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Social Anxiety Symptoms and Suicidal Ideation in a Clinical Sample of Early Adolescents: Examining Loneliness and Social Support as Longitudinal Mediators

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Abstract

Recent research has shown that social anxiety may be related to increased risk for suicidal ideation in teens, although this research largely has been cross-sectional and has not examined potential mediators of this relationship. A clinical sample of 144 early adolescents (72 % female; 12–15 years old) was assessed during psychiatric inpatient hospitalization and followed up at 9 and 18 months post-baseline. Symptoms of social anxiety, depression, suicidal ideation, loneliness, and perceived social support were assessed via structured interviews and self-report instruments. Structural equation modeling revealed a significant direct relationship between social anxiety symptoms at baseline and suicidal ideation at 18 months post-baseline, even after controlling for baseline depressive symptoms and ideation. A second multiple mediation model revealed that baseline social anxiety had a significant indirect effect on suicidal ideation at 18 months post-baseline through loneliness at 9 months post-baseline. Social anxiety did not have a significant indirect effect on suicidal ideation through perceived social support from either parents or close friends. Findings suggest that loneliness may be particularly implicated in the relationship between social anxiety and suicidality in teens. Clinicians should assess and address feelings of loneliness when treating socially anxious adolescents.

Keywords

Adolescents; Social anxiety; Suicidal ideation; Loneliness; Social support

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Conflict of Interest The authors declare that they have no conflict of interest.

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Adolescence has been identified as a period of increased risk for the onset of suicidal thoughts and behaviors. Results from the National Comorbidity Study show the lifetime prevalences of suicide ideation, plans, and attempts in adolescents to be 12.1 %, 4.0 %, and 4.1 %, respectively (Nock et al. 2013). The same nationally representative study found the 12-month prevalences of suicide ideation and attempts in adolescents to be 4.2 % and 1.9 %, respectively (Husky et al. 2012). Psychosocial risk factors for suicidal thoughts and behavior in youth include depression, substance abuse, negative life events, past physical or sexual abuse, and hopelessness (Mazza and Reynolds 1998). Given that past ideation and attempts predict future suicidality (Lewinsohn et al. 1994), and completed suicide remains the third leading cause of death among adolescents (Centers for Disease Control and Prevention 2011), it is vitally important to identify additional risk factors for suicidal thoughts and behaviors in adolescents and to develop models of risk that offer greater explanatory power.

The present study examines social anxiety symptoms as a longitudinal predictor of suicidal ideation in a clinical sample of early adolescents, and explores feelings of loneliness and low perceived social support as potential mediators of this relationship. The transition to adolescence coincides with a dramatic increase in suicidal ideation and attempts (Kessler et al. 1999), making it especially important to study the precursors of suicidality in this age group. In addition, the present study utilizes a high-risk sample of youth that was initially assessed during psychiatric hospitalization and followed up over an 18-month period. Due to methodological constraints, suicidal thoughts and behaviors often are studied in community samples, such as high school or college students. Although such research has made valuable contributions to the literature on suicidality, it especially is important to study suicidal ideation among higher risk youth. In particular, it is vital to examine risk factors for suicidality after discharge from psychiatric hospitalization. Research has shown that rates of suicidal ideation and attempts are especially high in the 12 months following discharge (e.g., Gunnell et al. 2008), making this timeframe a particularly important period for understanding the trajectory of suicidal ideation in these high-risk teens.

Social Anxiety and Suicidal Thoughts and Behaviors

Anxiety disorders are highly prevalent in adolescence (Costello et al. 1996), and researchers have begun to examine the relationship between anxiety disorders and suicidality in youth. Several specific anxiety disorders have been linked to adolescent suicidality, including panic disorder, generalized anxiety disorder, and separation anxiety disorder (for a review, see Hill et al. 2011). Recent research also has begun to examine the relationship between social anxiety disorder (also known as social phobia) and adolescent suicidality. Characterized by a fear of social situations, social anxiety disorder involves physical symptoms such as blushing and trembling, cognitive symptoms such as worry and negative self-evaluation, and a pattern of behavioral avoidance (Mesa et al. 2011). The 12-month prevalence of social anxiety disorder is 3.0 % in teenagers, with the disorder being twice as prevalent among girls as it is among boys (Wittchen et al. 1999).

To date, there is limited research on the relationship between social anxiety and suicidality in adolescents, with most studies focused on community or epidemiological samples. One epidemiological study of children and teens found that social anxiety distinguished youth

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with recent ideation or a lifetime attempt from nonsuicidal controls (Gould et al. 1998). However, the authors did not account for possible comorbidity, a crucial step given the high co-occurrence of social anxiety and depression in youth, shown to be approximately 31 % (Wittchen et al. 1999). In a population-based study that did control for comorbidity, researchers found that teenage girls with a lifetime social anxiety diagnosis were more likely to report lifetime ideation, plans, and attempts as compared to controls; however, only ideation risk remained significant after accounting for depression (Nelson et al. 2000). Similarly, research using a sample of high-school students found that current social phobia symptoms were marginally associated with suicidal ideation but not suicidal behavior, after controlling for depression (Valentiner et al. 2002). Finally, in the only study to use a clinical sample, the authors found that adolescent outpatients with current ideation or past attempts were no more likely to be socially anxious than nonsuicidal patients. These results held for both younger and older youth (Strauss et al. 2000). However, the study's classification of patients reporting "slight ideation" as "nonsuicidal" may have obscured relevant findings related to suicidal ideation.

Although research on this topic has been sparse in adolescent populations, studies in adult populations consistently have evidenced an association between social anxiety and increased risk for suicidality. In community and epidemiological samples, researchers have shown that both current and lifetime social anxiety disorder diagnoses are associated with increased risk for suicidal ideation and attempts, even after controlling for depression and other diagnoses (e.g., Nock et al. 2010; Sareen et al. 2005). Nearly all of the research in this area has been cross-sectional in nature, however, limiting our understanding of the temporal relationship between social anxiety and suicidality. In the only longitudinal study to date, Sareen and colleagues (2005) found that a social anxiety diagnosis at baseline was independently associated with new-onset suicidal ideation, but not new-onset attempts, at 3-year follow-up.

Loneliness and Low Social Support as Mediators of the Relationship Between Social Anxiety Symptoms and Suicidal Ideation

Interpersonal models of suicide may provide a framework for understanding the relationship between social anxiety and increased risk for suicidal thoughts and behaviors. According to Joiner's Interpersonal Theory of Suicide, two factors are thought to contribute to the desire for suicide, *thwarted belongingness* and *perceived burdensomeness*, while a third factor called *the acquired capability for suicide* is implicated in suicidal behavior. Thwarted belongingness encompasses feelings of isolation and loneliness as well as a perception that one lacks mutually supportive relationships. Perceived burdensomeness, on the other hand, involves a belief that one's life has become a burden to friends and family (Joiner 2005). Tests of this model largely have supported its main hypotheses. Of particular relevance to the present study, thwarted belongingness and perceived burdensomeness have been shown to be associated with increased risk for suicidal ideation (for a review, see Van Orden et al. 2010).

Among the constructs found in the Interpersonal Theory of Suicide, thwarted belongingness has been shown to be uniquely associated with social anxiety symptoms (Davidson et al. 2011). Consistent with this finding, social anxiety has been linked to interpersonal

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difficulties characteristic of thwarted belongingness, such as low perceived social support and feelings of loneliness. For instance, social anxiety in teens has been shown to be negatively associated with perceived social support, including social support from peers and close friends (e.g., Calsyn et al. 2005; LaGreca and Lopez 1998). It should be noted, however, that all of the research that has thus far linked social anxiety to low levels of perceived social support has used community samples, making it unclear whether there is a similar link in high-risk youth.

The cognitive and behavioral characteristics of social anxiety may help to explain its relationship to low perceived social support. Individuals with social anxiety tend to exhibit a heightened sensitivity to negative evaluation and to negatively interpret ambiguous social situations (Stopa and Clark 2000); such biases may negatively influence how socially anxious individuals perceive the level of support they are receiving. Behaviorally, socially anxious individuals tend to withdraw from social interaction, exhibit poorer social skills, and have a smaller network of friends (Miers et al. 2010; Van Zalk et al. 2011), which may diminish the actual social support received. Finally, even within their social networks, socially anxious adolescents tend to experience less intimacy with close friends (Vernberg et al. 1992), and report that their parents use a more controlling parental style (Rork and Morris 2009), which may negatively impact how these adolescents perceive the support they are receiving from friends and parents.

Given that adolescence is marked by an increased emphasis on social relationships, interpersonal difficulties such as low perceived social support may be especially problematic for socially anxious teens, and thus may help to explain the relationship between social anxiety and suicidality. Studies that have looked at specific sources of support suggest that adolescent ideation and attempts are negatively associated with perceptions of family-related support and connectedness (Czyz et al. 2012; Eskin et al. 2007; Kerr et al. 2006; Yuen et al. 1996), particularly with perceptions of parental support (Babiss and Gangwisch 2009; De Man et al. 1993). Studies have also shown that adolescent ideation is negatively related to perceived social support from peers and close friends (Rigby and Slee 1999), perceptions of friends' caring (Babiss and Gangwisch 2009), and connectedness with peers (Czyz et al. 2012), consistent with adolescents' focus on peer relationships during the teenage years. It should be noted, however, that few studies linking social support to suicidality in teens have used clinical samples (e.g., Czyz et al. 2012; Kerr et al. 2006). Finally, some studies have indicated that there may exist gender differences in the relationship between perceived social support and adolescent suicidality, with significant associations present among teenage girls only (e.g., Kerr et al. 2006; Mazza and Reynolds 1998).

Joiner's interpersonal account of suicide (2005) also implicates loneliness as a factor that may help to explain the link between social anxiety and suicidal ideation. Research using both community and clinical samples has shown that socially anxious adolescents report greater feelings of loneliness (Beidel et al. 2007; Lasgaard et al. 2011a), which has been described as an aversive emotional state resulting from a belief that one's social relationships are inadequate (Heinrich and Gullone 2006). In general, loneliness has been shown to peak in adolescence (Perlman and Landolt 1999), and it may be that socially anxious teens are even more likely to endorse loneliness as a result of the lower social

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acceptance and friendship intimacy that they experience (LaGreca and Lopez 1998; Vernberg et al. 1992). There also is mixed evidence supporting a link between loneliness and adolescent suicidality. Research has shown that loneliness is associated with increased risk for recent suicidal ideation and behavior in community samples of adolescents (Roberts et al. 1998; Schinka et al. 2012) and for lifetime attempts (Rossow and Wichstrom 1994) in an epidemiological sample of youth. Similarly, loneliness was found to be related to increased risk for lifetime self-harm behavior in a community sample of teens and to suicide attempts in a clinical sample of teens, although the latter finding was no longer significant after controlling for other risk factors (Groholt et al. 2000). In contrast, however, Lasgaard et al. (2011b) found that loneliness did not predict suicidal ideation in high school students, after controlling for depression.

The Present Study

Prior research suggests that socially anxious adolescents are at increased risk for suicidal thoughts and behaviors (Nelson et al. 2000; Valentiner et al. 2002). Past work in this area has largely been cross-sectional in nature, however, and the present study extends this literature by examining social anxiety symptoms as a longitudinal predictor of suicidal ideation in teens. The current study also examines two potential mediators of this longitudinal relationship: loneliness and low perceived social support. It is hypothesized that social anxiety symptoms at baseline will prospectively predict suicidal ideation at follow-up, after controlling for baseline ideation. Given the high co-occurrence of social anxiety and depression in youth (Wittchen et al. 1999) and prior research showing that social anxiety is related to suicidality above and beyond the effects of depression (Nelson et al. 2000; Valentiner et al. 2002), the present study also controlled for baseline depressive symptoms in order to examine social anxiety as a unique predictor of adolescent suicidal ideation. In addition, it is hypothesized that loneliness and low perceived close friend and parental support will each statistically mediate the relationship between baseline social anxiety symptoms and suicidal ideation at follow-up.

Methods

Participants

Participants were 144 adolescents (72 % female) between the ages of 12 and 15 years (M=13.51, SD=0.81) at baseline. Approximately 75 % of the participants identified as White/Caucasian, 4 % Latino American, 3 % African American, and 17 % of mixed ethnicity. Around 27 % of the adolescents lived with both biological parents, 29 % lived with their biological mother only, and 15 % lived with their biological mother and a stepparent. The remaining 29 % lived with their biological father only, with extended family, or in temporary care. The educational status of participants' mothers was as follows: 19 % had not received a high school diploma, 40 % had obtained a high school degree, 14 % had received a trade degree, 11 % had obtained some undergraduate education, and 16 % had a college degree or higher.

The participants were recruited from a psychiatric inpatient facility in the northeastern United States, and study procedures were approved by the relevant Institutional Review

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Board. Although an exact record of the reasons for admission to the inpatient unit is not available, participants were admitted in accordance with hospital standards for admitting individuals who had engaged in recent self-harm, or who were in imminent danger of harm to self or others. Both suicidal and nonsuicidal adolescents were recruited to ensure variability in the constructs of interest. Of those admitted to the inpatient unit during the recruitment period, a total of 246 adolescents met study inclusion criteria (12–15 years old, with no history of mental retardation or psychosis). At the time of data collection, approximately 40 % of all admissions to this unit were discharged or transferred within 1–2 days of admission. This length of stay was related to a variety of factors (e.g., insurance limitations, vacancies at area facilities), and was not related to the severity of adolescents' psychological symptoms or socioeconomic background. Therefore, the discharge/ transfer conditions did not serve as a marker for psychiatric severity or socioeconomic status in the present sample.

Clinical staff initially met with the adolescents' parent or guardian (typically on the second day post-admission) in order to obtain permission for research staff to contact the family about the study. Assent/consent was then requested from 183 of the 246 eligible adolescents/ parents. A total of 162 (88.5 %) adolescents/parents provided informed consent. Of these adolescents, a total of 144 participants were available to take part in study procedures. The majority of the patients who were not available for assent/consent (N=63) or who did not complete the study after assent/consent (N=16) were among those teens who were discharged or transferred within 1–2 days of admission (as described above).

The baseline assessment took place during the adolescents' hospitalization (within 2 to 4 days of admission) immediately following assent/consent. Psychiatric diagnoses were obtained at baseline using the Diagnostic Interview Schedule for Children (DISC-IV-Adolescent Report; Shaffer et al. 2000). The diagnostic breakdown was as follows: major depressive disorder (31.3 %), oppositional defiant disorder (25.7 %), conduct disorder (17.4 %), posttraumatic stress disorder (13.2 %), social phobia (12.5 %), and generalized anxiety disorder (6.3 %; cumulative total exceeds 100 % due to comorbidity). In addition, approximately 48 % of the participants (N=66) endorsed having made a suicide attempt in the year prior to the baseline assessment. Participants also completed follow-up assessments at 9 and 18 months post-baseline.

The inpatient recruitment setting and longitudinal nature of this research contributed to the presence of missing data. A variety of strategies was used to enhance retention: frequent phone and mail contact with participants and their family members and friends, public access database searches for updated contact information, and incentives for completion of follow-up assessments (i.e., $30 at each follow-up for both the adolescent and a parent). Of the 144 adolescents who took part in the baseline assessment, 105 adolescents (73 %) took part in the 9-month follow-up while 101 adolescents (70 %) took part in the final assessment, a retention rate that is consistent with previous longitudinal studies of adolescent suicide ideators and attempters (see Boergers and Spirito 2003, for a review). There were no significant differences on age, gender, or other baseline variables among adolescents with and without complete data. In order to avoid biased estimates resulting from listwise deletion or other ad hoc missing data procedures, analyses were conducted

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with all available data using full information maximum likelihood procedures, a method that has been shown to produce efficient, unbiased estimates under both missing completely at random (MCAR) and the more stringent missing at random (MAR) conditions (Enders and Bandalos 2001).

Measures

All adolescent questionnaire-based measures were administered during individual meetings with a trained research assistant, who read each questionnaire aloud while adolescents privately recorded their responses. This procedure was chosen because it allowed research assistants to monitor adolescents' attention and compliance when completing measures, to clarify questionnaire items when needed, and to immediately check for response inconsistencies.

Suicidal Ideation—The Suicidal Ideation Questionnaire (SIQ; Reynolds 1985) was used to measure adolescents' suicidal ideation at baseline and at the 18-month follow-up time point. The SIQ is a 30-item self-report inventory that assesses specific thoughts and cognitions about suicide. Items are scored on a 7-point scale ranging from 0 (I never had this thought) to 6 (I had this thought almost every day). A total score was computed as the mean of the 30 items, with higher scores reflecting a greater frequency/severity of suicidal ideation. Adolescents were asked about ideation in the last 12 months at baseline, and about ideation in the last 3 months at the 18-month follow up. Adequate internal reliability and validity of the SIQ has been established in adolescent psychiatric inpatients (Pinto et al. 1997). In this sample, the internal consistency of the SIQ was 0.98 at both time points.

Psychiatric Symptoms and Diagnoses at Baseline—The Diagnostic Interview Schedule for Children (DISC-IV-Adolescent Report; Shaffer et al. 2000) was administered at baseline to assess symptoms of social phobia and major depression. The DISC-IV is a structured diagnostic interview designed to assess symptoms consistent with the diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association 1994). The adolescent self-report version of the DISC-IV is designed for adolescents ages 6–17. The DISC-IV has been shown to have adequate interrater and test-retest reliability (Shaffer et al. 2000). A continuous measure of symptom severity for social phobia and major depressive disorder was created by summing the number of adolescents' clinically significant symptoms for each disorder. Internal consistency at baseline was 0.90 for major depression symptoms and 0.85 for social phobia symptoms. Modules for oppositional defiant disorder, conduct disorder, posttraumatic stress disorder, and generalized anxiety disorder were also administered. The total number of diagnoses at baseline (excluding social phobia and major depression) was calculated as an indicator of baseline diagnostic status and comorbidity.

The Social Anxiety Scale for Adolescents (SASA; LaGreca and Lopez 1998) was administered at baseline to assess participants' social anxiety symptoms. The SASA is a 22-item self-report scale that assesses symptoms of social anxiety along three dimensions: fear of negative evaluation by peers, general social avoidance and distress, and social avoidance and distress in novel social situations. The SASA includes 18 descriptive self-statements

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(e.g., "I feel shy around people I don't know") that are rated on a 5-point scale ranging from 1 *(not true at all)* to 5 *(always true)*, along with 4 filler items (e.g., "I like to play sports") that are not included in the scoring. A total score was computed as the mean of the 18 items, with higher scores indicating a greater level of social anxiety symptoms. The SASA has been found to have satisfactory internal reliability and validity in a high school sample (LaGreca and Lopez 1998). In the current sample, the internal consistency of the SASA was 0.95 at baseline.

Loneliness—The Loneliness and Social Dissatisfaction Scale (LSDS; Asher et al. 1984) was administered at baseline and at the 9-month follow-up time point to assess participants' subjective feelings of loneliness. The LSDS is a 24-item self-report scale that measures the extent to which a child feels lonely and socially dissatisfied. The scale includes 16 items (e.g., "I feel alone"), and 8 filler statements (e.g., "I like to draw") that are not included in the scoring. Children are asked to rate each statement on a 5-point scale ranging from 1 *(not true at all)* to 5 *(always true)*. A total score was computed as the mean of the 16 items, with higher scores reflecting a greater degree of loneliness. The LSDS has been shown to have strong reliability and validity in a non-clinical sample (Parkhurst and Asher 1992). In the current study, the internal consistency was 0.92 at both time points.

Social Support—The Social Support Scale for Children and Adolescents (SSSCA; Harter 1985) was administered at baseline and at the 9-month follow-up time point to measure adolescents' level of perceived social support. The SSSCA is a 24-item self-report scale assessing perceptions of social support from four different sources: parents, classmates, teacher, and close friends. The present study included only the Parent and Close Friend subscales (6 items each). Each of the items on the SSSCA utilizes a forced-choice format, in which teens are instructed to first choose which of two statements is more true for them (e.g., "Some kids have a close friend who they can tell their problems to BUT Other kids don't have a close friend who they can tell problems to"). After selecting a statement, adolescents are then asked to rate whether the statement is *sort of true* or *really true* for them. This format yields scores from 1 to 4 for each item, in which higher scores indicate greater levels of perceived support. Mean scores were calculated for each subscale. The SSSCA has been found to have strong internal reliability and validity (Harter 1985). In the present study, the internal consistency for the Close Friend support subscale was 0.83 at baseline and 0.89 at the 9-month time point. Internal consistency for the Parent support subscale was 0.92 at baseline and 0.88 at the 9-month time point.

Data Analyses

In order to test the direct relationship between baseline social anxiety and 18-month suicidal ideation, as well as potential mediation effects, two hypothesized models were examined using structural equation modeling (SEM). Recent literature suggests it may not be necessary to show a direct relationship between the independent variable and outcome in order to establish mediation (MacKinnon et al. 2007). Nevertheless, the current study aimed to extend prior cross-sectional research in this area. Therefore, the first hypothesized model examined the direct longitudinal relationship between social anxiety and ideation. A second hypothesized model then tested 9-month loneliness and 9-month close friend and parental

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support as mediators of the relationship between baseline social anxiety and 18-month suicidal ideation. A multiple mediation model was used in lieu of individual mediation models due to its ability to: (a) test competing theories within a single model, and (b) reduce parameter bias due to omitted variables, i.e., other possible mediators (Preacher and Hayes 2008).

A number of methods for testing the significance of indirect effects have been proposed. Several techniques such as Baron and Kenny's (1986) causal steps approach and the Sobel test have been shown to exhibit problems with statistical power and Type I error rates (MacKinnon et al. 2007). Thus, in order to test mediation effects, the current study used the Monte Carlo method as outlined by Preacher and Selig (2012). This method generates a 95 % asymmetric confidence interval for the indirect effect (ab). Confidence intervals resulting from the Monte Carlo approach have been shown to perform as well as other methods such as the bias-corrected bootstrap (Preacher and Selig 2012). An indirect effect was considered statistically significant if the 95 % confidence interval did not contain zero.

All structural equation models in this study were estimated using full-information maximum likelihood estimation in the AMOS 19 program (Arbuckle 2010). Model goodness of fit was evaluated using multiple fit indices. The χ^2/df ratio indicates adequate model fit when it is less than or equal to 2.0 (Byrne 2009). The root mean square error of approximation (RMSEA) indicates close model fit when values are less than or equal to 0.05 and adequate model fit when values are less than or equal to 0.08. The comparative fit index (CFI) and the incremental fit index (IFI) both indicate good fit when values are 0.95 or higher (Byrne 2009). All nested models were compared using chi-square difference tests.

Results

Descriptive Statistics and Bivariate Correlations

Table 1 contains the means and standard deviations for all study variables, as well as the results of *t*-tests assessing gender differences. Results indicated that female participants scored consistently higher than male participants on study variables, with the exception of self-reported parental social support. However, gender differences were statistically significant for only three variables: Girls reported a greater severity of social phobia and major depressive symptoms at baseline, and higher levels of suicidal ideation at 18 months post-baseline. Given these gender differences, gender was included as a covariate in all models. As might be expected in a sample of clinically referred adolescents followed longitudinally after inpatient hospital discharge, levels of psychological distress decreased over time. Of particular note, a paired-samples *t*-test indicated a significant decrease in suicidal ideation from baseline to 18 months post-baseline, $t(101) = 7.86$, $p<0.001$.

Independent-samples *t*-tests were used to examine the relationship between baseline social anxiety disorder and suicidal ideation. Individuals with a social anxiety disorder diagnosis endorsed higher levels of baseline suicidal ideation (M_{Dx}=3.95, M_{noDx}=2.89, $t(140) = -2.49$, $p<0.05$) as well as higher levels of suicidal ideation at 18 months post-baseline (M_{Dx}=2.78, M_{noDx}=1.61, $t(16.71) = -2.55$, $p<0.05$) compared to individuals who did not receive a social anxiety disorder diagnosis.

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Social anxiety was modeled as a latent variable specified by two indicators measuring the severity of social anxiety symptoms at baseline, with one indicator representing social phobia symptoms as measured by the DISC-IV and one indicator representing the mean score on the Social Anxiety Scale for Adolescents (SASA). The two indicators of social phobia symptoms were significantly correlated with each other (r=0.51, p<0.001). Estimated correlations between the latent social anxiety variable and all other observed variables can be found in Table 2. Most bivariate correlations were of the expected strength and direction. Baseline suicidal ideation, social anxiety and depression symptoms, and number of other psychiatric diagnoses, were all found to be positively intercorrelated. Social anxiety at baseline was also found to be positively associated with both baseline and 9-month loneliness, although it was not significantly correlated with baseline or 9-month parental/close friend support. Suicidal ideation at 18 months was positively associated with baseline social anxiety, baseline suicidal ideation and 9-month loneliness, and was negatively associated with 9-month parental social support. However, suicidal ideation at 18 months was not significantly associated with 9-month close friend support. Finally, the estimated correlation between baseline depression symptoms and 18-month suicidal ideation also was not significant, a notable finding given that depression has been shown to be a strong predictor of suicidal ideation over time (Mazza and Reynolds 1998). However, it should be noted that the estimated correlation between baseline depression symptoms and 18-month suicidal ideation narrowly missed significance (r=0.19, p=0.05), while the observed correlation did reach significance (r=0.24, p<0.05).

Longitudinal Relationship Between Social Anxiety Symptoms and Suicidal Ideation

The first hypothesized model examined the longitudinal relationship between baseline social anxiety and 18-month suicidal ideation, adjusting for depression symptoms and other baseline covariates. A measurement model was specified in order to evaluate the model's fit to the observed data. The model included five observed variables (gender, baseline depression symptoms and number of psychiatric diagnoses, and baseline and 18-month suicidal ideation) and the latent variable representing baseline social anxiety. The standardized loadings for the two social anxiety indicators were 0.80 for symptom severity as measured by the DISC-IV youth interview and 0.62 for symptom severity as measured by the SASA. All covariances were freely estimated. The model was a close fit to the observed data: $\chi^2(11, N=144) = 12.41$; $\chi^2/df = 1.13$; CFI = 0.99; IFI = 0.99; RMSEA = 0.03.

A structural model was then specified to test the direct relationship between baseline social anxiety and 18-month suicidal ideation, adjusting for gender and other covariates (baseline depression symptoms, number of psychiatric diagnoses, and suicidal ideation). In the interest of model parsimony, nonsignificant correlations among predictor variables were trimmed from the structural model. Results of χ^2 difference testing indicated that the more parsimonious model did not lead to a significant decrease in model fit, $\chi^2(4, N=144) = 8.41$, p=0.08. The trimmed structural model exhibited adequate fit to the data: $\chi^2(8, N=144) = 12.37$; $\chi^2/df = 1.55$; CFI = 0.97; IFI = 0.97; RMSEA = 0.06 (see Fig. 1). Consistent with prediction, results indicated that baseline social anxiety significantly predicted suicidal ideation at 18 months post-baseline, adjusting for baseline depressive symptoms and other covariates (B=0.22, β=0.30, p<0.05). In addition, female gender also significantly predicted

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suicidal ideation at 18 months post-baseline (B=0.49, β=0.19, p<0.05). The present model accounted for 21 % of the variance in suicidal ideation at 18 months post-baseline. Post hoc probing of findings revealed that individuals with a social anxiety disorder diagnosis experienced less steep decreases in suicidal ideation over time compared to individuals without a social anxiety disorder diagnosis.

Loneliness and Perceived Social Support as Mediators of the Longitudinal Relationship Between Social Anxiety Symptoms and Suicidal Ideation

The second model examined the interrelationships among baseline social anxiety, potential 9-month mediators (loneliness, parental support, close friend support), and 18-month suicidal ideation. A measurement model was first specified to examine the model's fit to the observed data. The model included 11 observed variables (gender, baseline depression symptoms and number of psychiatric diagnoses, baseline and 18-month suicidal ideation, and baseline and 9-month loneliness and parental/close friend support) and one latent variable (baseline social anxiety). Baseline social anxiety was specified by two indicators. The standardized loadings for these indicators were 0.62 for symptom severity as measured by the DISC-IV interview and 0.81 for symptom severity as measured by the SASA. All variables were allowed to freely covary. The model was a close fit to the observed data: $\chi^2(23, N=144) = 25.11$; $\chi^2/\text{df} = 1.09$; CFI = 0.99; IFI = 0.99; RMSEA = 0.03.

A structural model was then specified to examine the interrelationships between baseline social anxiety, the 9-month mediators (loneliness, parental support, close friend support), and suicidal ideation at 18-months post-baseline. Gender, baseline depression symptoms and psychiatric diagnoses, and baseline suicidal ideation were included in the model as covariates, and each of the 9-month mediators was also adjusted for initial baseline levels, as is recommended for longitudinal tests of mediation (Cole and Maxwell 2003). In the interest of model parsimony, nonsignificant correlations among predictor variables were trimmed from the structural model. Results of χ^2 difference testing indicated that the trimmed model did not lead to a significant decrement in model fit, $\chi^2(11, \text{N} =144) = 12.98$, p=0.30. The structural model exhibited adequate fit to the data: $\chi^2(45, \text{N} =144) = 63.68$; $\chi^2/\text{df} = 1.42$; CFI = 0.94; IFI = 0.95; RMSEA = 0.05 (see Fig. 2). Consistent with study hypotheses, the results indicated that baseline social anxiety was a significant predictor of 9-month loneliness (B=0.21, β=0.36, p<0.05) and that 9-month loneliness was a significant predictor of suicidal ideation at 18 months post-baseline (B=0.57, β=0.32, p<0.01). In keeping with a possible mediation effect, baseline social anxiety no longer significantly predicted 18-month suicidal ideation (B=−0.07, β=−0.07, p>0.05). However, contrary to prediction, baseline social anxiety was not a significant predictor of 9-month social support (parent: B=−0.13, β=−0.20, p> 0.05; close friend: B=−0.04, β=−0.09, p>0.05). Similarly, social support at 9 months post-baseline did not significantly predict 18-month suicidal ideation (parent: B=−0.21, β=−0.13, p>0.05; close friend: B=0.07, β=0.03, p>0.05). Results indicated that two other pathways significantly predicted 18-month suicidal ideation: baseline ideation (B=0.20, β=0.28, p<0.05) and female gender (B=0.50, β=0.19, p<0.05). The final model accounted for 25 % of the variance in 18-month suicidal ideation. Post-hoc probing revealed that adolescents with high levels of loneliness (as compared to those with low levels of

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loneliness) experienced higher levels of suicidal ideation at baseline and at 18 months. However, both groups experienced a similar rate of decline of suicidal ideation over time.

Indirect effects were examined using 95 % Monte Carlo confidence intervals. The 95 % confidence interval for the total indirect effect did not contain zero (95 % CI: 0.01–0.31), indicating a significant overall indirect effect of baseline social anxiety on 18-month suicidal ideation through the 9-month mediators: loneliness and parental/close friend social support. The 95 % confidence interval for the indirect effect through 9-month loneliness also did not contain zero (95 % CI: 0.01– 0.27), indicating a significant indirect effect of baseline social anxiety on 18-month suicidal ideation through 9-month loneliness. Given the study's null results with respect to both friend and parent social support, indirect effects for these proposed mediators are not presented here.

Discussion

Suicidal thoughts and behaviors represent an important public health concern, particularly among adolescents, a population for whom completed suicide is the third leading cause of death (Centers for Disease Control and Prevention 2011). A number of psychosocial risk factors for adolescent suicidality have been identified, with research showing that social anxiety symptoms are concurrently related to suicidal ideation in teenagers (Nelson et al. 2000; Valentiner et al. 2002). The present study sought to extend the literature by examining the longitudinal relationship between social anxiety symptoms and suicidal ideation in a sample of clinically referred early adolescents. A secondary aim of the study was to examine potential mediators of this relationship (i.e., loneliness and low perceived social support), with the goal of developing a model of risk with greater explanatory power.

An initial goal of the study was to examine the longitudinal relationship between social anxiety symptoms and suicidal ideation in adolescents. Results indicated that social anxiety symptoms, as measured during a baseline assessment, prospectively predicted suicidal ideation at 18 months post-baseline, even after controlling for baseline depression symptoms, number of psychiatric diagnoses, and suicidal ideation. This finding is in keeping with prior research suggesting that social anxiety symptoms are concurrently related to suicidal ideation in adolescents (Nelson et al. 2000; Valentiner et al. 2002) and are longitudinally associated with suicidal ideation in adults (Sareen et al. 2005). These results also extend the existing literature linking social anxiety and ideation in community samples of adolescents to a higher-risk clinical sample of youth. Adolescence is a developmental period in which teenagers become increasingly defined by their social relationships. Given that social anxiety is linked to social withdrawal and social skills deficits (Beidel et al. 2007), it is possible that social anxiety symptoms may interfere with this developmental period, leading to increased isolation, hopelessness, and suicidality. As the current study focused solely on suicidal ideation, more research is needed to examine whether adolescent social anxiety is also longitudinally related to suicide attempts or completed suicide.

In order to better understand the longitudinal relationship between social anxiety symptoms and suicidal ideation, the present study investigated loneliness and perceived social support as mediators of this relationship. Results indicated that loneliness (measured at 9 months

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post-baseline) significantly mediated the relationship between baseline social anxiety symptoms and 18-month suicidal ideation, even after adjusting for baseline depression symptoms, number of psychiatric diagnoses, and suicidal ideation. This finding is consistent with prior research showing that adolescent loneliness is associated with both social anxiety (Beidel et al. 2007) and increased risk for suicidality (e.g., Schinka et al. 2012). Very few studies have examined either of these relationships in clinical samples (e.g., Groholt et al. 2000; Rossow and Wichstrom 1994), and the present study adds to the literature looking at the inter-relationships between social anxiety, loneliness, and suicidality in high-risk youth. It is also consistent with the relationship between thwarted belongingness and suicidal ideation, as proposed by Joiner's Interpersonal Theory of Suicide (Joiner 2005). If loneliness is construed as a component of thwarted belongingness, then the present study suggests that loneliness may play an important role in the development of suicidal ideation in socially anxious teens.

The study's findings regarding loneliness as a mediator may reflect the unique developmental concerns of adolescents. Research has shown that feelings of loneliness are highest during adolescence (Perlman and Landolt 1999), and that socially anxious teens report even greater feelings of loneliness than non-anxious teens (e.g., Beidel et al. 2007). Thus, the present study may reflect the important role of loneliness in increasing the risk of suicidal ideation in these socially anxious teens. Additional research is needed, however, to more fully understand how social anxiety leads to increased loneliness. Social anxiety has been associated with lower social acceptance and friendship intimacy (LaGreca and Lopez 1998; Vernberg et al. 1992), and it may be that the negative peer consequences related to social anxiety increases feelings of loneliness in these teens. In addition, research is needed to delineate which aspects of loneliness increase risk for suicidal ideation in socially anxious youth. For instance, one study suggests that peer-related loneliness may be a particular problem for these teens (Lasgaard et al. 2011a).

Future research also is needed to further understand the mechanisms by which loneliness impacts suicidal ideation. Despite its longitudinal design, the present study lacked additional time points needed to examine indirect pathways linking the 9-month mediators to 18-month suicidal ideation. For example, hopelessness, considered to be a strong indicator of suicide risk (Mazza and Reynolds 1998), may help to explain the relationship between loneliness and suicidality in youth. Loneliness is associated with feelings of hopelessness in adolescents (Page 1991), and a domain-specific form of social hopelessness has been linked to suicidal ideation in young adults (Heisel et al. 2011). More research is needed to examine how this type of social hopelessness may influence the relationships between social anxiety, loneliness, and suicidality in teens.

The present study also examined two other potential mediators of the relationship between adolescent social anxiety and suicidal ideation: perceived social support from family and close friends. In contrast to the study's findings regarding loneliness, results indicated that neither form of social support mediated the longitudinal relationship between social anxiety and suicidal ideation. In fact, close friend social support was not associated with many of the key study variables, including social anxiety, depressive symptoms, and suicidal ideation. These results are inconsistent with prior research showing that social anxiety in adolescents

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is associated with lower perceived social support (e.g., Calsyn et al. 2005), and that lower perceived social support is linked to suicidal ideation (e.g., Rigby and Slee 1999). However, the present study utilized a clinical sample, while prior research largely has focused on community samples, which could explain the discrepant findings. In addition, the six-item subscales measuring perceived social support may have been inadequate to capture teenagers' support appraisals. Future studies may benefit from the inclusion of an objective measure of actual social support. Finally, the current study did not capture variables that could mediate the relationship between social support and suicidality, which may have obscured relevant findings. In fact, prior research suggests that a lack of family-based social support may increase feelings of hopelessness in youth, and that the impact of low family support on suicide risk may occur only indirectly through its relationship with increased hopelessness (Thompson et al. 2005).

The present findings have implications for the prevention and treatment of suicidal thoughts and behaviors in teens. The results indicate that feelings of loneliness may be one mechanism through which adolescent social anxiety increases the risk of suicidal thinking over time. Clinicians involved in the treatment of socially anxious adolescents may wish to evaluate these teens for heightened levels of loneliness, the presence of which may indicate a greater risk for eventual suicidality. The present findings also suggest that interventions focused on the reduction of loneliness may be particularly useful when working with socially anxious teens. Both social skills training and loneliness-focused cognitive behavioral therapy have been shown to reduce feelings of loneliness in teens (Adams et al. 1988; McWhirter and Horan 1996), and practitioners may find it helpful to employ these techniques with socially anxious adolescents. Doing so may be of broader psychological benefit to these teens: A study of a 12-week social effectiveness intervention found that reductions in loneliness mediated overall treatment outcome in socially anxious youth (Alfano et al. 2009). Given that the present study focused on a sample of teenagers recently discharged from a psychiatric hospital, these findings may be especially relevant to clinicians treating high-risk adolescents.

As an initial exploration of the relationship between adolescent social anxiety and suicidal ideation over time, the present study had a number of strengths. As is recommended for longitudinal mediation, the study used multiple time lags (Cole and Maxwell 2003). In addition, the design allowed variables to intercorrelate at baseline and adjusted for prior levels of both the mediators and the outcome variables, allowing for a more accurate representation of the prospective relationships. The study also used a latent variable to assess social anxiety and adjusted for baseline depressive symptoms, which, given the high comorbidity of depression and social anxiety in youth (Wittchen et al. 1999), allowed for a stronger test of the unique relationship between social anxiety and suicidal ideation. In addition, the study focused on teenagers in early adolescence, a particularly crucial developmental period coinciding with the onset of suicidal thoughts and behavior (Kessler et al. 1999). Furthermore, the majority of studies linking social anxiety to suicidality in youth have utilized community or epidemiological samples, and the clinical sample used in the present study augments this literature.

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Nevertheless, the present study had important limitations as well. First, the study was correlational in nature, and thus no conclusions can be drawn about the causal relationships among variables. Furthermore, the sample was predominately White and was recruited from an inpatient psychiatric unit. Therefore, the results may not generalize to ethnic minority populations or to individuals experiencing less severe psycho-pathology. The sample used in the current study was also disproportionately female, and the small sample size did not allow for the examination of gender differences in the relationship between social anxiety, loneliness, social support, and suicidal ideation. Given that prior research has shown that gender is implicated in each of these constructs, future research may wish to include gender as a moderating variable.

Another limitation of the present study was its reliance on self-report for many of the study variables, including loneliness, social support, and suicidal ideation. Due to the use of self-report measures across variables and time points, it is possible that shared method variance could partially account for the present results. In addition, while the study included variables (i.e., social support, loneliness) that reflect the construct of thwarted belongingness, it did not measure a second construct shown to contribute to suicidal ideation: perceived burdensomeness (Interpersonal Theory of Suicide; Joiner 2005). Additionally, the present study measured depressive symptoms via a semi-structured interview (i.e., DISC-IV) that uses a skip-out option. Thus, the study may have underestimated the level of depressive symptoms in the present sample. Finally, it is unclear whether 9 months is the optimal timeframe for examining the longitudinal relationships in the present study. Previous research suggests that loneliness may be more stable over shorter periods (i.e., several months; for a review, see Heinrich and Gullone 2006), and it is possible that shorter time lags (less than 9 months) may more accurately capture the present relationships. Future research may wish to follow the recommendation of Cole and Maxwell (2003), who suggest that longitudinal mediation utilize empirically determined timeframes.

Despite these limitations, the current study contributes to the literature on adolescent social anxiety and suicidal ideation by examining this relationship longitudinally, and by testing potential mediators of the relationship. The results indicate that social anxiety symptoms predict suicidal ideation in adolescents over an 18-month follow-up period, and that feelings of loneliness may help to explain this longitudinal relationship. These findings add to the literature on psychosocial risk factors for suicidal ideation in high-risk early adolescents, and may help to inform prevention and treatment efforts in this population.

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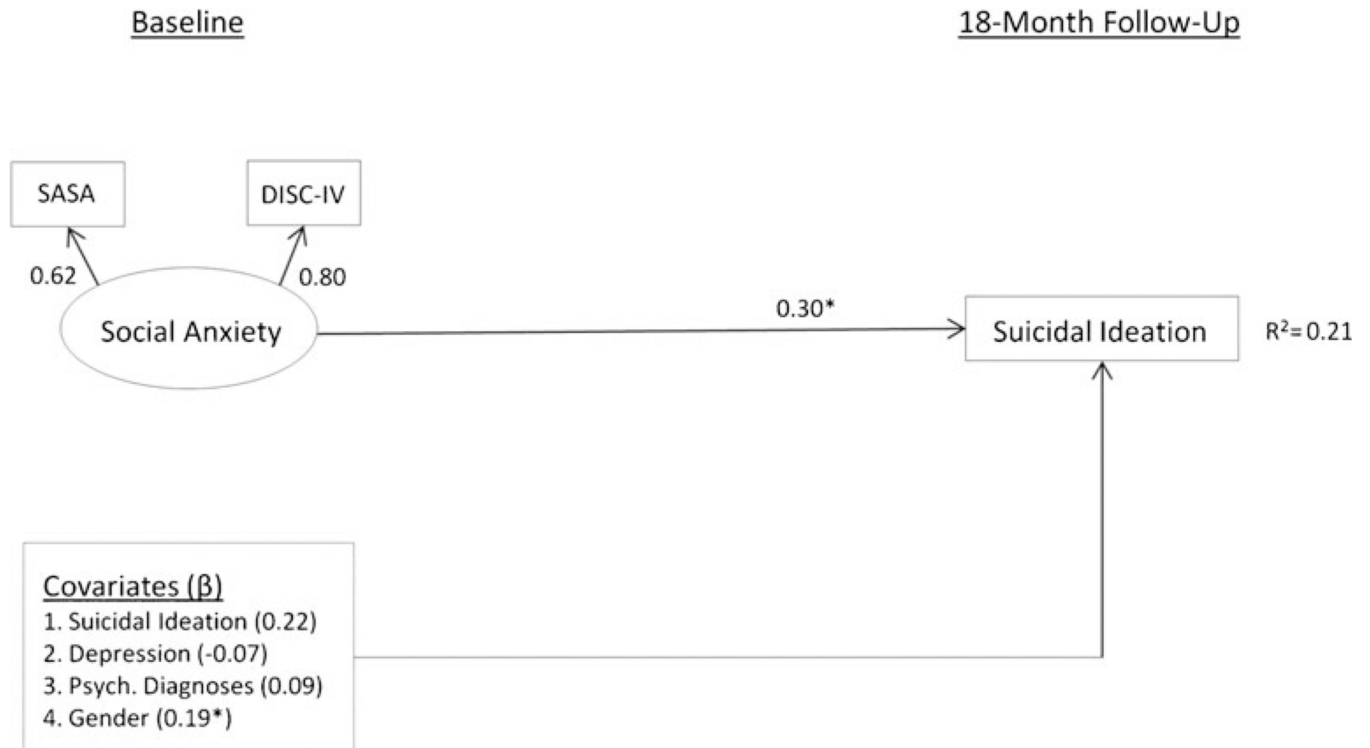

Fig. 1.

Structural equation model depicting the direct relationship between social anxiety symptoms at baseline and suicidal ideation at 18 months post-baseline. Note. Values shown are standardized regression coefficients. *DISC-IV* = social phobia symptoms as measured by the Diagnostic Interview Schedule for Children (DISC-IV-Adolescent Report; Shaffer et al. 2000). *SASA*= social anxiety symptoms as measured by the Social Anxiety Scale for Adolescents. Covariance estimates have been omitted for ease of comprehension. * $p<0.05$

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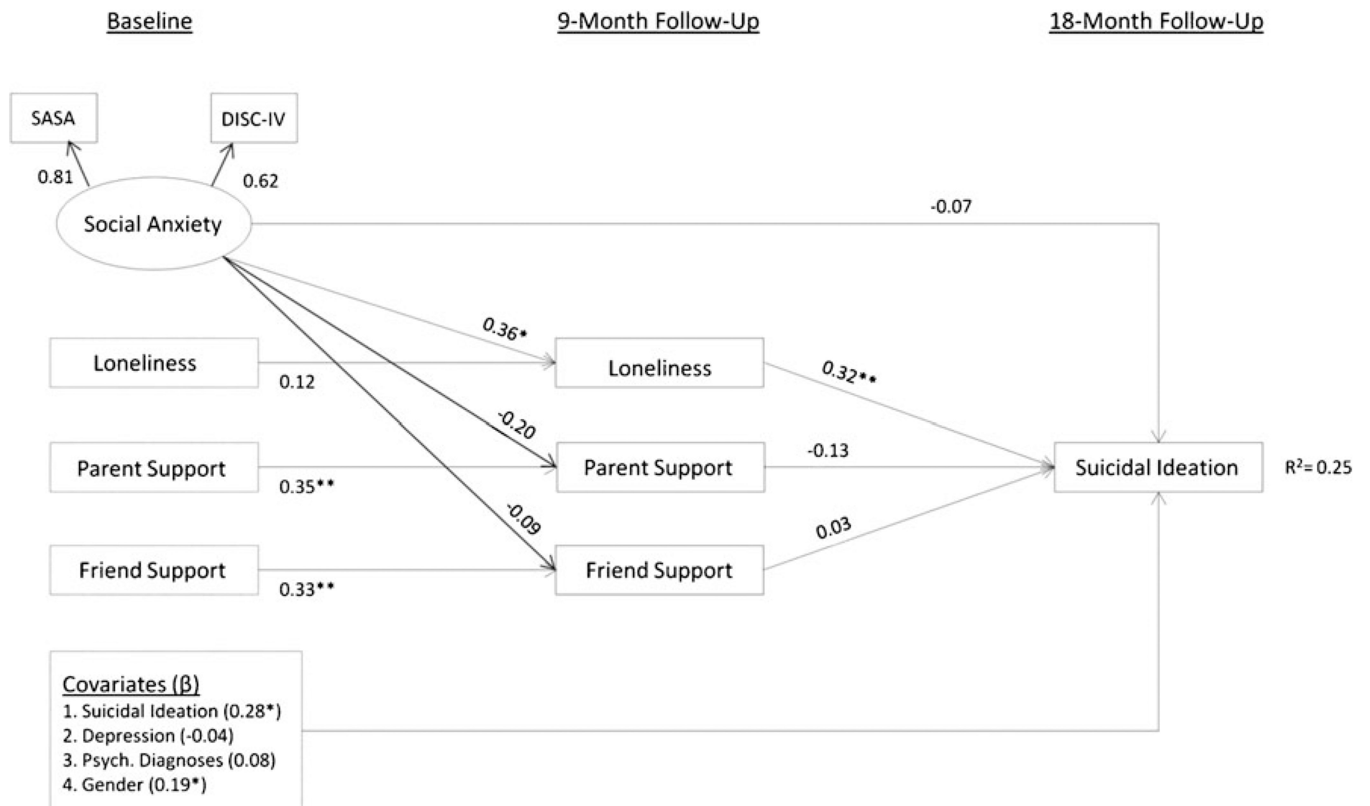

Fig. 2.

Structural equation model with baseline social anxiety as the independent variable, multiple mediators at 9 months post-baseline (loneliness; parent and close friend social support), and 18-month suicidal ideation as the outcome variable. Note. Values shown are standardized regression coefficients. *DISC-IV* = social phobia symptoms as measured by the Diagnostic Interview Schedule for Children (DISC-IV-Adolescent Report; Shaffer et al. 2000). SASA= social anxiety symptoms as measured by the Social Anxiety Scale for Adolescents. Covariance estimates have been omitted for ease of comprehension. * $p<0.05$. ** $p<0.01$

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Table 1

Descriptive statistics for primary study variables and tests of gender differences

Variable	Total	Boys	Girls	Statistic
Age at baseline, *M (SD)*	13.52 (0.74)	13.51 (0.81)	13.52 (0.71)	t (142) = −0.09
Suicidal ideation, *M (SD)*				
Baseline	3.00 (1.73)	2.63 (1.81)	3.15 (1.68)	t (142) = −1.64
18 months	1.82 (1.23)	1.31 (0.54)	2.03 (1.37)	$t\,(99.87)^{a} = -3.83^{**}$
Baseline psychological symptoms, *M*(*SD*)[b]				
Social phobia	1.35 (1.93)	0.85 (1.59)	1.55 (2.02)	$t\,(90.04)^{a} = -2.19^{*}$
Major depression	2.44 (3.00)	1.10 (2.23)	2.97 (3.11)	$t\,(99.43)^{a} = -3.99^{**}$
Loneliness, *M (SD)*				
Baseline	2.16 (0.79)	2.11 (0.86)	2.18 (0.77)	t (126) = −0.47
9 months	1.85 (0.68)	1.77 (0.72)	1.89 (0.66)	t (97) = −0.79
Parent social support, *M (SD)*				
Baseline	3.05 (0.75)	3.14 (0.60)	3.01 (0.80)	$t\,(77.64)^{a} = 0.95$
9 months	3.28 (0.73)	3.35 (0.80)	3.25 (0.70)	t (91) = 0.62
Close friend social support, *M (SD)*				
Baseline	3.49 (0.75)	3.27 (0.85)	3.57 (0.69)	t (119) = −1.98
9 months	3.66 (0.52)	3.51 (0.52)	3.73 (0.51)	t (88) = −1.85
Other baseline variables, *M (SD)*				
Social anxiety (SASA)	2.50 (1.04)	2.32 (0.97)	2.58 (1.06)	t (122) = −1.28
Baseline diagnoses[c]	0.63 (0.89)	0.48 (0.75)	0.70 (0.93)	t (140) = −1.34

SASA Social Anxiety Scale for Adolescents

* $p<0.05$.

** $p<0.01$

[a] Equal variances not assumed

[b] Symptoms measured with the Diagnostic Interview Schedule for Children (DISC-IV-Adolescent Report; Shaffer et al. 2000)

[c] Number of baseline DISC-IV psychiatric diagnoses (excludes social phobia and major depression)

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Table 2

Estimated correlation matrix for latent and observed study variables

Variable	1	2	3	4	5	6	7	8	9	10	11
Suicidal ideation											
1. Baseline	–										
2. 18 months	0.32**	–									
Symptoms											
3. Major depression (baseline)[a]	0.52**	0.19	–								
4. Social anxiety (baseline)[b]	0.40**	0.32*	0.30**	–							
Loneliness											
5. Baseline	0.34**	0.12	0.36**	0.71**	–						
6. 9 months	0.11	0.35**	0.09	0.38**	0.35**	–					
Parent social support											
7. Baseline	−0.21*	−0.28**	−0.23*	−0.09	−0.30**	−0.20	–				
8. 9 months	−0.12	−0.23*	−0.09	−0.16	−0.23*	−0.24*	0.38**	–			
Close friend support											
9. Baseline	0.00	0.07	0.03	−0.21	−0.47**	0.06	0.23*	−0.03	–		
10. 9 months	0.02	−0.02	0.07	−0.12	−0.18	−0.32**	−0.01	0.17	0.33**	–	
Other variables											
11. Number of diagnoses (baseline)	0.35**	0.18	0.33**	0.21*	0.11	−0.05	−0.20*	−0.10	0.05	0.00	–

* $p<0.05$.

** $p<0.01$

[a] Symptoms were measured with the Diagnostic Interview Schedule for Children (DISC-IV-Adolescent Report; Shaffer et al. 2000)

[b] Latent variable, with one indicator representing social phobia symptoms as measured by the DISC-IVand one indicator representing mean score on the Social Anxiety Scale for Adolescents