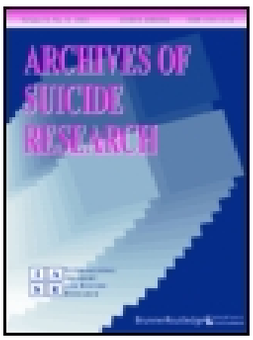

Archives of Suicide Research

ISSN: 1381-1118 (Print) 1543-6136 (Online) Journal homepage: http://www.tandfonline.com/loi/usui20

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**To cite this article:** Elise Paul & Ana Ortin (2017): Correlates of Suicidal Ideation and Self-harm in Early Childhood in a Cohort at Risk for Child Abuse and Neglect, Archives of Suicide Research, DOI: 10.1080/13811118.2017.1413468

**To link to this article:** https://doi.org/10.1080/13811118.2017.1413468

Accepted author version posted online: 27 Dec 2017.
Published online: 05 Mar 2018.

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Archives of Suicide Research, 0:1–17, 2018
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ISSN: 1381-1118 print/1543-6136 online
DOI: 10.1080/13811118.2017.1413468

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# Correlates of Suicidal Ideation and Self-harm in Early Childhood in a Cohort at Risk for Child Abuse and Neglect

Elise Paul and Ana Ortin

*Objectives: This study provides prevalence and persistence rates of suicidal ideation and self-harm, and examines how child maltreatment types, mental health symptoms, and age 4 suicidal ideation and self-harm are associated with each suicidal outcome among 6-year-old children.*

*Methods: Participants were 1,090 caregivers assessed when their children were 4 and 6 years old from the Longitudinal Studies of Child Abuse and Neglect. Data were collected from the Child Behavior Checklist, Parent-Child Conflict Tactics Scales, and Child Protective Services.*

*Results: Persistence rates within each suicidal outcome were high. Failure to provide -a physical neglect subtype- was the only maltreatment type that independently predicted self-harm. Depressive/anxious symptoms and age 4 suicidal ideation were independently associated with age 6 suicidal ideation, whereas attention problems and age 4 self-harm predicted age 6 self-harm.*

*Conclusion: Our findings align with the consensus emerging from adolescent studies that risk factors associate differentially with suicidal ideation and self-harm.*

**Keywords** child maltreatment, early childhood, self-harm, suicidal ideation

## INTRODUCTION

Suicidal ideation and non-fatal self-harm are the most important predictors of future suicidal behavior (Pfeffer et al., 1991) and suicide death across the life span (Hawton et al., 2015; Soole, Kõlves, & De Leo, 2015). Previously assumed to be too young to inflict serious self-harm, children under the age of 6 have been observed running into fast traffic, jumping from heights, and hanging themselves (Paulson, Stone, & Sposto, 1978; Pfeffer & Trad, 1988; Rosenthal, Rosenthal, Doherty, & Santora, 1986). Understanding children's suicidal ideation and non-fatal self-harm are especially urgent given the significant increase in rates of child suicides (ages 5–11) that occurred between 1999 and 2014 in the United States (Curtin, Warner, Hedegaard, & others, 2016).

Data from community samples in children (<12 years) indicate that current rates of self-report suicidal ideation are as high as 17% (Kovess-Masfety et al., 2015) and 11% for collapsed measures of lifetime suicidal ideation or self-harm reported by parents (Whalen, Dixon-Gordon, Belden, Barch, & Luby, 2015). However, obtaining accurate prevalence rates of young children's self-harm separated from suicidal ideation is difficult because many studies in this age group have collapsed these two phenomena into a single index (e.g., Whalen et al., 2015) or have only assessed suicidal ideation (Kovess-Masfety et al., 2015). The first aim of this study is to provide information on 6-month prevalence and persistence rates of suicidal ideation and self-harm/suicide attempts at ages 4 and 6 in a U.S. cohort of children characterized by varying levels of risk for maltreatment, the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN).

Identifying factors that differentially associate with suicidal ideation and self-harm in youth is a research priority (Glenn & Nock, 2014). This study expands on the extant literature by examining how different risk factors, types of child maltreatment and mental health symptoms, and prior suicidal ideation and self-harm relate to suicidal ideation and self-harm in at-risk age-6 children. Early child adversity and negative life events such as child maltreatment and family conflict are associated with suicidal behavior (Miller, Esposito-Smythers, Weismoore, & Renshaw, 2013; Serafini et al., 2015) and death by suicide (Sheftall et al., 2016) in children. Theoretical models of suicide risk also emphasize child adversities, such as child maltreatment, as risk factors for suicidal thoughts and behaviors (Bridge, Goldstein, & Brent, 2006; Brodsky, 2016; Turecki & Brent, 2016). However, whether certain types of child maltreatment associate with suicidal ideation or self-harm has not been empirically explored in a young sample.

Earlier reports of preschool-aged suicidal children that describe intense parental aggression, abandonment, family violence, and rejection of the children's autonomy, support the association between maltreatment and self-harm (Pfeffer, 1981; Pfeffer & Trad, 1988; Rosenthal & Rosenthal, 1984; Rosenthal et al., 1986). Further underscoring the salience of disturbed parenting for these behaviors, children of preschool (Paulson et al., 1978; Pfeffer & Trad, 1988) and school age (Paulson et al., 1978; Pfeffer, 1981; Wyman et al., 2009) explain their desire for death as a way to deal with feeling unwanted and worthless and to escape unbearable family situations. The patterns of abusive and neglectful parenting contained in these earlier case narratives of suicidal young children are conceptually congruent with emotional maltreatment (Glaser, 2002). That emotional abuse and neglect may be especially relevant for suicidal behaviors comes from a large epidemiologic study of adults (Dube et al., 2001) and a recent meta-analysis of all ages (Liu et al., 2017), which found that among the different types of abuse and neglect, emotional abuse had the highest risk for suicide attempt. Thus, a further examination of this form of maltreatment in relation to suicidal ideation and self-harm in children is warranted.

Despite the theoretical and empirical relevance for suicide risk, only three quantitative studies have examined associations of child maltreatment with suicide outcomes in childhood. In a sample of suicidal preschoolers, 81% and 77% of the outpatient and inpatient children's parents had been abusive and/or neglectful, compared to 25% of same-aged behaviorally disordered outpatients (Rosenthal et al., 1986). The second study used data from the LONGSCAN and found that the presence of any maltreatment reported to Child Protective Services (CPS) was more likely to occur in 8-year-old children who had thought about killing themselves,

compared to those who had not (Thompson et al., 2005). Among maltreated children, the severity of physical abuse was associated with suicidal ideation; but the severity of the other maltreatment types (e.g., sexual abuse, failure to provide, lack of supervision, and emotional maltreatment) did not predict suicidal thoughts. In the third study, low-income school-aged children who were maltreated and had at least one official record of any form of child abuse or neglect were more likely to have reported current suicidal ideation than their non-maltreated peers (Cicchetti, Rogosch, Sturge-Apple, & Toth, 2010).

Retrospective data from a worldwide epidemiologic study of adults suggest that child physical abuse, sexual abuse, and neglect are related to suicide attempts occurring in childhood (ages 4–12) and adolescence (Bruffaerts et al., 2010). However, no study has examined how different types of child maltreatment relate to suicidal ideation and self-harm in younger children. The second aim of this article is to provide the first empirical examination of which child maltreatment types from two sources, official records and caregiver reports, increase risk for suicidal ideation and self-harm among 6-year-old children at risk for maltreatment or who were already identified as maltreated.

In a parallel line of research, a handful of studies based on children's self-reports have demonstrated the importance of mental health symptoms as indicators for suicidal ideation and self-harm in childhood. The majority of this work has focused either on suicidal ideation or self-harm (Kovess-Masfety et al., 2015; O'Leary et al., 2006; Pfeffer et al., 1991) or a combined measure of both of these outcomes (Foley, Goldston, Costello, & Angold, 2006; Whalen et al., 2015). Studies with community samples of children (≤12) focused on parent-report suicidal ideation and mental health correlates, suggest that externalizing symptoms have a stronger association with child's suicidal ideation than internalizing symptoms (Kashani, Goddard, & Reid, 1989; Kovess-Masfety et al., 2015; Min et al., 2012). We are aware of only one study that has examined the association between suicide attempts and mental health symptoms among school-age children (Gould et al., 1998). Based on combined parent-child reports, authors found that while disruptive disorders were independently associated with suicidal ideation, mood and anxiety disorders were independent correlates of suicide attempts. Epidemiological studies of adolescents suggest the opposite, and while depression associates with suicidal ideation, disorders that are characterized by physical aggression, anxiety, and substance abuse relate to suicide plan or attempt (Glenn & Nock, 2014).

A further reason to evaluate these outcomes in young children is that even though there are differences in the psychiatric profiles of adolescents and children with suicidal thoughts and attempts (Ben-Yehuda et al., 2012; Sheftall et al., 2016), many studies have evaluated children and adolescents as one group (Foley et al., 2006; Tishler, Reiss, & Rhodes, 2007). Therefore, there is a need for further examination of the clinical profiles of young children with suicidal ideation and self-harm behaviors, as they may differ from those of adolescents (Zeanah & Gleason, 2015). Thus, the third aim of this study is to identify which mental health symptoms are elevated among high-risk children as young as 6 years old who talk about suicide or engage in self-harm.

Finally, another limitation of childhood suicidality literature is in the longitudinal investigation of suicidal trajectories. Pre-pubertal children who talk about or make a suicide attempt are at risk for future repetition and suicide death (Pfeffer et al., 1991; Shaffer, 1974; Soole

et al., 2015). Earlier studies have documented repeated self-harm and suicide attempts in young children (Paulson et al., 1978; Pfeffer & Trad, 1988; Rosenthal et al., 1986). More recently, Whalen and colleges (Whalen et al., 2015) found that the majority (75%) of the children who had reported lifetime suicidality—suicidal ideation or self-harm—at ages 3–7 were at increased risk for repetition 4 years later. In fact, prior suicidal behavior was a stronger predictor of future suicidality than psychiatric disorders. Research not only on repetition but also on whether there might be transitions from prior suicidal ideation to self-harm in young children is therefore needed. The fourth and final aim of this study is to provide insights into the longitudinal trajectories of suicidal ideation and self-harm by examining the persistence in these outcomes from age 4 to 6.

This study is the first to examine how child maltreatment types, mental health symptoms, and prior suicidal ideation and self-harm relate to suicidal ideation and self-harm in young children. The study aims are fulfilled by conducting secondary analyses of data from the LONGSCAN, a cohort of children who were already maltreated or at risk for maltreatment (Runyan et al., 1998). While prior work with the LONGSCAN data has investigated children's suicidal ideation at the year 8 interview (Thompson et al., 2005), no research on suicidal thoughts and behaviors at earlier ages has been conducted.

The first study aim is to provide data on the 6-month prevalence and persistence rates of suicidal ideation and self-harm at ages 4 and 6. The second aim is to examine which child maltreatment types relate to suicidal ideation and self-harm at age 6. Based on prior work documenting intense parental rejection and emotional neglect in the families of suicidal children (Pfeffer, 1981; Rosenthal & Rosenthal, 1984), we hypothesize that emotional/psychological abuse and neglect, will show significant relationships with both suicidal outcomes. The third aim is to examine whether mental health symptoms relate differentially to suicidal ideation and self-harm in young children. We expect that parent-report internalizing symptoms (i.e., depressive/anxiety), and especially externalizing symptoms (i.e., aggression and attention problems), to be independently associated with suicidal ideation (Gould et al., 1998; Kovess-Masfety et al., 2015) and internalizing symptoms with self-harm (Gould et al., 1998). The fourth aim is to examine the longitudinal trajectories of suicidal ideation and self-harm from ages 4 to 6. We expect both persistence (Whalen et al., 2015) and a transition from suicidal ideation to self-harm between assessments. Gaining a clearer understanding of suicidal children's early maltreatment experiences, mental health symptoms, and suicidal behavior progression over time, will help tailor prevention and intervention efforts directed at high-risk children.

## METHODS

### Sample

*The Longitudinal Study of Child Abuse and Neglect.* The present study is a secondary analysis of data from the ongoing Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), a consortium of five study sites in different regions in the United States (South, East, Midwest, Northwest, and Southwest) that shared common methodology and measures. Children at each study site were chosen based on varying degrees of risk for maltreatment, ranging from high-risk families recruited from health-care clinics (e.g., low-income families, mothers at risk for HIV infection, failure to thrive children, etc.), to families reported to Child Protective Services (CPS), to mistreated children placed in

foster care. LONGSCAN started collecting data in 1991 and first assessed children when they were 4 years old. Additional participants were added into the LONGSCAN study at the age 6 interview. Informed consent was obtained from the caregivers. Assessments were administered by trained interviewers and financial compensation was provided for participation. For a detailed description of the methods used see Runyan et al. (1998).

The present study sample includes 1,090 primary caregivers who had complete data on outcome variables from the Child Behavior Checklist (CBCL) and participated in the study at children's ages of 4 and 6. Study sample selection was as follows. A total of 1,220 and 1,221 caregivers participated in the ages 4 and 6 interviews, respectively, and 1,092 participated in both interviews. Of these 1,092, only 2 had missing data on outcome variables, leaving 1,090 in the study sample. The participants which were excluded due to non-participation in both interviews or because of missing outcome data ($n = 257$) were slightly less educated than the study sample participants (11.45 years versus 11.80 years; $F = 5.25$, $p = 0.022$), but did not differ on any other study variable.

Missing data on independent and control variables ranged from 5.5% for caregiver reported psychological aggression and minor physical assault to 12.8% for child vocabulary. In order to preserve the participants with complete outcome data but missing data on other study variables, multiple imputation with chained equations was used. We therefore did not impute outcome data. The resulting 10 data sets were averaged for each sample and were used in all presented analyses. To assess the potential impact of missing data on results, we compared analyses using the study sample with and without imputation to the sample with missing data on predictor variables and covariates and the final pattern of multivariate results did not differ from those reported in this paper (results available upon request).

In the final sample, almost 65% of the caregivers were biological mothers, 8.0% grandmothers, 7.5% adoptive mothers, 4.1% foster mothers, 5.2% other female relatives (e.g., aunt), 3.1% biological fathers, and the remaining 7.6% were other female or male caregivers, either adoptive or other biological relatives.

## Measures

*Child Suicide Behaviors.* Suicidal ideation and self-harm during the past 6 months were measured with two items from the Child Behavior Checklist (CBCL/4-16 (Achenbach, 1991) ("Child talks about killing self" and "Child harms self/attempts suicide"). Caregivers rated these two items on a scale rating from 0 (*not true*) to 2 (*often true*) when children were 4 and 6 years old. Each item was dichotomized such that if a caregiver rated those items as 1 or 2 on the CBCL, child's suicidal ideation or self-harm was coded as present at ages 4 or 6. Prior studies provide evidence for the clinical utility and construct validity of these two CBCL items. For example, in a large longitudinal community-based study of 11-year-old children, the suicidal ideation item from the CBCL was strongly predictive of suicidal ideation, mood disorders, and anxiety disorders in adulthood (Herba, Ferdinand, van der Ende, & Verhulst, 2007). Another longitudinal study combined parents' and youth's reports on those two items on the CBCL and Youth Self Report (youth version of the CBCL) to create a measure of "suicidality." Authors found that adolescents with any suicidality at age 16 had significantly higher concurrent levels of internalizing and externalizing problems (Sourander, Helstelä, Haavisto, & Bergroth, 2001).

*Child Mental Health Symptoms.* Children's mental health symptoms at the age of 6

were measured with the CBCL subscales (Achenbach, 1991): Aggression (20 items), Attention (11 items), Delinquent Behavior (13 items), Depression/Anxiety (14 items), and Somatic Complaints (9 items). The suicidal ideation and self-harm variables were not part of any of these subscales. The CBCL is widely used and has good test-retest reliability, interrater agreement, and construct validity (Achenbach, 1991). Caregivers rate the frequency of their children's problem behaviors during the previous six months on a Likert-type scale from 0 (*not true)* to 2 (*very or often true*). Internal reliability for each of the subscales in this sample was good (Cronbach's $\alpha = .65–.89$).

*Child Maltreatment.* Child maltreatment was measured in two ways. The first measure was comprised of the number of allegations in different child maltreatment types reported to the Child Protective Services (CPS) until the child was 6 years old. Official records were coded by trained abstractors at each study site (English, LONGSCAN investigators, & others, 1997). In this study, we examined emotional maltreatment (persistent or extreme thwarting of the child's emotional needs), physical abuse (inflicted blows or injury to the body), sexual abuse (sexual exposure, molestation, or penetration), and two forms of physical neglect: lack of adequate supervision (failure to ensure the child's safety in or out of the home) and failure to provide (e.g., not supplying the child with adequate food, clothing, shelter, or health care).

Child maltreatment was also measured with the Psychological Aggression (6 items) and Minor Physical Assault (6 items) subscales from the Parent-Child Conflict Tactics Scales (CTS) (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), which were collected from caregivers when the children were 6 years old. The Psychological Aggression subscale includes items such as yelling and screaming or insulting and swearing at the child. The Minor Physical Assault subscale includes items such as throwing something at or grabbing the child. Both subscales inquire about the frequency of these behaviors in the last year on a scale from 0 (*never*) to 4 (*>5 times*). For these analyses, items within each subscale were dichotomized into 0 (*never*) and 1 (*once or more*) and then summed up into frequency scales. Internal consistency was acceptable for both the Psychological Aggression and Minor Physical Assault subscales (Cronbach's $\alpha = .70$ and .60, respectively). Construct validity of the CTS had previously been demonstrated (Straus & Hamby, 1997).

*Covariates.* Child socio-demographic measures, including gender, age, and race/ethnicity (White, African American, and Hispanic/multiracial/other), were collected from primary caregivers when the child was 4 years old. The child's age in months at age 6 was calculated by subtracting the child's date of birth from the interview date. Children's vocabulary was assessed at age 6 with the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R): Short Form Vocabulary and Block Design (Wechsler, 1989). The WPPSI-R is a test of intellectual functioning for children ages 3 to 7 years. In the first vocabulary section, children are asked to provide names for pictures of objects. The children are then asked to define a word that the experimenter presents orally. In this study, age-standardized scores will be used. The WPPSI-R has been used extensively and construct validity has been demonstrated (Canivez & Watkins, 1998; Wechsler, 1989). In relation to caregiver-related covariates, we included years of formal education, depressive symptoms, and family conflict, which were all assessed when the child was 6 years old. Primary caregiver depressive symptoms were measured with the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977).

This scale measures the frequency of depressive symptoms in the last week (0 = *rarely or none of the time*, to 3 = *most or all of the time*). The CES-D has well-documented construct validity and reliability (Knight, Williams, McGee, & Olaman, 1997; Radloff, 1977), and the internal consistency was high in this sample (Cronbach's α = .85). A total score for depressive symptoms was calculated by summing the 20 items. Family conflict was assessed with the Family Conflict subscale of the Self-Report Family Inventory (SFI) (Beavers, Hampson, & Hulgus, 1990). Caregivers rated each of the 12 items of the subscale on a scale ranging from 1 (*fits our household very well*) to 5 (*does not fit our household at all*). Exemplar items included "Grownups in the household compete and fight with each other" and "Household members put each other down". The subscale has shown good convergent and concurrent validity, and test-retest reliability (0.50 to 0.59) (Beavers & Voeller, 1983; Beavers et al., 1990). In this study, items were summed and higher values indicated more family conflict (Cronbach's alpha = .81). A nominal variable was used to control for varying recruitment practices at each of the five LONGSCAN study sites.

*Statistical Analyses.* First, we reported the 6-month prevalence, persistence, and transition rates of suicidal ideation and self-harm at ages 4 and 6. Next, binary logistic regressions were used to determine bivariate associations of child maltreatment types, mental health symptoms, age 4 suicidal ideation and self-harm, and each covariate with age 6 suicidal ideation and self-harm separately. The case group for suicidal ideation included children with age 6 suicidal ideation but not self-harm. For self-harm, the case group included children with age 6 self-harm, with and without suicidal ideation. In these analyses, the comparison group for each case group was children with neither suicidal ideation nor self-harm at age 6. Main predictors and covariates with statistical significance of $p < .05$ in the bivariate analyses were retained for subsequent multivariate analyses.

Four multivariate logistic regression models were conducted to test associations of child maltreatment types, mental health symptoms, and age 4 suicidal ideation and self-harm with each suicide outcome at age 6. First we examined the simultaneous associations of child maltreatment types with suicidal ideation (Model 1) and self-harm (Model 2). Then we tested simultaneous associations of mental health symptoms and age 4 suicidal ideation and self-harm with age 6 suicidal ideation (Model 3) and self-harm (Model 4). Children without suicidal ideation or self-harm served as the reference groups in all models. Multivariate models were adjusted for the corresponding significant covariates from the bivariate models for suicidal ideation and self-harm, respectively. Statistical tests were two-tailed. Regression coefficients were transformed into odds ratios (ORs) and 95% confidence intervals (CIs) for ease of interpretation. Stata (StataCorp, 2015) was used for analyses.

***TABLE 1.*** **Prevalence of Ages 4 and 6 Suicidal Ideation and Self-Harm in the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) Sample (*N* = 1,090)**

| | Age 4 | Age 6 |
|---|---|---|
| **Suicide Outcomes** | **%** | **%** |
| Child talks about killing self (suicidal ideation) | | |
| Never | 98.5 | 96.9 |
| Sometimes | 1.4 | 2.9 |
| Often | 0.1 | 0.2 |
| Child harms self/attempts suicide (self-harm) | | |
| Never | 96.1 | 96.8 |
| Sometimes | 2.9 | 2.6 |
| Often | 1.0 | 0.6 |
| Child has both suicidal ideation and self-harm | 0.0 | 0.0 |

*TABLE 2.* **Bivariate Associations of all Study Variables with Age 6 Suicidal Ideation and Self-Harm in the LONGSCAN Sample ($N = 1,090$).**

| | Neither Ideation nor Self-harm[a] $n = 1,028$ | Suicidal Ideation $n = 27$ | | Self-harm $n = 35$ | |
|---|---|---|---|---|---|
| | % or M (SD) | % or M (SD) | OR (95% CI) | % or M (SD) | OR (95% CI) |
| Gender (female) | 51.3% | 44.4% | 0.66 (0.33–1.32) | 45.7% | 0.80 (0.41–1.57) |
| Child age (years) | 6.42 (0.51) | 6.47 (0.47) | 1.19 (0.63–2.26) | 6.28 (0.46) | 0.55 (0.24–1.23) |
| Child race/ethnicity | | | | | |
| White[b] | 26.3 | 44.4% | 1.00 | 17.1% | 1.00 |
| African American | 54.0% | 25.9% | 0.37 (0.16–0.86) | 42.9% | 1.22 (0.47–3.17) |
| Hispanic/mixed race/other | 19.7% | 29.6% | 1.13 (0.49–2.56) | 40.0% | 3.10 (1.17–8.22) |
| Child vocabulary | 8.42 (2.96) | 8.45 (3.27) | 1.03 (0.92–1.16) | 6.97 (3.05) | 0.85 (0.76–0.95) |
| Caregiver years of education | 11.82 (2.13) | 11.15 (3.62) | 0.89 (0.77–1.03) | 11.94 (2.74) | 1.03 (0.88–1.20) |
| Caregiver depressive symptoms | 11.73 (10.27) | 22.05 (13.12) | 1.06 (1.04–1.09) | 13.53(12.85) | 1.02 (0.97–1.05) |
| Family conflict | 20.32 (7.54) | 25.78 (9.53) | 1.05 (1.01–1.09) | 20.34 (7.63) | 1.00 (0.96–1.05) |
| *Child maltreatment types, age 6* | | | | | |
| CTS Psychological aggression | 2.31 (1.30) | 3.32 (1.65) | 1.53 (1.20–1.95) | 2.47 (1.43) | 1.10 (0.85–1.42) |
| CTS Minor physical assault | 1.38 (1.15) | 1.97 (1.35) | 1.43 (1.11–1.84) | 1.65 (1.23) | 1.21 (0.93–1.59) |
| CPS Emotional maltreatment | 0.47 (1.06) | 0.59 (0.93) | 1.33 (1.11–1.59) | 1.06 (2.09) | 1.31 (1.09–1.56) |
| CPS Physical abuse | 0.48 (1.13) | 0.59 (1.12) | 1.32 (1.09–1.59) | 1.06 (2.16) | 1.29 (1.07–1.56) |
| CPS Sexual abuse | 0.14 (9.48) | 0.22 (0.51) | 1.50 (0.94–2.40) | 0.31 (0.99) | 1.50 (0.98–2.30) |
| CPS Failure to provide | 1.22 (2.21) | 0.93 (1.14) | 1.04 (0.90–1.19) | 2.66 (3.46) | 1.17 (1.06–1.28) |
| CPS Lack of supervision | 0.67 (1.33) | 0.86 (1.57) | 1.15 (0.95–1.39) | 0.86 (1.57) | 1.09 (0.89–1.35) |
| *Mental health symptoms, age 6* | | | | | |
| Aggression | 10.44 (6.92) | 17.73 (7.24) | 1.13 (1.08–1.17) | 18.80 (8.43) | 1.14 (1.09–1.18) |
| Attention | 3.88 (3.31) | 7.33 (3.93) | 1.24 (1.15–1.34) | 8.89 (5.02) | 1.31 (1.21–1.41) |
| Delinquent behavior | 2.17 (2.10) | 4.37(2.86) | 1.35 (1.21–1.51) | 4.11 (2.95) | 1.31 (1.18–1.46) |
| Depression/anxiety | 3.03 (3.14) | 8.67 (5.06) | 1.34 (1.24–1.44) | 6.74 (5.32 | 1.23 (1.15–1.32) |
| Somatic complaints | 0.93 (1.38) | 2.22 (2.12) | 1.46 (1.29–1.73) | 1.74 (2.31) | 1.32 (1.12–1.57) |
| *Suicidal behaviors, age 4* | | | | | |
| Suicidal ideation | 1.0% | 18.5% | 18.32 (5.86–57.24) | 4.3% | N/A |
| Self-harm | 3.0% | 0% | N/A | 35.3% | 17.40 (7.91–38.31) |

*Note*. Bold indicates $p < .05$. CTS = Conflict Tactics Scale (last year). CPS = Child Protective Services lifetime allegations. OR = odds ratio. CI = confidence interval.
[a]Children with neither suicidal ideation nor self-harm served as the reference group in all models. [b]Reference category. N/A = Not applicable.

## RESULTS

### Prevalence and Longitudinal Trajectories of Suicidal Ideation and Self-Harm

Table 1 presents the 6-month prevalence of suicidal ideation and self-harm at ages 4 and 6 based on caregiver report on the CBCL. When the LONGSCAN children were 4 years old, 1.5% ($n = 16$) of these children had talked about killing themselves, and 3.9% ($n = 43$) had self-harmed at least sometimes or often in the past 6 months. At age 6, 3.1% ($n = 34$) of the sample had talked about killing themselves and an almost equal number of children (3.2%; $n = 35$) had harmed themselves or attempted suicide sometimes or often in the past 6 months. Two children had both talked about suicide and engaged in self-harm at the age of 4 and seven children did so at the age of 6. In relation to persistence, 33.3% and 27.9% of the children with suicidal ideation and self-harm at age 4 reported the same behavior at age 6, respectively. Only one 4-year-old with suicidal ideation had transitioned to self-harm at age 6, and two children with age 4 self-harm had talked about suicide at age 6.

### Bivariate Associations of Child Maltreatment Types, Child Mental Health Symptoms, Age 4 Suicidal Ideation and Self-Harm, and Covariates with Age 6 Suicidal Outcomes

At age 6, 27 (2.5%) children endorsed suicidal ideation but no self-harm and 35 (3.2%) children had engaged in self-harm with or without suicidal ideation (Table 2). Children without suicidal ideation or self-harm at age 6 (94.3%, n = 1,028) were the comparison group. There were no differences by child gender and age, and caregiver years of education in either suicide outcome relative to the comparison group. White children were significantly more likely than African American children to have talked about killing themselves, and children in the Hispanic/mixed race/other racial/ethnic group were more likely than White children to self-harm. Six-year-old children who had self-harmed had significantly lower vocabulary scores than their peers with no suicidal ideation or self-harm. Maternal depression symptoms and family conflict were significantly higher in the suicidal ideation group than in the comparison group.

***TABLE 3.*** **Multivariate Logistic Regressions of Child Maltreatment on Age 6 Suicidal Ideation and Self-Harm**

| | **Suicidal Ideation** | **Self-harm** |
|---|---|---|
| | **OR (95% CI)** | **OR (95% CI)** |
| Model 1 | | |
| CTS Psychological aggression | 1.24 (0.91–1.70) | — |
| CTS Minor physical assault | 1.21 (0.87–1.68) | — |
| CPS Emotional maltreatment | 1.06 (0.83–1.37) | — |
| CPS Physical abuse | 1.23 (0.96–1.59) | — |
| Model 2 | | |
| CPS Emotional maltreatment | — | 1.16 (0.92–1.45) |
| CPS Physical abuse | — | 1.16 (0.92–1.47) |
| CPS Failure to provide | — | 1.12 (1.01–1.25) |

*Note*. Bold indicates $p < .05$. CTS = Conflict Tactics Scale (last year). CPS = Child Protective Services lifetime allegations. OR = odds ratio. CI = confidence interval. Children with neither suicidal ideation nor self-harm served as the reference group in both models. Model 1 was adjusted for child race/ethnicity, caregiver depressive symptoms, and family conflict. Model 2 was adjusted for child race/ethnicity and child vocabulary.

Compared to children without suicidal ideation or self-harm, caregiver-reported (CTS) psychological abuse and minor physical assault, and number of CPS allegations of emotional maltreatment and physical abuse were higher in children with suicidal ideation. Number of CPS allegations of emotional maltreatment, physical abuse, and failure to provide were significantly higher in children with self-harm than in children without suicidal ideation or self-harm. All age 6 mental health symptoms were significantly elevated among children with suicidal ideation and those with self-harm than among children without suicidal ideation or self-harm. Finally, age 4 suicidal ideation was associated with age 6 suicidal ideation, and age 4 self-harm was associated with age 6 self-harm. However, age 4 suicidal ideation did not predict self-harm at age 6.

## Multivariate Associations of Child Maltreatment Types with Age 6 Suicidal Ideation and Self-Harm

Next, we examined simultaneous associations of the child maltreatment types that were significant ($p < .05$) in the bivariate models with age 6 suicidal ideation and self-harm, adjusting for covariates (Table 3). In Model 1, none of the child maltreatment types remained significantly related to age 6 suicidal ideation. In Model 2, CPS failure to provide was the only maltreatment type that remained significantly related to self-harm. Children whose caregivers frequently failed to provide for their physical needs had 1.12 higher odds of self-harming than children whose caregivers did not fail to provide.

***TABLE 4.*** **Multivariate Logistic Regressions of Age 6 Mental Health Symptoms and Age 4 Suicidal Behaviors on Age 6 Suicidal Ideation and Self-Harm**

| | **Suicidal Ideation** | **Self-harm** |
|---|---|---|
| | **OR (95% CI)** | **OR (95% CI)** |
| Model 3 | | |
| Aggression | 1.01 (0.93–1.09) | — |
| Attention | 1.06 (0.93–1.21) | — |
| Delinquent behavior | 1.11 (0.92–1.34) | — |
| Depression/anxiety | 1.19 (1.07–1.33) | — |
| Somatic complaints | 1.14 (0.91–1.42) | — |
| Suicidal ideation, age 4 | 17.93 (4.16–77.31) | — |
| Model 4 | | |
| Aggression | — | 1.03 (0.96–1.12) |
| Attention | — | 1.16 (1.03–1.30) |
| Delinquent behavior | — | 1.02 (0.84–1.23) |
| Depression/anxiety | — | 1.06 (0.94–1.19) |
| Somatic complaints | — | 1.13 (0.92–1.39) |
| Self-harm, age 4 | — | 7.09 (2.73–18.41) |

*Note.* Bold indicates $p < .05$. OR = odds ratio. CI = confidence interval. Children with neither suicidal ideation nor self-harm served as the reference group in both models. Model 1 was adjusted for child race/ethnicity, caregiver depressive symptoms, and family conflict. Model 2 was adjusted for child race/ethnicity and child vocabulary.

### Multivariate Associations of Child Mental Health Symptoms and Age 4 Suicidal Ideation and Self-Harm with Age 6 Suicidal Outcomes

Table 4 presents simultaneous associations of age 6 mental health symptoms and age 4 suicidal ideation and self-harm that were significant in the bivariate associations with each one of the age 6 outcomes, adjusting for covariates. In Model 3, only depressive/anxious symptoms and age 4 suicidal ideation remained significantly associated with age 6 suicidal ideation. Specifically, children with depressive/anxious symptoms and those with suicidal ideation at age 4 had 1.2 and 17.9 higher odds of endorsing suicidal ideation at age 6, respectively, compared to those children without suicidal ideation or self-harm. In Model 4, attention problems and age 4 self-harm remained significantly associated with increased risk for self-harm at age 6. Specifically, children with attention problems and those with self-harm at age 4 had 1.2 and 7.1 higher odds of self-harming at age 6, respectively, compared to those children without suicidal ideation or self-harm.

## DISCUSSION

This is the first study to examine the risk factors for suicidal ideation and self-harm in young children who are at risk for or have already been maltreated. Findings suggest that children with suicidal ideation or self-harm have been exposed to more maltreatment experiences than children with neither outcome, especially physical neglect among those engaging in self-harm. We also found that while depressive/anxious symptoms were significantly elevated among 6-year-old children with suicidal ideation, attentional problems were especially elevated among children with self-harm at this young age. Among the risk factors examined, the strongest predictors of suicidal ideation and self-harm at age 6 were age 4 suicidal ideation and self-harm, respectively.

Based on caregiver report, the prevalence of child suicidal ideation and self-harm in the past 6 months was 1.5% and 3.9% at age 4, and 3.1% and 3.2% at age 6, respectively. These rates are similar to the 3.8% rate of recent suicidal ideation reported by mothers about their 1st grade children (Min et al., 2012). In a prior publication using the LONGSCAN data, age 8 child self-reports of suicidal ideation were 9.9% (Thompson et al., 2005). An 11% lifetime prevalence of suicidal ideation/self-harm has been reported by parents in a study of mostly depressed children aged 3-7 (Whalen et al., 2015). Although rates of ideation are usually higher than rates of self-harm, in the present study, self-harm was reported by caregivers at higher rates than suicidal ideation, especially at age 4. Children at these ages may be less able to verbally express their negative feelings and thoughts than through behavior. Among high-risk families, caregivers may also be less responsive to their children's verbalizations (Mesman, van IJzendoorn, & Bakermans-Kranenburg, 2012), while self-harm is a more noticeable behavior. More research on rates of suicidal ideation and self-harm in high-risk and community samples of young children is needed.

Our findings on maltreatment experiences suggest that particular child maltreatment types in early childhood associate with suicidal ideation and self-harm at age 6 in a different way. Initially, CTS psychological aggression and minor physical assault, as well as CPS allegations of emotional maltreatment and physical abuse, were related to suicidal ideation at age 6. However, in the multivariate model, none of the child maltreatment types remained significant. These non-significant results may be indicative of the probable

co-occurrence of these forms of maltreatment, which further suggest that if one of those types is identified as present, professionals should assess for other possible maltreatment experiences, as well as for suicidal ideation. Future studies should also examine the extent to which specific maltreatment types versus frequency of any maltreatment experience relate to suicidal ideation at this young age.

In relation to self-harm, CPS allegations of emotional maltreatment, physical abuse, and failure to provide were initially related to this outcome, but only CPS allegations of failure to provide remained significant in the multivariate model. This form of physical neglect was assigned to caregivers whose official maltreatment records showed that they had severely and consistently failed to provide consistent and empathic responses to their child's basic physical needs, such as supplying adequate food, clothing, shelter, or health care. Other studies have found that physical abuse and sexual abuse increase the risk of suicidal behavior in adolescents (Beautrais, Joyce, & Mulder, 1996; Miller et al., 2013). It may be that the impact or consequences of these other types of maltreatment appear later as the child ages, whereas other types of maltreatment, such as physical neglect, may place younger children at higher risk for suicidal behavior among high-risk families, as we hypothesized. Children whose parents consistently did not respond to their physical needs could have learned to ignore their body signals as a way to cope, which may facilitate self-harm (Orbach, 2003; Rosenthal et al., 1986).

Our hypothesis that internalizing and externalizing symptoms would be associated with suicidal ideation (Gould et al., 1998; Kovess-Masfety et al., 2015) was partially supported by our findings. In the multivariate model, only the association between depressive/anxious symptoms and suicidal ideation remained significant in the multivariate model, while the association of suicidal ideation with aggression and attention problems and delinquent behavior did not. However, attention problems, including problems with sitting still, concentration, impulsiveness, and failure to finish tasks, were an independent contributor to self-harm. The fact that this finding is contrary to our initial hypothesis based on Gould et al.'s (1998) findings may be due to differences in the sample characteristics, such as informants and degree of maltreatment, and symptom severity (i.e., symptoms vs. disorders). More studies examining self-harming behaviors at these young ages are therefore necessary.

Building on what others have reported (Cohen-Sandler, Berman, & King, 1982; Whalen et al., 2015), we found evidence for the persistence of suicidal ideation and self-harm between the ages 4 and 6, with 33.3% and 27.9% of the children with suicidal ideation and self-harm at age 4 reporting the same behavior at age 6, respectively. In fact, suicidal ideation and self-harm were the strongest predictors of future suicidal ideation and self-harm after adjusting for concurrent mental health symptoms. We did not, however, find evidence for a transition between the two time points. That is, 4-year-old children who had talked about killing themselves were not at an increased risk for self-harm 2 years later. Despite the lack of evidence for transitioning from ideation to self-harm in this sample, it is worth noting that children under the age of 6 are capable of formulating and carrying out suicide plans (Pfeffer & Trad, 1988; Tishler, 1980) as well as engaging in repeated and serious self-harm (Paulson et al., 1978; Pfeffer & Trad, 1988; Rosenthal et al., 1986). Therefore, children's suicidal verbalizations and self-harm behaviors should be taken seriously, especially because they are the strongest predictors of suicide death (Hawton et al., 2015; Soole et al., 2015).

## LIMITATIONS

This study has several limitations. First, parents tend to underreport their children's suicidal behaviors (Gabrielli et al., 2014); thus, the number of children with these behaviors may be underestimated. Alternatively, children who had spoken to their parents about their suicidal wishes and self-harm may have had at least some hope of caregiver response and receiving mental health care. Second, although we relied on single measures to assess each outcome, this is an improvement over other studies which have collapsed these two items (e.g., Becker et al., 2016; Whalen et al., 2015). Besides, the usage of single items from depression or life event scales is common in studies of suicidal thoughts and behaviors (Gould et al., 1998; Kovess-Masfety et al., 2015; Mayes, Calhoun, Baweja, & Mahr, 2015) and also in large population-based studies of adolescents (Kann et al., 2016; Nock et al., 2013). Third, although we included caregiver assessments of their own psychologically aggressive and physically assaultive behaviors, we primarily relied on CPS reports for our maltreatment data. Since most maltreatment does not get reported to CPS (Sedlak et al., 2010), our results may have underestimated relations between these measures and the outcomes. The results of this sample of children at risk for maltreatment or identified as maltreated cannot be generalized to other community-based samples. Nevertheless, a study with the same sample when children were aged 8 identified risk factors for suicidal behavior that were mostly consistent with those identified in the literature with community and school-based samples (Thompson et al., 2005). Finally, the data used in this study were conceived to study the effects of child maltreatment and early disadvantage, and not necessarily child suicidal ideation and self-harm specifically. That said, our secondary use of the LONGSCAN data to study suicidality is in line with the policies and recommendations of numerous national and international research bodies such as the National Institute of Health.

## CONCLUSIONS

Together, our findings regarding different risk factors for suicidal ideation and self-harm align with the consensus emerging from adolescent studies and support the recommendation of examining both outcomes separately (Glenn & Nock, 2014). Considering the absence of well-established treatments for suicidal thoughts and behaviors in children, early identification and prevention of those behaviors is crucial (Glenn & Nock, 2014). In line with prior recommendations, our findings suggest that clinicians should carefully assess young children that have been maltreated or are at risk for maltreatment because they may be at heightened risk for suicidal behavior and vice versa (Pfeffer & Trad, 1988; Tishler et al., 2007). Our results also suggest that, contrary to the common assumption that physical abuse and sexual abuse pose particular risks for suicidal behaviors (O'Connor & Nock, 2014), young children whose basic physical needs have not been met may be at increased risk for self-harm. Different mental health symptoms should also be considered when assessing suicide risk among young children through caregiver report. Special attention is required for children with depressive and anxious symptoms or previous suicidal ideation because of their higher risk of thinking about suicide; and for those children with attention problems or previous self-harm, because they may be currently engaging in self-harming behavior.

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## FUNDING

This work was supported by the American Foundation for Suicide Prevention [Grant number PRG-0-106-15].

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