Published in final edited form as:

Psychiatry Res. 2014 December 30; 220(3): 998–1006. doi:10.1016/j.psychres.2014.10.009.

Parents and Friendships: A Longitudinal Examination of Interpersonal Mediators of the Relationship between Child Maltreatment and Suicidal Ideation

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Abstract

This study examined parental relationship quality, friendship quality, and depression as mediators of the association between child maltreatment (CM) and adolescent suicidal ideation (SI). Participants were 674 adolescents (46% female; 55% African American) involved in the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN). Data were collected via youth self-report at ages 12, 16, and 18. CM before age 12 predicted poor parental relationships and depression, but not poor friendships, at age 16. Age 16 depression was negatively associated with parental relationship quality and positively associated with SI at age 18. An indirect path from CM to SI via depression was significant, suggesting that the early CM affects depression severity, which in turn is associated with SI. Strong friendship quality (age 16) was associated with SI at age 18; however, there was no significant indirect path from CM to SI via friendships. Results suggest that: 1) CM before age 12 affects parental relationships in adolescence; 2) depression and friendships are related to suicide ideation in later adolescence; and 3) depression partially mediates the association between CM and SI. Results highlight the importance of assessing for a history of CM, quality of interpersonal relationships, and depression severity among youth reporting SI.

Keywords

child abuse; suicidal thoughts; mediation; interpersonal relationships

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1. Introduction

Suicide is a significant public health problem. It is the third leading cause of death among adolescents in the United States (US) (CDC, 2010) and the fourth leading cause of death among adolescents across 90 countries according to the World Health Organization (WHO) mortality statistics (Wasserman et al., 2005). In 2011, 4,688 completed suicides were reported for this age group in the US (Hoyert and Xu, 2012). An even greater number of youth attempt suicide, with 100–200 attempts for every completed suicide (McIntosh, 2012). Many more adolescents experience suicidal ideation (SI) (Eaton et al., 2012). According to the 2011 Youth Risk Behavior Survey (YRBS), administered nationwide by the CDC, 15.8% of US high school students seriously considered suicide in the prior 12 months, 12.8% made a suicide plan, and 7.8% attempted suicide (Eaton et al., 2012). Several studies have demonstrated that severity (frequency and specificity) of SI predicts subsequent suicide attempts (King et al., 2009a) in both community (Lewinsohn et al., 1996) and clinical (Huth-Bocks et al., 2007; Kerr et al., 2007; Prinstein et al., 2008) samples.

Child maltreatment occurs at relatively high rates and has been implicated as a strong predictor of suicidal behavior, including SI. In 2011, the US national rate of child maltreatment (sexual abuse, physical abuse, emotional abuse, and/or neglect) was 9.6 per 1,000 children (UDHHS, 2011). Summarizing findings across numerous US epidemiological surveys that employed self- and agency-report, Finkelhor (2011) found that one-year rates of childhood maltreatment ranged from 1.2–270 per 1,000 children surveyed. According to the WHO, rates of childhood sexual abuse range from 10% (males) to 20% (females), and physical abuse from 25–50% (across sexes) (Runyan et al., 2002). More recent international research reports similar prevalence rates (Kohrt, 2014). Notably, rates of maltreatment are even higher in clinically referred and high-risk samples (Boxer and Terranova, 2008; Thompson et al., 2012). The relationship between child maltreatment and adolescent SI has been well established (King and Merchant, 2008; Miller et al., 2013). In a recent literature review, Miller and colleagues (2013) concluded that child maltreatment is related to and/or predicts SI across adolescent community (Brezo et al., 2008) and clinical (Fortune et al., 2005) samples. However, few studies have examined potential pathways through which child maltreatment may lead to adolescent SI. To address this gap in the literature, the purpose of the present study is to examine perceived quality of interpersonal relationships as a mediator of the association between child maltreatment and adolescent SI.

Classical and recent theories of suicide suggest that perceived disruption of interpersonal relationships may serve as one potential mechanism of the association between child maltreatment and SI. Indeed, Durkheim (1951) classified suicide as stemming from social causes, including isolation, altruism, and anger/frustration. Behavioral theorists suggest that suicide is a learned behavior rooted in adverse childhood experience and psychosocial environmental factors (Lester, 1987). Shneidman (1993) posits that suicide is driven by a desire to escape emotional pain or “psychache,” which is caused by a lack of socially supportive and nurturing relationships. The more recent Interpersonal Psychological Theory of suicide (IPT; Joiner, 2005) focuses specifically on the importance of interpersonal relationships. This theory posits that the desire for death arises out of the confluence of two negative interpersonal states—thwarted belongingness and perceived burdensomeness.

Thwarted belongingness refers to feelings of alienation from friends, family, or other valued social contacts. Perceived burdensomeness refers to the belief that one is highly ineffective and incompetent, which negatively affects other people. As is clear, theories of suicide have consistently noted the importance of strong, supportive interpersonal relationships. Experiences of child maltreatment may contribute to a sense of isolation or unwantedness (e.g., Riggs, 2010), which could lead to perceived interpersonal difficulties.

Consistent with these theories of suicide, the developmental literature also emphasizes the importance of interpersonal relationships to healthy socio-emotional functioning. The positive and negative effects of close friendships, particularly best friendships, on adolescent behavior have been well established (Prinstein and Dodge, 2008; Peltonen et al., 2010; van der Zwaluw et al., 2012). Establishing supportive close friendships while also maintaining strong familial bonds is a difficult developmental task of adolescence. Youth who fail to show such normative developmental maturation patterns are at a greater risk for socio-emotional maladjustment (Steinberg, 1987). Youth with a history of child maltreatment are at particularly high risk for developmental perturbation. Childhood maltreatment has been shown to have deleterious effects on adolescent socio-emotional development (Cicchetti and Valentino, 2006), including poor cognitive flexibility (Spann et al., 2012), fewer emotion regulation skills (Romens and Pollak, 2012), less prosocial behavior, and more aggressive behavior (Alink et al., 2012). Indeed, individuals with histories of child maltreatment report less supportive interpersonal relationships in both adolescence (Johnson et al., 2002; Seeds et al., 2010) and adulthood (Lamoureux et al., 2012). As reviewed below, low perceived quality of family and peer connectedness, may in turn, play a significant role in the development of adolescent SI (King and Merchant, 2008).

1.1 Interpersonal Relationships and Suicidal Ideation

Several recent studies have examined the association between both family and peer support and SI. With regard to parents, less supportive parental relationships have been associated with greater SI. This association is demonstrated in both cross-sectional ((Babiss and Gangwisch, 2009; Sharaf et al., 2009; Bonanno and Hymel, 2010; Cho and Haslam, 2010; Tang et al., 2010; Teasdale and Bradley-Engen, 2010; Pettit et al., 2011; Hetrick et al., 2012) and longitudinal studies (Winfrey and Jiang, 2010; Lasgaard et al., 2011; Czyz et al., 2012). Similarly, several recent studies demonstrate a negative relationship between social support from close friendships and SI across cross-sectional (Babiss and Gangwisch, 2009; Bonanno and Hymel, 2010; Cho and Haslam, 2010; Teasdale and Bradley-Engen, 2010; Winterrowd et al., 2010; Langhinrichsen-Rohling et al., 2011; Logan et al., 2011; Pettit et al., 2011; Pinheiro et al., 2012) and longitudinal studies (Johnson et al., 2002; Dupéré et al., 2009; Czyz et al., 2012).

Although several prior studies have investigated the effects of peer (including close friendships) and parental support on adolescent SI, few have examined these interpersonal variables simultaneously (King and Merchant, 2008). Cross-sectional studies that have included both peer and parent support variables generally support the importance of both parents and peers. Babiss and Gangwisch (2009) found that among 14,594 adolescents drawn from the National Longitudinal Study of Adolescent Health, both peer support

variables (social acceptance and perception of friends caring) and parent support significantly predicted a greater likelihood of SI in a multivariate model which included other covariates such as sports participation, age, sex, race/ethnicity, public assistance status, physical limitations, binge drinking, drug use, body weight, physical exercise, and depression. Fotti et al. (2006) found that both poor peer relationships and decreased parental nurturance was associated with increased odds of SI for girls while only decreased parental nurturance was associated with greater odds of SI for boys. Among 131 psychiatrically hospitalized adolescents, close friend related stress and family related stress were both significantly associated with SI after controlling for covariates (psychiatric diagnosis, past suicidal behaviors, non-interpersonal stress; Pettit et al., 2011). Together, results from cross-sectional studies suggest that both peers and parents are important in understanding adolescent SI.

Relative to cross sectional work, findings from two longitudinal studies examining peer and parent influences on adolescent SI provide a more nuanced picture of these relationships. In a sample of 338 adolescents drawn from an intervention trial for suicidal adolescents (Youth-Nominated Support Team-II; King et al., 2009), a significant interaction was found between family connectedness and suicide attempt history on current SI. Specifically, a greater increase in connection with family post-hospitalization was associated with less SI among those without multiple attempts at 3-month follow-up. The relationship between peer connectedness and SI was moderated by time and sex. Greater peer connectedness post-hospitalization was associated with less SI at 3-month follow-up only for girls (not boys). However, at 12-month follow-up, this increase in peer connectedness was associated with *more* SI for girls (not boys). In a second study, Johnson et al. (2002) found that among 659 community adolescents, interpersonal difficulties (difficulty making friends, frequent arguments with parents, poor peer and parent relationships) reported at age 16 partially mediated the relationship between substantiated cases of childhood abuse (sexual and physical), and suicide attempts reported at age 22. This relationship remained significant after controlling for age, sex, psychiatric symptoms during childhood and early adolescence, parental psychiatric symptoms, and previous suicide attempts.

Taken together, only a handful of studies have examined the association between both peer and parent support, and adolescent SI in the same multivariate analysis. Results are generally more consistent in cross-sectional relative to longitudinal research, with some evidence for potential sex differences in these relationships. In the present longitudinal study, both family and close friendship support will be examined together as mediators of the association between child maltreatment and adolescent SI. Moreover, to further build upon this research, depression will be examined as a potential mediator in a competing model. Depression is a well-established outcome of child maltreatment (Cutuli et al., 2013) and predictor of suicidal ideation (Brezo et al., 2008).

1.2 Present Study

Drawing from previous research, the purpose of this study was to explore the longitudinal associations of child maltreatment prior to age 12 in relation to interpersonal relationships (age 16) and subsequent SI in later adolescent (age 18). We hypothesized that: 1) child

maltreatment prior to age 12 would be associated with increases in SI at age 18; 2) child maltreatment prior to age 12 would be associated with poor parental and peer relationships at age 16; 3) poor interpersonal relationships would be associated with increases in SI at age 18; and 4) there would be significant indirect relationships between child maltreatment and increases in SI via poor parental and peer relationships and depression severity. Given evidence of sex differences in prior research, we also conducted secondary analyses to explore potential sex differences in the interrelationships of child maltreatment, interpersonal relationships, and SI. Finally, as prior research has established a consistent link between SI and depression, depression was examined in two alternative models. To our knowledge, no study has examined the longitudinal effects of childhood maltreatment on SI in late adolescence via disruptions in key interpersonal relationships.

2. Methods

2.1 Participants

Participants comprised 884 children (50% female) involved in the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), a consortium of longitudinal studies investigating the risk factors for and consequences of childhood maltreatment (Runyan et al., 1998). Each of the five LONGSCAN sites recruited child-caregiver (typically female care-giving figure) dyads into the study at age 4 or 6 based on a variety of selection criteria. One site included children that were at high risk for maltreatment, two sites included children who had been reported for maltreatment (one of these sites included only children who had been placed in substitute care subsequent to this report), and two sites included both children who had been reported as maltreated and children who were identified as at risk. In all cases, risk was defined based on demographic risk factors. Detailed information on LONGSCAN recruiting strategies and location, sociodemographic data, consenting/assenting procedures, inclusion/exclusion criteria, and attrition rate is available from Runyan et al. (1998).

Data collection consisted of face-to-face interviews and self-report questionnaires with children and their parents at ages 4, 6, 8, 12, 14, 16 and 18. The original baseline sample consisted of 1,354 children and parents (see Runyan et al., 1998, for a detailed description of the sample). Female caregiver education level (assessed at age 16) included high school diploma/GED (76%), associate degree (9%), bachelor's degree (6%), and masters/doctorate (2%). The median family income (assessed at age 16) was between \$25,000.00 and \$30,000.00. The current analyses focus on youth-self report data collected at ages 12, 16, and 18. The current sample also was restricted to only those individuals who provided valid responses on self-reports of maltreatment obtained at age 12 and on SI at age 18 (65.2% of baseline sample). The current sample was racially and ethnically diverse and matched the demographics of the overall baseline sample; slightly more than half (55%) of the sample was identified by caregivers as African American, 26% were white, and 11% were identified as "mixed race."

2.2 Measures

2.2.1 Childhood maltreatment—The age 12 interview included a self-report assessment of youths' experiences of physical, sexual, or psychological abuse (Everson et al., 2008).

This assessment included behaviorally anchored descriptions of experiences that could be construed as abusive, but did not rely on respondents to make these construals. For example, an item in the assessment of physical abuse was “hit or punched you with their hand or fist, or kicked you.” Stem questions focusing on the timing of the event (“Up to now, has a parent or other adult who was supposed to be supervising you or taking care of you ever done something to you like...”) were followed with yes/no responses which would describe specific abuse experiences (e.g., “bruised you, or given you a black eye?”, “put some part of their body or anything else inside your private parts or bottom?”). For these analyses, we focused on questions assessing whether the given form of maltreatment had occurred from birth to age 12, which were dichotomized and summed to produce an indicator of severity of each form of maltreatment. Each form of maltreatment had a different number of specific dichotomized behaviors that were summed to create a severity score; scores on physical abuse could range from 0 to 15, scores on sexual abuse could range from 0 to 11, and scores on psychological abuse could range from 0 to 18 (for detailed information see (Everson et al., 2008).

The decision to use self-report of child maltreatment versus official reports of child maltreatment was made for several reasons. First, there is a moderate correlation between this self-report of maltreatment and administrative record reviews of official reports of maltreatment in the current sample (Everson et al., 2008). Second, prior research has demonstrated that prediction of psychopathology related to maltreatment is not improved by using official versus self-reported maltreatment or combining the reports (Hussey et al., 2005; Shaffer et al., 2008; Smith et al., 2008). Further, reliance on official reports may underestimate the presence and severity of maltreatment for more subjective and under-identified types of abuse, such as psychological abuse (Shaffer et al., 2008). Finally, research has demonstrated that subjective identification of maltreatment experiences has a nontrivial influence on the development of psychopathology (Shaffer et al., 2008).

2.2.2 Parental relationships—Participants’ relationships with their parents were assessed via self-report at age 16, on two key dimensions: the quality of the relationships and the parents’ involvement in their lives. Items assessing these constructs were adapted from the National Longitudinal Study of Adolescent Health (AddHealth: Resnick et al., 1997) and focused on closeness, understanding, trust, shared decision making, caring and getting along. An example of an item is “How much do you think s/he cares about you?” This measure has high internal consistency ($\alpha = 0.84$) and parent and youth reports of quality of relationship correlate moderately (Knight et al., 2009). Children rated their relationships with their mother and father separately. Thus, each child respondent had assessments of the quality of their relationship with their mother and father and the involvement of their mother and father in their lives.

2.2.3 Friendships—Participants’ friendships were assessed via self-report at age 16, using a LONGSCAN-adapted version of the Network of Relationships Inventory (NRI: Furman and Buhrmester, 1985). Participants rated relationships with their best peer friend (either same or opposite sex, non-romantic peer) on three dimensions: degree of companionship, intimacy, and satisfaction. Each of these ratings was on a Likert-type scale from 1 to 5. The

NRI has good internal consistency ($\alpha = 0.81$ in the current sample) and correlates with peer ratings of social functioning (Furman and Buhrmester, 1985).

2.2.4 Suicidal ideation—SI was assessed via self-report at age 12 using one item from the Trauma Symptoms Checklist for Children (TSCC Item# 52; Briere, 1996) and one item from the Youth Self Report (item #91; Achenbach, 1991). At age 18, SI was assessed using one item from the Trauma Symptom Inventory (TSI Item#25; Briere et al., 1995) and one item from the Youth Self Report (Item# 91; Achenbach, 1991). These items from the TSCC/TSI and YSR asked whether the child wanted to kill him/herself and whether the child had thought about killing him/herself, respectively. If a respondent endorsed either of these items, they received a 1 on the SI variable; if they denied both, they received a 0 on the variable.

2.2.5 Depression—Symptoms of depression were assessed via self-report at age 16 using the Depression subscale from the TSCC (Briere, 1996) and at 18 using the Depression subscale from the TSI (adult version of the TSCC; Briere et al., 1995). Participants rated how frequently they experienced 8 symptoms of depression (e.g., irritability) in the last six months on a scale of “0, Never” to “3, Often.” Higher scores reflect more frequent symptoms of depression. In accordance with prior suicide research (e.g., Beck et al., 1993), the TSCC and TSI depression items measuring a desire to be dead (TSCC item #52 and TSI item #30) were removed given the high correlation with the SI index. Internal reliability in the current sample was excellent (TSCC $\alpha = 0.81$; TSI $\alpha = 0.91$).

2.3 Analysis Plan

Data were prepared and simple analyses were conducted using SPSS Version 19.0. Structural equation modeling (SEM) was conducted using Mplus Version 7 (Muthén and Muthén, 2012). Model fit was evaluated using a variety of indices. A non-significant chi-square suggests that the model fits the data. However, due to the chi-square statistic's sensitivity to sample size, resulting in a tendency to reject models with large samples ($N > 500$), it is recommended that additional indices be used to determine model fit (Hooper et al., 2008). A Root Mean Square Error of Approximation (RMSEA) under 0.05, a Comparative Fit Index (CFI) over 0.95, and a Standardized Root Mean Square Residual (SRMR) under 0.08 indicate close fitting models (Hu and Bentler, 1999). All regression coefficients are presented as standardized simple effects (z-scores).

Measurement models of the key latent variables were constructed using confirmatory factor analysis to ensure that the measured indicators loaded onto the hypothesized latent constructs. To account for the categorical nature of the SI index, the full model used a robust weighted least squares (WLSMV) estimator (Flora and Curran, 2004). WLSMV uses a process that incorporates all available data (all participants with childhood maltreatment responses at age 12 and suicidal ideation responses at age 18), without deleting missing data or imputing values on other items. Like Full Information Maximum Likelihood (FIML) estimation, WLSMV estimation performs well when missing data are missing at random (MAR) and missing completely at random (MCAR), but does not perform well when data are not missing at random (NMAR). Further, the WLSMV approach to missing data has

been shown to be superior to listwise deletion, which reduces power and can result in biased parameter estimates (Asparouhov and Muthén, 2010). Within a WLSMV framework, a Weighted Root Mean Square Residual (WRMR) of less than 1.0 indicates very close model fit (Yu and Muthén, 2002). Indirect effects of Parental Relationships, Friendships, and Depression in these analyses were estimated using a nonparametric bootstrapping approach with 1000 bootstrap re-samples; indirect paths are considered significant if the 95% confidence intervals do not contain zero (Preacher and Hayes, 2008). This approach makes no assumptions about the normality of the sampling distribution of the indirect effect, and has been considered superior to the Sobel test for mediation analysis (Sobel, 1982). Given developmental literature demonstrating the importance of maintaining both strong family and close friendship relationships, the relative importance of close friendships and parental relationships was not directly tested in the current study.

To explore the potential moderating role of gender in the relationships estimated in the model, a multiple group analysis was conducted. This analysis compared the fit of a model in which all structural paths were constrained to be equal for boys and girls, suggesting no moderation, to a model in which these paths were free to differ between boys and girls, suggesting moderation. Because the chi-square statistics yielded when using a WLSMV estimator do not follow a chi-square distribution, the standard difference test to assess invariance across gender cannot be used. Instead, Mplus provides an adjusted chi-square difference test to assess invariance (Muthén and Muthén, 2012).

3. Results

3.1 Missing Data

Participants were included in study analyses if they had valid data for the childhood maltreatment variables. This yielded a final analytic sample of 884 participants, which represented 65% of the LONGSCAN baseline sample. Individuals included in the present analyses did not differ significantly from those excluded on any variable under study ($p's > .05$). Of those included in analyses, 24% ($n=210$) had missing data for SI at age 18. There was a greater proportion of girls represented among those with missing data for SI at age 18 (60%) relative to girls with valid data (46%; $\chi^2(1) = 12.89, p < .001$). No other significant differences between those with and without data for SI at age 18 emerged on any variable under study ($p's > .05$). Comparisons of participants with and without missing data on the remaining constructs and variables of interest (Parental Relationships, Friendships, Depression at age 16, Depression at age 18, SI at age 12) did not reveal any statistically significant differences ($p's > .05$).

3.2 Descriptive Statistics

Means and standard deviations for study variables are presented in Table 1. At age 18, approximately 7% of the sample reported SI. Table 2 shows zero-order correlations among study variables included in the structural model.

3.3 Structural Model

Prior to testing the full model, a zero-order correlation between the Childhood Maltreatment severity factor and SI index was computed, and the correlation was significantly positive, $r = 0.32$, $p < 0.001$. Factor loadings for each of the latent constructs appear in Table 3.

3.3.1 Model 1—The first model tested estimated a direct path between Childhood Maltreatment and SI at age 18, with Parental Relationships and Friendships as potential mediators. This model also controlled for the influence of SI at age 12 on Childhood Maltreatment and SI at age 18¹(Figure 1a). The full structural model showed acceptable fit, $\chi^2(47) = 77.74$, $p < 0.01$, CFI = 0.98, RMSEA = 0.03, WRMR = 0.89, and is presented in Figure 1. Within the model, the direct relationship between Childhood Maltreatment severity and SI at age 18 ($\beta = 0.28$, $SE = 0.08$, $p < 0.001$) remained despite the significant association between the concurrent measurements of Childhood Maltreatment severity and SI at age 12 ($\beta = 0.36$, $SE = 0.04$, $p < 0.001$). SI at age 12 was unrelated to SI at age 18 ($\beta = -0.03$, $SE = 0.07$, $p = 0.64$). Childhood Maltreatment severity was unrelated to Friendships ($\beta = -0.07$, $SE = 0.05$, $p = 0.14$). Surprisingly, strong Friendships predicted increased odds of SI ($\beta = 0.19$, $SE = 0.09$, $p = 0.03$). The indirect path from Childhood Maltreatment severity to SI via Friendships was non-significant ($\beta = -0.01$, 95% CI: $-0.05 - 0.01$), as the 95% confidence interval contained zero. Childhood Maltreatment severity predicted poor Parental Relationships ($\beta = -0.29$, $SE = 0.05$, $p < 0.001$), which predicted increased odds of SI ($\beta = -0.22$, $SE = 0.10$, $p = 0.02$), suggesting that the experience of early childhood mistreatment hinders the development of strong parental relationships, which in turn, is associated with greater risk of SI in late adolescence. However, the full indirect path from Childhood Maltreatment severity to SI via Parent Relationships was not significant ($\beta = 0.07$, 95% CI: $-0.001 - 0.19$). The model accounted for 9% of the variance in Parent Relationships ($p < 0.01$), but less than 1% of the variance in Friendships ($p = 0.45$).

3.3.2 Model 2—The second model assessed included Parental Relationships, Friendships, and Depression, each measured at age 16, as mediators of the relationship between Childhood Maltreatment Severity and SI at age 18 (Figure 1b), controlling for the influence of SI at age 12. This model showed acceptable fit, $\chi^2(55) = 111.87$, $p < 0.001$, CFI = 0.96, RMSEA = 0.03, WRMR = 0.97. Parental Relationships and Depression was allowed to co-vary ($\beta = -0.38$, $SE = 0.04$, $p < 0.001$), as was Friendships and Depression ($\beta = -0.07$, $SE = 0.05$, $p = 0.18$). A significant robust chi-square difference test suggested that allowing Parental Relationships and Depression to co-vary, rather than omitting this relationship (constraining it to 0), greatly improved model fit ($\chi^2(1) = 48.93$, $p < .001$), while allowing Friendships and Depression to co-vary did not result in improved fit ($\chi^2(1) = 1.65$, $p = .20$); however, both associations were retained in the model. Consistent with the first model, the direct relationship between Childhood Maltreatment severity and SI at age 18 ($\beta = 0.24$, $SE = 0.08$, $p < 0.01$) remained after including the association between the concurrent measurements of Childhood Maltreatment severity and SI at age 12 ($\beta = 0.37$, $SE = 0.04$, $p < 0.001$).

¹We also ran each model including Parental Relationships at age 12 to examine the unique influence of CM on Parental Relationships at age 16. We were unable to include Friendships at age 12 as this was not measured until age 16 in the LONGSCAN study. The overall pattern of results remained unchanged; thus, we present the results of the models without Parental Relationships at age 12.

0.001). Childhood Maltreatment severity was predictive of greater Depression ($\beta = 0.29$, $SE = 0.04$, $p < 0.001$), which subsequently predicted increased odds of SI ($\beta = 0.23$, $SE = 0.08$, $p < 0.01$). This indirect path was significant ($\beta = 0.07$, 95% CI : 0.02 – 0.11). With depression in the model, Childhood Maltreatment severity remained predictive of poor Parental Relationships ($\beta = -0.30$, $SE = 0.05$, $p < 0.001$), but Parental Relationships was not predictive of later SI ($\beta = -0.14$, $SE = 0.11$, $p = 0.18$; indirect: $\beta = 0.04$, 95% CI : -0.03 – 0.11). The relationship between Childhood Maltreatment severity and Friendships was non-significant ($\beta = -0.07$, $SE = 0.05$, $p = 0.14$), though the direct path between Friendships and SI was significant ($\beta = 0.18$, $SE = 0.09$, $p = 0.03$; indirect: $\beta = -0.01$, 95% CI : -0.03 – 0.01).

3.3.3 Concurrent depression—To assess whether the findings were specific to SI at age 18, rather than Depression generally, we included a concurrent measure of Depression in a final model. All original paths were retained, and Childhood Maltreatment severity, Parent Relationships, Friendships, and Depression at age 16 were each included as predictors of Depression. Depression at age 18 was also included as a covariate of SI. This model exhibited acceptable fit to the data, $\chi^2 (65) = 130.77$, $p < 0.001$, $CFI = 0.96$, $RMSEA = 0.04$, $WRMR = 0.98$. SI and Depression at age 18 were positively associated ($\beta = 0.55$, $SE = 0.05$, $p < 0.001$). The direct path between Childhood Maltreatment severity and SI at age 18 remained ($\beta = 0.24$, $SE = 0.08$, $p < 0.01$) with the significant relationship between Childhood Maltreatment severity and Depression included in the model ($\beta = 0.19$, $SE = 0.04$, $p < 0.001$). Childhood Maltreatment severity remained as a significant predictor of Parental Relationships ($\beta = -0.30$, $SE = 0.05$, $p < 0.001$), but did not predict Friendships ($\beta = -0.07$, $SE = 0.05$, $p = 0.14$). Neither Parental Relationships ($\beta = -0.01$, $SE = 0.06$, $p = 0.98$) nor Friendships ($\beta = 0.04$, $SE = 0.05$, $p = 0.36$) predicted subsequent Depression. Parental Relationships was unassociated with SI in this model ($\beta = -0.14$, $SE = 0.11$, $p = 0.18$), though Friendships remained predictive of increased odds of SI ($\beta = 0.18$, $SE = 0.09$, $p = 0.03$). Depression at age 16 predicted later Depression ($\beta = 0.36$, $SE = 0.04$, $p < 0.001$), and still significantly predicted SI at age 18 ($\beta = 0.23$, $SE = 0.08$, $p < 0.01$; indirect: $\beta = 0.06$, 95% CI : 0.02 – 0.11).

3.4 Sex—To explore sex as a moderator of the relationships between Childhood Maltreatment, Parent Relationships, Friendships, Depression, and SI, a multi-group analysis was conducted using the final model estimated. This procedure assesses whether each path coefficient estimated differs between boys and girls. Thus a model in which all paths were free to vary by gender was compared to a model in which each of these paths was held equal for boys and girls. The unconstrained and fully constrained models differed significantly, suggesting that boys and girls differed in the strength or direction of relationships for at least one path, $\chi^2 (17) = 31.26$, $p = 0.02$. Examination of the parameters for girls and boys revealed that the association between Depression at age 16 and Parental Relationships differed by gender. Allowing this path to vary by gender resulted in the greatest improvement in model fit ($\chi^2 (1) = 10.35$, $p < 0.01$), and yielded a model that did not differ significantly from one in which all paths were free to vary by gender, $\chi^2 (16) = 20.91$, $p = 0.18$. Specifically, the association between Depression at age 16 and Parental Relationships was stronger for boys ($\beta = -0.45$, $SE = 0.06$, $p < 0.001$) than for girls ($\beta = -0.23$, $SE = 0.06$, $p < 0.001$), while other relationships in the model were similar across gender.

4. Discussion

Drawing from the adolescent developmental and suicide literature, the present study explored longitudinal associations between child maltreatment, adolescent interpersonal relationships, depression, and adolescent SI. The purpose of this paper was to extend previous research by identifying potential pathways from child maltreatment to adolescent SI (Brezo et al., 2008). Results suggested that child maltreatment negatively affects parental relationships, that poor relationships with parents is related to depression severity, and that depression severity partially explains the relationship between child maltreatment and late adolescent SI. Overall, results demonstrated that depressive symptoms emerged as the most important link between CM before age 12 and SI at age 18.

4.1 Child Maltreatment and Interpersonal Relationships

As hypothesized, child maltreatment before age 12 was associated with poor parent relationships at age 16. This finding is consistent with prior research (Johnson et al., 2002; Seeds et al., 2010) and suggests that the experience of childhood maltreatment affects the quality of parental relationships in later adolescence. Drawing from the developmental psychopathology literature, these findings can be understood through the framework of the developmental-organizational model (Cicchetti and Valentino, 2006) of child maltreatment. This model suggests that ecological environments characterized by harm, or risk thereof, may deprive children of the physical and interpersonal resources necessary to meet typical developmental milestones. This is particularly likely when the maltreated child's responses to this environment are met with unsupportive feedback. Child maltreatment may thwart early socio-emotional development, which hinders the ability to successfully establish supportive friendships and parental relationships (Collins and Steinberg, 2006). Indeed, maltreated children have been shown to display poor emotion regulation skills (Cicchetti and Valentino, 2006), decreased self-regulatory capacities (Oshri et al., 2013), less prosocial behavior (Jacobson and Straker, 1982) and more aggressive behavior (Bolger and Patterson, 2001) relative to non-maltreated youth, all of which can affect both friendships and parental relationships. This negative interpersonal trajectory may lead to heightened risk for mental health problems, such as SI, and behaviors due to strain within the family setting.

4.2 Interpersonal Relationships and Suicidal Ideation

In partial support of study hypothesis and prior research (Johnson et al., 2002; King and Merchant, 2008; Czyz et al., 2012), poor parental relationships were found to increase odds of SI. However, this relationship was reduced to non-significance in a model that included depression severity. Contrary to study hypotheses, we found evidence to suggest that strong friendship quality was related to increased odds of SI at age 18. This finding is inconsistent with findings from Johnson et al. (2002) but consistent with research by King et al. (2009b). As the latter authors note, it may be that the stress of maintaining strong close friendships over time contributes to the risk of SI. Another potential explanation may be that the effects of support from best friends varies among adolescents; for some it may decrease risk for mental health problems but for others it may increase risk depending on the nature of the relationship and mental health of the friend. Indeed, prior research has demonstrated an association between youth internalized distress and that of their friend (Prinstein et al.,

2000). More recently, in a study conducted with suicidal youth, stronger peer support was found to be positively associated with externalizing behavior, depressive symptoms, hopelessness, and SI, particularly among males (Kerr et al., 2006). In future research, it will be important to examine whether the nature of friendships (i.e., prosocial, deviant) moderates outcomes on SI.

4.3 Pathways from Child Maltreatment to Suicidal Ideation

Interestingly, mediation analyses suggested that the indirect effects of child maltreatment to SI through parent relationships and friendships were not significant. However, there was a significant partial mediation pathway from child maltreatment to SI via depression severity. Child maltreatment predicted higher depression severity, which in turn predicted higher odds of SI over time. This effect was present over and above quality of parental and friendship relationship quality. Together, results suggest that depression severity emerged as significantly more important than interpersonal relationship in understanding the link between child maltreatment and adolescent SI.

Our results also suggested that there is an important concurrent association between depression severity and parent-relationship quality at age 16, which were both influenced by CM before age 12. However, parent-relationship quality did not predict subsequent depression or SI at age 18. This is somewhat surprising given prior research demonstrating that parental figures play an important role in a child's response to child maltreatment. For example, parental reactions following the initial disclosure of child maltreatment are related to mental health outcomes (e.g., depression; Rosenthal et al., 2003). Warm, supportive reactions to disclosure of child maltreatment have been associated with minimized feelings of threat (Johnson and Kenkel, 1991), less negative appraisals of the abuse experience (Spaccarelli, 1994), and better long-term, socio-emotional adjustment (Rosenthal et al., 2003; Bal et al., 2009). Reactions to disclosures that involve caregivers as perpetrators may be particularly important to attend to, given that risk of SI increases with the degree of relatedness between the perpetrator and victim (Eisenberg et al., 2007; Brezo et al., 2008). Thus, further attention to different aspects of the caregiver's role in the link between CM and adolescent SI is warranted in future research.

Somewhat surprisingly, the only sex difference in our model was a stronger concurrent association between depression and parental relationship quality at age 16 for boys compared to girls. Overall, the pattern of results was largely unchanged between sexes suggesting similar effects of depression in the link between CM and SI. Based on prior literature (Fotti et al., 2006; Czyz et al., 2012), we expected stronger sex differences in predictors of SI. However, a recent literature review suggests that sex differences appear to vary by maltreatment type and whether a suicide attempt or SI is the outcome under investigation (Miller et al., 2013). For example, in one study that followed 1,631 youth from childhood into adolescence, sex differences were found in the association between sexual abuse and suicide attempts but not physical abuse and SI (Brezo et al., 2008). Thus, it is possible that stronger sex differences were not found in the current study given that all forms of maltreatment were collapsed into one variable and the outcome under study was SI.

4.4 Limitations

Results from the present study should be interpreted within the context of several limitations and methodological considerations. First, youth were oversampled for early reports of maltreatment, and thus represent a relatively high-risk sample. The high-base rate of child maltreatment was also influenced by the decision to use youth self-report of maltreatment experiences. However, as noted above, prior research suggests that behavioral outcomes of children with substantiated versus self-report of child maltreatment do not significantly differ (Hussey et al., 2005). Future research may benefit from examining self- and parent-report as well as legal substantiation of abuse in study analyses. Second, the sample was predominantly low-income, African American. Therefore, results may not generalize to all adolescents. However, it is important to note that mechanisms of the relationship between child maltreatment and SI and behavior have been understudied in diverse racial, ethnic, and cultural groups (Miller et al., 2013). Third, the SI construct was derived from two items with a relatively coarse scale. More comprehensive suicide assessment instruments are available (Goldston, 2003), and future research may benefit from examining the current study hypotheses with a more nuanced SI and behavior measure.

Fourth, we only examined peer relationships within the context of a same-sex and opposite-sex best friends. . It is possible that interpersonal stress related to peer group affiliation, bullying, and peer rejection, plays a stronger role in the association between child maltreatment and SI in adolescence, and thus deserves study. Further, because we did not have this same measure at age 12, we could not control it in study analyses. Fifth, this study used a global measure of parent-child relationship functioning and did not account for whether the caregiver was also the perpetrator of the abuse. Future research may benefit from examining the relative importance of different aspects of parent-child relationships, such as quality, involvement, and communication, in the association between child maltreatment and SI. It would also be of interest to examine whether results vary across parental relationships (mother vs. father). Sixth, given that only adolescent self-report was used and mental health symptoms may affect reporting, it is possible that perceptions of parental relationships or support may be negatively impacted by concurrent psychopathology. However, prior research has demonstrated that perceptions of social support appear to be independent of shared variance with concurrent psychopathology (Cutrona, 1989; Kerr et al., 2006). Last, this study examined a latent construct reflecting multiple types of maltreatment.

Future research may benefit from examining the effects of specific types of maltreatment on interpersonal functioning and subsequent SI. Future research may always wish to consider alternative pathways from childhood maltreatment to adolescent SI. For example, recent research suggests that childhood maltreatment may lead to lasting changes to the stress responses system (hypothalamic-pituitary-adrenal [HPA] axis), which in turn, increases vulnerability to psychiatric problems during adolescence (Ehlert, 2013) and impaired decision making (Guillaume et al., 2013). Supportive social relationships have been show to affect HPA axis responses in adolescence (Hostinar and Gunnar, 2013). Thus, HPA-axis functioning may plan an important role in understanding interpersonal relationships and mental health outcomes among maltreated youth.

4.5 Clinical Implications

The effects of child maltreatment are complex and far reaching across multiple developmental stages including childhood, adolescence, and adulthood (Cicchetti and Valentino, 2006). Results from the present study highlight the importance of assessing for a history of child maltreatment, depressive symptoms, and perceived quality of interpersonal relationships among teens presenting with SI. Also notable is that results suggest that child maltreatment negatively affects parent relationships, which in turn may result in a worsening and/or onset of depressive symptoms. For those that report poor interpersonal functioning, particularly within the family realm, clinical work dedicated toward strengthening general social and communication skills may prove helpful. This clinical work will likely include interventions targeted toward improving parent-child relationships. Finally, results suggest that specifically addressing depressive symptoms for maltreated children may help address risk of SI.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Data collection was funded by grants to the LONGSCAN investigators from the Administration on Children and Families. The contribution of Mr. Miller was funded, in part, by support from the Inova Kellar Center Foundation. The contribution of Dr. Adams was supported by the National Institute on Drug Abuse (F31DA029393). The contributions of Dr. Thompson and Dr. Proctor were funded by the National Institute on Drug Abuse (1R01DA031189).

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Highlights

- A model of child maltreatment and adolescent suicidal ideation is presented.
- Child maltreatment is longitudinally associated with suicidal ideation.
- Child maltreatment affects parent-adolescent relationships prospectively.
- Child maltreatment leads to depression and subsequent suicidal thoughts in teens.

Figure 1a.*Full Structural Model* **Figure 1b.***Full Structural Model* **Figure 1.**

Figure 1a. *Full structural model with interpersonal relationships mediators of the relationship between child maltreatment and adolescent suicidal ideation.*

Note. N=674. Numbers on structural paths represent standardized simple effects (z-scores). Dashed lines indicate non-significant effects. $^*p<.05$, $^{**}p<.01$. Suicidal ideation at age 12 (not pictured) was included in this model to account for past suicidal thoughts.

Figure 1b. *Full structural model with depression symptoms and interpersonal relationships as mediators of the relationship between child maltreatment and adolescent suicidal ideation.*

Note. N=674. Numbers on structural paths represent standardized simple effects (z-scores). Dashed lines indicate non-significant effects. * $p < .05$, ** $p < .01$. Suicidal ideation at age 12 (not pictured) was included in the final model to account for previous suicidal thoughts. Correlated residuals (not pictured) included parental relationship with depression and friendships with depression.

Table 1

Descriptive Statistics.

	N	Mean (SD)	Range
<i>Childhood Maltreatment Age 12</i>			
Physical Abuse	881	0.43 (1.04)	0–10
Psychological Abuse	883	1.24 (2.19)	0–15
Sexual Abuse	874	0.40 (1.03)	0–4
<i>Parental Relationship Age 16</i>			
Quality – Mom	629	4.04 (0.75)	1–5
Quality – Dad	444	3.81 (0.87)	1–5
Involvement – Mom	629	4.80 (2.54)	0–15
Involvement – Dad	444	3.63 (2.85)	0–14
<i>Friendships Age 16</i>			
Companionship	646	3.77 (0.76)	1–5
Satisfaction	644	4.27 (0.63)	1–5
Intimacy	645	3.80 (0.99)	1–5
<i>Depression Age 16</i>	584	3.57 (3.81)	0–21
<i>Depression Age 18</i>	662	4.25 (5.01)	0–21
<i>Suicidal Ideation Age 12</i>		% No	% Yes
<i>Suicidal Ideation Index Age 12</i>	883	93.43	6.57
TSCC #52	864	95.37	4.63
YSR #91	871	95.18	4.82
<i>Suicidal Ideation Age 18</i>		% No	% Yes
Suicidal Ideation Index Age 18	674	93.18	6.82
TSC #25	664	94.88	5.12
YSR #91	658	96.35	3.65

Note. Total N = 884. TSC=Trauma Symptom Checklist; YSR=Youth Self Report; Depression scores reflect removal of suicidal ideation item

Table 2

Zero-order correlations among study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Physical Abuse 12	--															
2. Psych Abuse 12	0.55**	--														
3. Sex Abuse 12	0.30**	0.35**	--													
4. Quality -- Mom	-0.15**	-0.22**	-0.13**	--												
5. Quality -- Dad	-0.06	-0.14**	-0.14**	0.45**	--											
6. Involvement -- Mom	-0.04	-0.05	0.01	0.35**	0.22**	--										
7. Involvement -- Dad	0.00	-0.08	-0.02	0.17**	0.42**	0.62**	--									
8. Companions hip	-0.02	-0.03	-0.05	0.10*	0.04	0.14**	0.14**	--								
9. Satisfaction	-0.02	0.01	0.02	0.07	-0.01	0.10*	0.03	0.44**	--							
10. Intimacy	-0.03	-0.02	-0.06	-0.03	-0.01	0.13**	0.05	0.44**	0.55**	--						
11. Depression Age 16 (TSCC)	0.21**	0.18**	0.15**	-0.35**	-0.33**	-0.06	-0.16*	-0.10*	0.01	0.11**	--					
12. Depression Age 18 (TSI)	0.15**	0.22**	0.20**	-0.16**	-0.20**	0.04	-0.10	-0.03	0.03	0.06	0.42**	--				
13. SI Age 12 (TSCC #52)	0.23**	0.23**	0.11**	-0.09*	-0.05	0.02	-0.02	-0.01	-0.06	-0.06	0.16**	0.11**	--			
14. SI Age 12 (YSR #91)	0.26**	0.28**	0.10**	-0.10*	-0.08	-0.08	-0.09	-0.05	-0.03	-0.05	0.17**	0.16**	0.60**	--		
15. SI Age 18 (TSI #25)	0.12**	0.17**	0.15**	-0.12**	-0.12*	0.03	-0.08	0.04	0.07	0.09*	0.27**	0.49**	0.05	0.09*	--	
16. SI Age 18 (YSR #91)	0.12**	0.16**	0.03	-0.17**	-0.09	-0.09*	-0.08	0.07	0.05	0.03	0.17**	0.39**	0.08	0.12**	0.41**	--

Table 3

Latent Factor Loadings

	Factor Loadings	Factor Loadings SE	P-Value
<i>Childhood Maltreatment Age 12 (n=884)</i>			
Physical Abuse	0.655	0.041	<0.001
Psychological Abuse	0.848	0.046	<0.001
Sexual Abuse	0.446	0.040	<0.001
<i>Parental Relationship Age 16 (n=642)</i>			
Quality – Mom	0.386	0.045	<0.001
Quality – Dad	0.466	0.047	<0.001
Involvement – Mom	0.764	0.036	<0.001
Involvement – Dad	0.798	0.038	<0.001
<i>Friendships Age 16 (n = 646)</i>			
Companionship	0.595	0.034	<0.001
Satisfaction	0.741	0.033	<0.001
Intimacy	0.736	0.033 7	<0.001