuals position in the birth order is also important for understanding sibling relationships. Widmer and Weiss (2000) found that older sibling support during adolescence associated with lower depressive symptoms, when younger siblings had a positive image of their older sibling. Further, Whiteman, McHale, and Crouter (2011) found that birth order predicted changes in conflict and intimacy in the transition from adolescence to emerging adulthood. Therefore, sibling sex, the age gap between siblings, and birth order were included as controls in the current study.

Present Study

The present study aimed to examine associations between parent, peer, and sibling relationship factors and depressive symptom trajectories from adolescence to emerging adulthood for girls and boys. Specifically, adolescent-parent communication, close friend support, and sibling warmth and hostility were explored. Grounded in previous research and bioecological and family systems theories, the following hypotheses were stipulated. First, girls will have higher overall depressive symptoms and steeper declines over time. Second, adolescent-parent communication, close friend support, and sibling warmth will be related to lower levels of depressive symptoms during adolescence. Conversely, perceptions of sibling hostility will be related to higher levels of depressive symptoms during adolescence. Third, adolescent-parent communication, close friend support, and sibling warmth in adolescence will be associated with a decline in depressive symptoms into emerging adulthood. Sibling hostility, however, will be associated with less steep declines in depressive symptoms over time.

Method

Participants

The sample for this study was drawn from the (Blinded for Review). Data collection occurred over four time points starting in 2007 (Time 1; $N = 1,033$; $M_{age} = 16.09$; $SD = .69$), with annual followups in 2008 (Time 2; $N = 865$; $M_{age} = 17.03$; $SD = .69$) and 2009 (Time 3; $N = 547$; $M_{age} = 17.87$; $SD = .71$). In 2014 (Time 4; $N = 256$; $M_{age} = 23.50$; $SD = .56$), participants completed an additional follow-up. At Time 1, over one half of the sample was female (55%) and most identified as European American (60%), followed by African American (21%), Hispanic (11%), and Asian American (3%). Approximately 5% of the sample identified as "other." The majority of the sample reported living with both their biological parents or with one biological parent and a step- or adoptive-parent (76%). The remainder of the participants either lived with one biological parent or other parents (e.g., grandparents or other adults). Most mothers and fathers reported having graduated from high school (96% and 96%, respectively). Moreover, 31% of mothers and 40% of fathers had completed 4 years of college or a graduate or medical degree. Only adolescents who reported having one sibling were included in the analyses ($N = 372$; 50% same-sex dyads). On average, adolescents' sisters were 14.67 ($SD = 2.19$) and brothers were 15.04 ($SD = 2.44$) years old. Adolescents were on average 2.43 years older than sisters and 2.55 years older than brothers. Most participants had a younger sibling (65%).

Procedures

The study was approved by the University of Delaware IRB (Approval #HS 09-019; Parental Alcoholism and Adolescent Psychological Adjustment). In the spring of 2007 (Time 1), all 10th and 11th grade adolescents from seven public high schools in the Mid-Atlantic U.S. were invited to participate in the study. There were no exclusion criteria. Prior to data collection, information about the study and consent forms were mailed to parents. Passive parental consent was used and parents who did not want their child to participate in the study were asked to contact the research team. Those who had parental consent and provided assent were administered a self-report survey by trained research staff in schools. Of the eligible students ($N = 1,462$), approximately 71% participated at Time 1, 84% at Time 2, and 53% at Time 3.¹ Only 1-3% of students present on the day of data collection elected not to participate across the waves. Most adolescents who did not participate were absent from school on data collection day. The survey took approximately 40 minutes to complete and participants were compensated with a movie pass. Yearly follow-up data collection occurred in the spring of 2008 (Time 2) and 2009 (Time 3) using the same study protocols.

As noted previously, an additional wave of data collection occurred in the spring of 2014 (Time 4) when participants were emerging adults. Participants were contacted via email and were invited to complete an online survey (or a mailed survey if they were non-responsive to the online survey invitation). Twenty-five percent of the original sample participated.¹ At Time 4, because participants were over the age of 18, only participant consent was obtained. Participants were compensated for survey completion with a \$25 American Express gift card.

Attrition analyses were conducted to explore potential differences on key study variables based on participation patterns across the study waves (i.e., depressive symptoms at Time 1-4, adolescent-mother communication, adolescent-father communication, friend support, sibling warmth, sibling hostility, gender, and age). Specifically, we explored differences between those who participated at Time 1 only, Time 1-2 only, Time 1-3 only, those who skipped one wave, and those who completed all four waves of measurement (Time 1-4). Boys were more likely to participate at Time 1 only ($p < .002$), Time 1-2 only ($p < .004$), and Time 1-3 only ($p < .03$) compared to girls. Moreover, girls were more likely to complete all waves than boys ($p < .01$). Older adolescents had increased odds of participation at Time 1 only ($p < .02$) and Time 1-2 only ($p < .001$) compared to participation at Time 1-4. Finally, friend support at Time 1 was associated with decreased odds of participation at Time 1-2 only ($p < .02$) compared to participation at Time 1-4.

Measures

Sex—At Time 1, adolescents identified their sex as either male (0) or female (1).

Sibling control variables—**Sibling sex**, age gap between siblings, and birth order were included as controls (assessed at Time 1). Sibling sex was dummy coded for female. The age

¹Approximately half of the same at Time 3 went to college and were therefore difficult to reach. Time 4 was an unplanned follow-up which resulted in low response rates.

gap between siblings was calculated by subtracting the siblings age from the target adolescents age. Absolute values of the sibling age gap were used. Finally, a control was included to account for birth order of adolescents. Birth order was dummy coded for having a younger sibling.

Adolescent-parent communication—At Time 1, the 20-item Adolescent-Parent Communication Scale (Barnes & Olson, 2003) was used to measure open (e.g., “My mother/father is always a good listener”) and problem (e.g., “I am careful about what I say to my mother/father”) communication between adolescents and both their mother and father. Response options ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The two subscales were combined into a single measure of total adolescent-mother ($\alpha = .91$) and total adolescent-father communication ($\alpha = .91$). Higher scores indicated greater open and less problematic communication. This measure has demonstrated acceptable reliability and validity in past samples (Rosnati, Iafrate, & Scabini, 2007).

Close friend support—The Close Friend subscale of the Self-Perception Profile for Adolescents (Harter, 1988) was used to assess adolescents’ perceptions of support from a close friend at Time 1. Adolescents were asked to evaluate a series of 6-items ($\alpha = .88$) on a scale ranging from 1 (*Really not true for me*) to 4 (*Really true for me*). A representative item is “Some kids have a close friend who they can tell problems to but other kids don’t have a close friend who they can tell problems to.” Previous studies have demonstrated acceptable reliability and validity for this scale (Wichstorm, 1995).

Sibling warmth and hostility—At Time 1, The Sibling Relationship Questionnaire (Slomkowski, Rende, Conger, Simons, & Conger, 2001) was used to assess adolescents’ perceptions of warmth (e.g., “Act supportive and understanding toward you?”) and hostility (e.g., “Criticize you or your ideas?”) from their brother or sister in the last month. Only those who reported having one sibling were included in the current study. The warmth ($\alpha = .89$) and hostility ($\alpha = .87$) subscales each included 6-items and response options ranged from 0 (*Never*) to 7 (*Always*). Summed scores were generated such that higher scores indicated greater perceptions of warmth or hostility from their sibling. This questionnaire has demonstrated acceptable reliability in past research (Howe, Karos, Aquan-Assee, 2011).

Depressive symptoms—The Center for Epidemiological Studies Depression Scale for Children (CES-DC; Weissman, Orvaschell, & Padian, 1980) was used as an indicator of depressive symptomatology at each wave of the study. Participants responded to 20 items about their feelings during the past week on a scale ranging from 0 (*Not At All*) to 3 (*A Lot*). Representative items included “I felt sad” and “It was hard to get started doing things.” Higher scores indicated more depressive symptoms. The CES-DC has been shown to be reliable and valid adolescent populations (Stockings et al., 2015). In our sample, the Cronbach’s alpha coefficient for the CES-DC ranged from .89 to .91 across the four waves.

Analytic Strategy

Growth curve modeling was used to address the study’s research aims (Raudenbush & Bryk, 2002; Singer & Willett, 2003). First, an unconditional means model was examined to

partition the variance in the outcome into within (level 1) and between (level 2) components and calculate the interclass correlation coefficient (ICC). Second, an unconditional growth model with random intercepts and slopes was examined. Preliminary results suggested that a quadratic form of time should be tested given the non-linear trajectories of depressive symptoms over time. Therefore, both linear time and quadratic time were included in the model. An unconditional growth model allows for the modeling of both a) individuals' depressive symptom trajectories over time and b) the variation in rates of change across individuals. The variance components of this model illustrated the deviation between individuals' actual and predicted trajectory as well as the variation in initial depressive symptoms and rates of change between individuals. Examination of these variance components determined if there was enough variability for the individual and social relationship factors variables to predict.

Finally, separate conditional growth models were conducted to assess associations between social relationship factors and depressive symptom trajectories for girls and boys. Specifically, adolescent perceptions of communication with mothers and fathers, close friend support, sibling warmth, and sibling hostility were included as predictors of depressive symptoms intercepts and slopes for girls and boys. In addition, the sibling control variables were included (i.e., sibling sex, age gap, and birth order) in the models. Estimation plots were used to examine depressive symptom slope differences for those with low ($-1\ SD$), average, and high ($+1\ SD$) levels of social relationship factors.

Across models, time was centered around the average age at the start of the study or 16 years of age. All level 2 predictors were time-invariant as they were only assessed at Time 1 (Singer & Willett, 2003). Social relationship factors entered into models were grand mean centered to allow the model intercepts to be interpreted as the expected level of depressive symptoms for the average adolescent at the start of the study. In addition, across models, deviance chi-square tests were used to compare models with and without random effects to determine which model was the best fit to the data.

To address the issue of missing data, full information maximum likelihood estimation (FIML) was used. This missing data estimation technique uses all available information from the observed data (Wothke, 2000). Studies have shown that FIML results in estimates similar to those produced by multiple imputation in longitudinal data (Larsen, 2011; Ferro, 2014) and that the use of FIML produces efficient and unbiased estimates of standard errors in the presence of missing data (Enders & Bandalos, 2001). FIML has been used to maximize the available data in past longitudinal studies with high levels attrition (e.g., 52% and 59% of the sample lost to attrition; Galambos et al., 2006; McClelland, Acock, & Morrison, 2006). The use of FIML also is supported by the fact that current study data are assumed to missing at random (MAR) (Enders & Bandalos, 2001; Wothke, 2000). Under the MAR assumption it is presumed that the analytic model includes variables that explain missingness (Acock, 2012). To support this assumption, we conducted a series of logistic regression analyses to explore potential auxiliary variables that predicted missingness (Acock, 2012). Common auxiliary variables including gender, former depressive symptoms, and socioeconomic status (maternal and paternal education were used as proxies), were already included in the model or did not predict missingness, supporting the assumption that

data were MAR. Despite the utility of FIML for handling missing data and the statistical advantage of this missing data technique over listwise or pairwise deletion (Wothke, 2000), complete case analyses were conducted for comparison. Comparison of FIML models and complete case models indicated very similar findings (see Supplemental Tables). As such, FIML models are reported below. All analyses were completed in HLM (version 7) and Stata (version 15).

Results

Preliminary Analyses

Descriptive statistics and correlations among study variables are displayed in Table 1. Scores above 24 on the CES-DC suggest significant levels of depressive symptoms (Roberts, Lewinsohn, Seeley, 1991). At Time 1, 21% of girls and 18% of boys scored above the cutoff, indicating significant levels of depressive symptoms. Girls and boys reported similar levels of adolescent-mother communication and close friend support. Boys reported slightly higher levels of adolescent-father communication than did girls. Girls also reported more warmth and less hostility with siblings than did boys. Bivariate correlations suggested that compared to boys, girls had stronger associations a) among depressive symptoms across waves, b) between parent, peer, and sibling relationship factors and depressive symptoms, and c) among the social relationship factors.

Primary Analyses

Unconditional models—Results from an unconditional means model suggested that there was considerable variability in depressive symptoms within individuals over time ($\tau_0 = 40.22$, $p < .001$) and that individuals differed from one another in levels of depressive symptoms ($e = 77.53$) (see Table 2). The ICC indicated that 34% of the variability in depressive symptoms can be attributed to differences between individuals. An unconditional growth model was conducted to assess the variability in intercepts and slopes of depressive symptoms across individuals through examination of the variance components. Deviance tests were used to compare models with random intercepts and random slopes to determine the best fitting model to the data. Results suggested that an unconditional growth model with random intercepts ($\tau_0 = 42.10$, $p < .001$) was a better fit to the data than a model with only random intercepts and random linear slopes ($X^2 = 2.41(2)$, $p < .05$) and a model with random intercepts, linear slopes, and quadratic slopes ($X^2 = 9.26(5)$, $p > .05$). The variance components suggested that variation in intercepts between individuals could be explained by level-2 predictors (e.g., social relationship factors). The fixed effects indicated that the expected level of depressive symptoms at baseline was 15.83 ($p < .001$). Depressive symptoms were not significantly predicted by linear time ($b = .62$, $p > .05$), but were predicted by quadratic time ($b = -.19$, $p < .05$). In other words, depressive symptoms did not significantly increase with one unit shifts in age, but increases in age captured the decline in the growth trajectory.

Conditional models by sex—Conditional growth models with all social relationship factors and controls were conducted separately for girls and boys (see Table 2). An estimation plot was used to illustrate the expected trajectory of depressive symptoms for the

average girl and average boy. Generally, this plot suggested that girls and boys had similar trajectories throughout adolescence and into emerging adulthood (see Figure 1). Although girls had higher levels of depressive symptoms at all time points, the gap between girls and boys narrowed with age, such that similar levels were observed in emerging adulthood.

Girls: The predicted depressive symptoms score for the average girl at 16 years old was 16.64 ($p < .001$). Girls with more open and less problematic communication with mothers ($b = -.38, p < .001$) and fathers ($b = -.09, p < .05$) and who reported more peer support ($b = -.51, p < .05$) had lower levels of depressive symptoms in adolescence (see Table 2). The sibling relationship characteristics and the sibling control variables did not predict depressive symptoms intercepts for girls.

Both linear and quadratic depressive symptom slopes were predicted by adolescent-mother communication, sibling warmth, and sibling hostility, although in different directions. Adolescent-mother communication was a positive predictor of the linear slopes ($b = .19, p < .01$) and negative predictor of the quadratic slope ($b = -.02, p < .05$). An estimation plot was used to explore these effects (see part A of Figure 2). This plot showed the decline in depressive symptoms into emerging adulthood for those with low, average, and high levels of adolescent-mother communication. Further, the greatest difference in depressive symptoms between those with low (i.e., less open and more problematic communication) and high (i.e., more open and less problematic communication) levels of communication with mothers was at age 16. Over time, these two trajectories converged.

Sibling warmth and sibling hostility also were negative predictors of girls' linear slopes ($b = -.36, p < .01$; $b = -.26, p < .05$, respectively) and positive predictors of quadratic slopes ($b = .05, p < .01$; $b = .04, p < .01$, respectively). Estimation plots illustrated similar patterns for both sibling relationship characteristics (see part B and C of Figure 2). Specifically, low levels of sibling warmth and low levels of sibling hostility predicted girls' gradual increases in depressive symptoms throughout adolescence and steep declines into emerging adulthood. Conversely, trajectories for those with high levels of sibling warmth and high levels of sibling hostility predicted more gradual declines in depressive symptoms over time for girls.

Given that sibling warmth and hostility predicted girls' depressive symptom trajectories in the same direction and that research suggests that sibling relationships are characterized by simultaneous warmth and conflict (Brody, 2004; Kramer, 2010), it is possible that these relationship characteristics work together to impact depressive symptoms. Therefore, an additional plot was estimated which modeled depressive symptom trajectories for four combinations of warmth and hostility: 1) low warmth and low hostility, 2) low warmth and high hostility, 3) high warmth and low hostility, and 4) high warmth and high hostility (see part D of Figure 2). This plot demonstrated that girls who experienced low levels of warmth and hostility had both the greatest increases in depressive symptoms throughout adolescence and the greatest declines into emerging adulthood. Girls with low warmth and high hostility and high warmth and low hostility showed similar and relatively flat trajectories of depressive symptoms throughout adolescence and declines into emerging adulthood. Finally, girls with high warmth and high hostility showed relatively steep declines in depressive symptoms throughout adolescence and modest increases in emerging adulthood. Adolescent-

father communication, peer support, and the sibling control variables did not predict trajectories of depressive symptoms into emerging adulthood for girls.

Boys: The predicted depressive symptoms score for the average boy at 16 years old was 14.20 ($p < .001$). Boys with higher levels of peer support had lower levels of initial depressive symptoms ($b = -.82, p < .01$). Conversely, boys who perceived greater hostility from their sibling ($b = .31, p < .05$) and who had an older sibling ($b = -4.64, p < .05$) had higher levels of depressive symptoms at the start of the study. Adolescent-parent communication, sibling warmth, and the remaining controls did not predict depressive symptoms intercepts.

Similar to girls, linear and quadratic changes in depressive symptoms over time were predicted by sibling hostility for boys. Sibling hostility was a negative predictor of the linear slope ($b = -.53, p < .01$) and a positive predictor of the quadratic slope ($b = .09, p < .01$). An estimation plot showed that boys with low levels of sibling hostility had increases in depressive symptoms over time and sharp declines into emerging adulthood (see part E of Figure 2). Conversely, although boys with high levels of sibling hostility initially had the highest levels of depressive symptoms, over time, depressive symptoms declined through adolescence and increased into emerging adulthood.

Lastly, adolescent-father communication was a significant negative predictor of the quadratic slope ($b = -.02, p < .05$). An estimation plot highlighted the decline in depressive symptoms into emerging adulthood for those with all three levels of adolescent-father communication (see part F of Figure 2). The other social relationship factors and sibling control variables were not significant predictors of depressive symptoms slopes for boys.

Discussion

Experiences with depressive symptoms during adolescence have been associated with a range of adjustment outcomes and may place youth at risk for future depressive episodes (Bertha & Balázs, 2013; Wesselhoeft et al., 2013). Evidence suggests that depressive symptoms differentially affect females (Girgus & Yang, 2015) and are related to experiences in familial and extrafamilial relationships (Harper et al., 2014). However, the extant research on depressive symptoms has been limited by short-term longitudinal studies, within developmental period examinations, and/or has neglected to consider important social influences. Therefore, the purpose of the current study was to examine how relationship experiences with parents, peers, and siblings impact depressive symptom trajectories for girls and boys from adolescence into emerging adulthood. Overall, the study findings underscored the importance of family relationships relative to peer relationships, and illustrated how relationship experiences were differentially associated with depressive symptom for girls and boys.

Results suggested that depressive symptoms were relatively stable throughout adolescence and declined into emerging adulthood for both girls and boys. Supporting hypotheses and past research (Galambos & Krahn, 2008; Meadows et al., 2006), girls' reported greater depressive symptoms in both adolescence and emerging adulthood in comparison to boys,

although the gap narrowed over time. Findings also suggested relationship factors with parents, peers, and, siblings were related to trajectories of depressive symptoms differently for girls and boys.

Parents

Results from the current study suggested that for girls, but not boys, communication with both mothers and fathers was related to lower levels of depressive symptoms during adolescence. Findings for girls' compliment research demonstrating that positive relationships with parents during adolescence are associated with lower depressive symptoms (Yu et al., 2006) and highlight parents as important members of the family system for supporting adolescent adjustment. Although study findings were contrary to the hypotheses for boys, the developmental changes that occur during adolescence may explain this result. It is possible that communication with parents does not affect boys in the same way it does girls as boys rely less on intimacy in relationships and are less socially expressive (Ruble, Martin, & Berenbaum, 2006). Alternatively, because girls and boys differ on a variety of communication elements, such as disclosure, frequency of communication, and discussions about problems in relationships (Cernkovich & Giordano, 1987; Kearney & Bussey, 2015), perhaps other aspects of adolescent-parent communication may be important for understanding boys' depressive symptoms. Future research should explore associations among other elements of boys' communication with parents and depressive symptoms to better understand this association.

Adolescent-parent communication also was related to depressive symptom trajectories differently for girls and boys. For girls, communication with mothers in adolescence predicted a decline of depressive symptoms over time. Despite differences during adolescence, trajectories of depressive symptoms became more similar over time for girls with both positive and negative communication styles with mothers. In contrast, for boys, only communication with fathers in adolescence predicted declines in depressive symptoms into emerging adulthood. Estimation plots revealed that boys showed similar levels of depressive symptoms in adolescence, across positive and negative communication styles with fathers. However, depressive symptom trajectories declined the most into emerging adulthood among boys who reported poor adolescent-father communication during adolescence. Perhaps this decline is associated with the positive impact that distance and autonomy has on the emerging adult-parent relationship (Seiffge-Krenke, 2016). For example, as the rules and roles of the family system change in response to emerging adults' development, perhaps the importance of communication with fathers diminishes over time.

Generally, findings support past research which has shown that adolescents with positive relationships with parents (i.e., good communication and trust) report low levels of concurrent and future depressive symptoms (Allen et al., 2006). The observed differences in the association between communication and depressive symptoms based on the sex composition of the adolescent-parent dyad are consistent with studies showing that mother-daughter communication (Ohannessian, 2012) and father-son relationship quality predict later depressive symptoms (Harper et al., 2014). These findings also are in line with research that suggests girls and boys tend to emulate same-sex models (Bussey & Bandura, 1984),

particularly in the context of close relationships (Gaunt & Bassi, 2012). Perhaps same-sex parent models are more influential sources of support for depressive symptoms than cross-sex parent models.

Peers

In the present study, close friend support predicted lower levels of depressive symptoms during adolescence for both girls and boys. This finding is consistent with research illustrating peer support as protective from depressive symptoms during adolescence (Burton et al., 2004; Nilsen et al., 2013) and with bioecological systems theory which emphasizes the importance of microsystem relationships (Bronfenbrenner & Morris, 2006). However, close friend support during adolescence was not related to depressive symptom trajectories into emerging adulthood. Although peers are salient sources of support throughout adolescence and emerging adulthood (Cooley et al., 2015; Jenkins et al., 2013), the nature of the adolescent-peer relationship may explain this null finding. Unlike family relationships which tend to be long-lasting and stable (Bengtson, 2001), peers may be more ephemeral sources of influence as friendships fluctuate and dissipate during adolescence (Poulin & Chan, 2010). Therefore, the transient nature of peer relationships may reduce the strength of their positive effect on adjustment outcomes over time.

Siblings

Lastly, results from the current study suggested that relationships with siblings predicted depressive symptom trajectories for both girls and boys, though in partially dissimilar ways. Contrary to study hypotheses, sibling warmth and hostility did not predict girls' depressive symptoms during adolescence. This finding is surprising as girls report more intimacy and less hostility in relationships with siblings than boys (Feinberg et al., 2012). However, sibling hostility, but not sibling warmth, was negatively associated with boys' depressive symptoms in adolescence. Sibling dyads that contain boys are more likely to experience conflict and report lower levels of intimacy than those that contain girls (Cole & Kerns, 2001). Therefore, it may be that boys are more susceptible to conflict, rather than warmth, as it is particularly prevalent in their sibling experience.

Having an older sibling also was predictive of greater depressive symptoms for boys during adolescence. This finding may be explained considering research indicating younger siblings are susceptible to the influence of their older sibling counterpart. For example, support from an older sibling has been found to be negatively related to depressive symptoms (Widmer & Weiss, 2000). Importantly, these associations only occurred when younger siblings had a positive image of their older sibling. Perhaps the relationship between birth order and depressive symptoms in the current study was driven by underlying perceptions adolescents had of their older sibling or levels of support within the sibling dyad. None of the other sibling dyad structural characteristics were associated with depressive symptoms in adolescence or depressive symptoms trajectories over time. Although the importance of sibling dyad structural characteristics appear to be a fairly robust finding in the literature (Feinberg et al., 2012), it should be noted that differences based on the sex constellation of the sibling dyad, age difference, and birth order are not consistent (e.g., Kim et al., 2007; Samek et al., 2015). Nonetheless, future research should explore how these structural

characteristics and sibling relationship elements work in tandem to influence depressive symptoms (see the Limitations section for a more developed discussion).

Of note, sibling relationship factors predicted changes in depressive symptoms over time differently by girls and boys. Among boys with low levels of sibling hostility in adolescence, depressive symptoms gradually increased throughout adolescence and then declined into emerging adulthood. Conversely, for boys with high levels of sibling hostility, depressive symptoms gradually declined throughout adolescence and then increased into emerging adulthood. Results for those with high levels of hostility in the sibling dyad support past research which has shown positive longitudinal associations between sibling hostility or conflict and depressive symptoms during adolescence (e.g., Harper et al., 2014). However, these findings may also point to the importance of hostility in sibling dyads for adolescent development. As a normal part of sibling interactions, conflict and hostility between siblings provides opportunities for individuals to enhance competencies related to social and emotional development (Kramer, 2010). Perhaps adolescents who are not afforded opportunities to develop these competencies through interactions with their siblings within the “safe” family environment are at risk for future adjustment disorders.

For girls, sibling warmth and hostility predicted depressive symptom trajectories in similar ways. This is not surprising given that sibling relationships are characterized by simultaneous warmth and conflict and these relationship elements have both a unique and a shared influence on a range of adjustment outcomes (Brody, 2004; Kramer, 2010). Therefore, it is possible that because warmth and hostility coexist, these effects may be interdependent. In the current study, girls who reported having emotionally uncharged sibling interactions (i.e., low warmth and low hostility) and volatile sibling interactions (i.e., high warmth and high hostility) in adolescence were estimated to have the greatest changes in depressive symptoms over time. Given that interactions between sibling fluctuate “rapidly between instances of conflict, teasing, and threats and instances of shared laughter, affection, and pride” (Kramer, 2010, p. 81), studies that examine the dynamic nature of siblings may be needed. For example, daily diary methodology may better illuminate how sibling warmth and hostility fluctuate within the sibling dyad and how these fluctuations are associated with depressive symptoms.

Results from this study addressing sibling relationships support bioecological and family systems perspectives which highlight siblings as important members of individuals’ immediate contexts (Bronfenbrenner & Morris, 2006; Cox & Paley, 1997). Further, findings support (Kim et al., 2007) and extend past research as to the ways sibling interactions in adolescence are associated with depressive symptom trajectories over time. However, with relatively limited literature exploring the shared effects of sibling relationship characteristics and the simultaneous influence of parents and peers, future work is needed to understand how social relationships impact depressive symptom trajectories over time.

Limitations

Although this study makes important contributions to the literature examining social influences on adolescent and emerging adult depressive symptoms, it has several limitations. First, the current study only included adolescents who reported having one sibling. As

families become increasingly complex, research that accounts for changing and diverse family structures is warranted. Second, future studies should explore associations among the various structural characteristics of sibling dyads, relationship characteristics, and depressive symptoms. For example, it is possible that relationships between sibling warmth or hostility and depressive symptoms may vary depending on the sex composition, birth order, or age gap within the sibling dyad.

Third, the current study is limited in that it did not explore the potentially interacting family subsystems. Family systems theory suggests that multiple family subsystems are constantly interacting and influencing one another (Cox & Paley, 1997). Therefore, it is possible that sibling and parent relationship factors work in concert to impact adolescent depressive symptoms. Future research should explore how parent and sibling relationship factors interact to predict depressive symptom trajectories over time. Fourth, the current study was limited due to the treatment of the social relationship factors as time-invariant. It is possible and likely (e.g., Kim et al., 2007) that in addition to depressive symptoms, parent, peer, and sibling relationship factors change over time. Studies examining relationship factors as time-varying covariates are needed to see how they change over time and explore their influence on depressive symptom trajectories. Relatedly, it is conceivable that hostility from a sibling may cause adolescents to experience depressive symptoms *and* that experiences with depressive symptoms may result in hostility from a sibling. In the future, studies should attempt to tease apart these relationships to understand potential alternative direction of effects.

This study also is limited by the reliance on a single data point during emerging adulthood. An additional data point during emerging adulthood may have yielded more reliable estimates. The study findings are limited due to the mono-method and mono-reporter study design. Utilization of multiple methods of data collection, such as observational techniques or in depth interviews, may result in greater insights into how social relationships are associated with depressive symptom trajectories. Further, reports from both members of the relationship dyad (e.g., adolescent and sibling reports) may reduce mono-reporter bias.

Conclusion

Despite the aforementioned limitations, the current study provides several important contributions to the literature examining associations between social relationship factors and depressive symptoms. Results from this study suggest that adolescent-parent communication, peer support, and sibling warmth and hostility play significant roles in understanding the diverse trajectories of depressive symptoms from adolescence to emerging adulthood for girls and boys. This study extended past literature by using a long-term longitudinal design which allowed for the exploration of the effect of multiple important social forces on depressive symptoms across developmental periods.

Understanding the factors associated with depressive symptoms has implications for individuals interested in supporting youth and their families through prevention and intervention programs. For example, because results from this study suggests that both familial and extrafamilial relationships predicted experiences with depressive symptoms, perhaps programs should consider including both groups in treatment plans. Relatedly,

prevention programs may find it advantageous to strengthen and promote positive relationships with the parents and siblings in adolescents' lives as these relationships are influential in understanding adolescent depressive symptomatology during the transition into adulthood. Finally, as findings identified sex differences, it may be beneficial for programs to tailor efforts to meet the specific needs of girls and boys.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Estimated depressive symptom trajectories for the average girl and boy. Adolescent-mother communication, adolescent-father communication, close friend support, sibling warmth, sibling hostility, and control variables were held at their averages.

Figure 2.

Estimated depressive symptom trajectories for girls (A–D) and boys (E–F). Adolescent-mother and adolescent-father communication were abbreviated “A-M Comm.” and “A-F Comm.”, respectively. In Figures A, B, C, E, and F, estimated trajectories were plotted for those with low ($-1\ SD$), average, and high ($+1\ SD$) levels of the moderating variable. Low adolescent-parent communication represents less open and more problematic communication, whereas high adolescent-parent communication represents more open and less problematic communication. In Figure D, combinations of low and high levels of

warmth and hostility were plotted for girls. Across figures, all other model variables were held at their averages.

Table 1
Correlations and Descriptive Statistics for Study Variables by Adolescent Gender

	1	2	3	4	5	6	7	8	9	<i>M</i> (<i>SD</i>)	<i>Range</i>
1. DS (T1)	–	0.47***	0.21	–0.02	–0.16	–0.30***	–0.28***	–0.13	0.11	14.93(11.31)	0–53
2. DS (T2)	0.42***	–	0.36*	–0.01	–0.23*	–0.18	–0.12	–0.20	–0.07	13.42(9.32)	0–37
3. DS (T3)	0.21	0.24*	–	0.28	–0.03	–0.22	–0.32*	–0.33*	0.06	14.23(11.29)	0–50
4. DS (T4)	0.38**	0.51***	0.32*	–	–0.24	–0.19	–0.21	0.11	–0.33	11.43(8.99)	0–35
5. A-M Comm.	–0.57***	–0.37***	–0.20	–0.41**	–	0.29***	0.22*	0.17*	–0.16	66.94(15.07)	32–98
6. A-F Comm.	–0.30***	–0.17	–0.06	–0.03	0.18*	–	0.22*	0.27**	–0.05	64.85(16.27)	24–100
7. Friend Support	–0.15	–0.03	–0.37***	–0.20	–0.03	0.17*	–	0.11	0.03	20.31(3.76)	9–24
8. Sibling Warmth	–0.12	–0.18*	–0.15	–0.14	0.35***	0.12	0.05	–	–0.13	22.58(8.45)	6–42
9. Sibling Hostility	0.20**	0.09	–0.11	0.43**	–0.27***	–0.14	–0.01	–0.47***	–	23.55(8.42)	6–42
<i>M</i>	17.00	16.61	16.63	10.02	67.01	61.96	22.12	25.06	22.45	–	–
<i>SD</i>	11.09	10.84	10.25	8.80	16.50	17.21	3.02	8.69	8.67	–	–
<i>Range</i>	0–52	0–50	0–41	0–39	28–100	20–99	6–24	6–42	6–42	–	–

Note. Correlations for girls are on the bottom panel and boys are on the top panel. The adolescent-parent communication, close friend support, and sibling relationship characteristics variables were measures at Time 1. Depressive symptoms (DP), Adolescent-mother communication (A-M Comm.), and adolescent-father communication (A-F Comm.) are abbreviated in this table.

* $p < .01$;

** $p < .001$;

*** $p < .001$.

Table 2

Full Conditional Growth Curve Model by Gender

	Unconditional Means Model	Unconditional Growth Model	Conditional Growth Model by Gender	
	<i>B(SE)</i>			
Fixed Effects			Girls	Boys
Intercept	15.52(.48)***	15.83(.57)***	16.64(.72)***	14.20(99)***
A-M Comm.			−0.38(.05)***	0.05(.08)
A-F Comm.			−0.09(.04)*	−0.10(.07)
Peer Support			−0.51(.24)*	−0.82(.28)**
Sibling Warmth			0.16(.10)	−0.25(.14) [†]
Sibling Hostility			0.05(.09)	0.31(.13)*
Sibling Age-gap			0.44(.64)	1.28(.96)
Birth Order			−1.81(1.73)	−4.63(2.23)*
Sibling Sex			−0.65(1.57)	−2.09(2.00)
Linear Slope		.62(.61)	0.16(.88)	0.50(1.22)
A-M Comm.			0.19(.06)**	−0.14(.09)
A-F Comm.			0.04(.05)	0.12(.08)
Peer Support			0.11(.30)	0.57(.35)
Sibling Warmth			−0.36(.12)**	−0.14(.16)
Sibling Hostility			−0.26(.12)*	−0.53(.17)**
Sibling Age-gap			−1.00(.87)	−0.22(1.24)
Birth Order			−1.10(2.17)	3.84(2.70)
Sibling Gender			2.05(1.93)	0.83(2.44)
Quadratic Slope		−0.19(.09)*	−0.16(.12)	−0.17(.26)
A-M Comm.			−0.02(.01)*	0.03(.01) [†]
A-F Comm.			−0.00(.01)	−0.02(.01)*
Peer Support			−0.02(.04)	−0.09(.07)
Sibling Warmth			0.05(.02)**	0.03(.03)
Sibling Hostility			0.04(.02)**	0.09(.04)**
Sibling Age-gap			0.13(.12)	0.08(.18)
Birth Order			0.13(.31)	−0.53(.41)
Sibling Sex			−0.24(.27)	−0.13(.41)
Variance Components	<i>B(SD)</i>			
Level 1: Within-person residual	77.53(8.80)	75.49(8.69)	52.28(7.23)	35.29(5.94)
Level 2: Random Intercepts	40.22(6.34)***	42.10(6.49)***	24.56(4.96)*	70.29(8.38)***
Random Linear Slopes			10.74(3.28)	55.02(7.42)*
Random Quadratic Slopes			0.19(.44) [†]	0.93(0.96)**

	Unconditional Means Model	Unconditional Growth Model	Conditional Growth Model by Gender	
	<i>B(SE)</i>			
Fixed Effects			Girls	Boys
<i>Pseudo-R</i> ²		.03	.41	.38
Deviance	5723.86	5412.58	2289.59	1551.95

Note.

^t
p < .10;

*
p < .05;

**
p < .01;

p < .001.