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Sluggish Cognitive Tempo is Associated with Suicide Risk in Psychiatrically Hospitalized Children

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Abstract

Background—Although identified as a significant public health concern, few studies have examined correlates of suicide risk in school-aged children. Recent studies show a relation between sluggish cognitive tempo (SCT) symptoms and a range of adverse outcomes linked to suicidal ideation, including depression, emotion dysregulation, lowered self-esteem, and peer problems/social withdrawal, yet no study to date has examined SCT in relation to suicide risk.

Methods—We tested the hypothesis that SCT would be associated with suicide risk in a sample of 95 psychiatrically hospitalized children (74% male; 62% Black) between the ages of 8 and 12 (*M*=10.01, *SD*=1.50). Parents completed measures of their child's psychiatric symptoms, including SCT and depression, as well as a measure of their own psychopathology. Children completed measures assessing loneliness and depression. Both parents and children completed measures of suicide risk.

Results—White children reported greater suicide risk than non-White children. After controlling for demographic characteristics, loneliness, parental psychopathology, and correlated psychiatric symptoms, including both parent- and child self-reported depressive symptoms, SCT remained uniquely associated with children's suicide risk. Results were consistent across both parent and child measures of suicide risk.

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Conclusions—This multi-informant study provides strong preliminary support for an association between SCT symptoms and suicide risk in psychiatrically hospitalized children, above and beyond loneliness, depression, and demographic characteristics. Findings are discussed in the context of the interpersonal theory of suicide. Additional studies are needed to replicate and extend these findings, with a particular need for studies that examine the cognitive processes and daydreaming content of individuals displaying elevated SCT symptomatology.

Keywords

ADHD; attention; depression; inpatient; rumination; suicidal ideation; suicidal imagery; suicide

Suicide is recognized as a worldwide public health concern. As noted by the World Health Organization (2014), "young people are among those most affected; suicide is now the second leading cause of death for those between the ages of 15 and 29 globally" (p. 11). Moreover, 17% of adolescents in the United States have seriously considered attempting suicide, 13.6% have made a plan about how they would attempt suicide, and 8% have attempted suicide within the past year (Kann et al., 2014). Although rates of suicide are higher in adolescence than in childhood, suicide is nonetheless the third leading cause of death among youth aged 10-14 years in the United States (Heron, 2013), and suicide risk in prepubertal children has been identified as a particularly important area for research and clinical attention (Tishler et al., 2007).

In response to the prevalence and severity of suicidal ideation and behaviors among youth, researchers have sought to identify risk factors associated with youth suicidality. It is important to identify correlates of suicide risk in children since suicide is increasingly prevalent in this population and also because suicidality in childhood is a strong predictor of suicidality in adulthood (Pfeffer et al., 1993). For instance, Herba and colleagues (2007) found that parent-report of suicidal ideation in children aged 11 years or younger was highly predictive of both suicidal ideation and lifetime history of suicide attempts in adulthood. Importantly, suicidal ideation in childhood remained significantly associated with suicidal ideation and suicide attempts in adulthood even after controlling for internalizing and externalizing problems in childhood (Herba et al., 2007). Thus, identifying correlates of suicidality in childhood may inform prevention and intervention efforts that mitigate immediate suicide risk as well as future risk.

There has been significant research attention devoted to psychiatric symptoms that may contribute to youth suicidality, yet no study to date has examined the possible association between sluggish cognitive tempo (SCT) and suicide risk. SCT is characterized by a range of symptoms including excessive daydreaming, mental confusion, slowed behavior/thinking, and lethargy/apathy, and research demonstrates SCT symptoms to be distinct from other psychiatric symptoms and uniquely associated with a range of functional impairments (Becker & Barkley, in press; Becker et al., 2016). For instance, SCT is strongly associated with depression (Becker et al., 2014; Lee et al., 2014; Willcutt et al., 2014) and emotion dysregulation[1] (Becker et al., 2015; Flannery et al., 2014), which are themselves clearly linked to youth suicidality (Esposito et al., 2003; Fite et al., 2011; Haavisto et al., 2005;

Marciano & Kazdin, 1994; Nock et al., 2013; Pfeffer et al., 1993; Sourander et al., 2001; Tamas et al., 2007).

The interpersonal theory of suicide (Van Orden et al., 2010) provides additional support for the hypothesis that SCT symptoms may be a risk factor for suicidality. The interpersonal theory of suicide describes three constructs contributing to suicidal desire. Two of these constructs are interpersonal in nature – *thwarted belongingness* occurs when an individual's need to belong is not met, and *perceived burdensomeness* occurs when an individual experiences self-hate and believes that they are a liability to others (Van Orden et al., 2010). Although psychopathology is not itself viewed as an indicator of either thwarted belongingness or perceived burdensomeness, it is theorized to be a risk factor for the development of these interpersonal constructs (Van Orden et al., 2010). In considering SCT specifically, it is clear that interpersonal problems – including withdrawal and loneliness specifically – is one of the most consistently identified correlates of SCT (Becker, 2014; Becker et al., 2013; Becker et al., 2015; Marshall et al., 2014; Willcutt et al., 2014). Social isolation is considered a core indicator of thwarted belongingness, and moreover, "social isolation is arguably the strongest and most reliable predictor of suicidal ideation, attempts, and lethal suicidal behavior" (Van Orden et al., 2010), p. 579). Furthermore, a recent study of school-aged children found SCT to be strongly associated with lower self-esteem in children (Becker et al., 2015), which is one aspect of perceived burdensomeness (Van Orden et al., 2010). Thus, recent empirical findings linking SCT to withdrawal, loneliness, and low self-esteem align with a prominent theoretical model of suicide and give rise to the hypothesis that SCT may be directly associated with children's suicide risk.

Whereas thwarted belongingness and perceived burdensomeness are theorized to increase the possibility of suicidal desire, the third construct within the interpersonal theory of suicide is *acquired capability for suicide* which includes an individual's propensity for suicidal intent and behavior due to a lowered fear of death and elevated pain tolerance (Van Orden et al., 2010). Although necessarily speculative in the absence of direct empirical data, the nature of SCT may itself increase an individual's acquired capability for suicide. A cardinal feature of SCT is excessive daydreaming, such that daydreaming is the most frequently-used item to date in studies assessing SCT (Becker et al., 2016). How might daydreaming be associated with acquired capability for suicide? As noted by Van Orden et al. (2010), "an individual who spends a great deal of time planning an attempt is not only making pragmatic arrangements for his or her death but is also habituating to the fear associated with making a suicide attempt (i.e., is engaging in mental practice)" (p. 588). In line with this possibility, multiple studies conducted with adults suggest that suicidal individuals often engage in violent daydreaming or suicidal imagery (Crane et al., 2012; Hales et al., 2011; Holmes et al., 2007; Selby et al., 2007). Selby and colleagues (2007) referred to this phenomenon as "daydreaming about death" that serves an emotion regulatory function. We are aware of only one study that has examined the possibility of violent

[1]It is important to clarify that SCT is either unassociated with or negatively associated with externalizing problems such as hyperactivity-impulsivity, oppositionality, and aggression when controlling for inattentive symptoms (Bernad et al., 2015; Lee et al., 2014; McBurnett et al., 2014). Although these externalizing behaviors are characterized by difficulties in affect regulation, emotion dysregulation is itself a broad construct and multiple studies demonstrate a significant positive association between SCT and measures of emotion dysregulation specifically (Barkley, 2012; Becker et al., 2015; Flannery et al., 2014; Jarrett et al., 2014; Wood et al., 2014).

imagery in youth, whereby Papolos et al. (2005) found imagery related to gore or violence to be associated with children's parent-reported suicide threat. Although these findings certainly do not suggest that all individuals displaying elevated SCT symptoms are ruminating or daydreaming about violence or self-harm, these studies do provide preliminary evidence for the possibility that individuals who are at-risk for self-harm and are also displaying SCT symptoms may be at heightened risk for suicidal ideation. In fact, Selby et al. (2007) suggested that "daydreaming about death may serve as a link that connects three major theories of suicidal behavior: suicide as an escape from negative affect (Baumeister, 1990), the role of emotion dysregulation proposed by Linehan (1993), and the acquired capability to enact lethal self-injury proposed by Joiner (2005)" (p. 876). Since daydreaming is a key feature of SCT, it is plausible that SCT symptoms are themselves associated with suicide risk in highly vulnerable individuals.

The Present Study

The purpose of this study was to evaluate whether SCT is associated with suicide risk in children. As in previous work examining youth suicide risk (Fite et al., 2011; Klaus et al., 2009; Marciano & Kazdin, 1994), we examined the association between SCT symptoms and suicide risk in children admitted to a psychiatric inpatient unit since this population is at a particularly high risk for experiencing suicidal ideation. We included both parent and child measures of suicidal ideation since consistent results across reporters would bolster confidence in the findings and because parents tend to report less suicidal ideation than children themselves (Klaus et al., 2009; Klimes-Dougan, 1998; Velez & Cohen, 1988). Moreover, to rigorously test our hypothesis, we examined whether SCT symptoms were not only correlated with suicide risk but also whether SCT symptoms remained uniquely associated with suicide risk after controlling for a host of other variables, including demographic characteristics, both child- and parent-rated depressive symptoms, loneliness, and other psychiatric symptoms associated with our suicide risk variables. Finally, since parents' own internalizing symptoms, and depression especially, may bias their ratings of child functioning (Briggs-Gowan et al., 1996; Fergusson et al., 1993), we also controlled for parents' own internalizing symptoms when examining parent-reported psychiatric symptoms (including SCT and depression) in relation to children's suicide risk. In sum, this is the first study to examine SCT in relation to suicide risk, and we tested this possibility in a sample of psychiatrically hospitalized children using a multi-informant design and rigorous control of other functioning domains known to be associated with children's suicide risk and behavior.

Methods

Participants

Participants were children admitted to an acute child psychiatric inpatient facility that provides services for 4-12-year-old children. Children were excluded from participation if their caregiver declined to allow the child's clinical data to be used in a research database or the child (a) was diagnosed with an autism spectrum disorder or psychosis or had a history of traumatic brain injury (generally precluding obtaining valid self-report), or (b) was in the custody of the Department of Human Services (precluding obtaining valid caregiver-report).

Although the facility provides services for 4- to 12-year-old children, only children aged 8 or older were included in the present study to be consistent with the validation samples of the child self-report measures used in this study (described below). Given these criteria, 95 children (70 boys) ages 8-12 years (M_{age}=10.01, SD_{age}=1.50) participated in this study. Most of the caregivers were mothers (79%); the remaining were fathers (4%), grandparents (11%), or others (including other family members or foster care guardians; 6%). For ease of presentation, "parent" will be used hereafter. Parent-identified race/ethnicity of the participants was primarily Black (62%), with 36% White, 1% Hispanic, and 1% "Other". Although the socioeconomic status of individual participants was unavailable, 84% of the children who are treated by the facility are covered by Medicaid. Children are admitted to the unit with a wide range of difficulties, including suicidal ideation and aggression. The typical length of stay is one to three weeks.

Measures

Parent ratings of child psychopathology symptoms—Child SCT, depression, anxiety, attention-deficit/hyperactivity disorder (ADHD), and oppositional defiant disorder (ODD) symptoms were assessed using the *Child Behavior Checklist* (CBCL) (Achenbach & Rescorla, 2001). The CBCL is a caregiver-report measure of children's emotional and behavioral problems. Respondents rate on a 3-point scale (0=*not true*, 1=*somewhat or sometimes true*, 2=*very true or often true*) how true each item is for their child. In the present study, the *DSM*-oriented ADHD[2], ODD, anxiety, and affective (depression) scales were used. The *DSM*-oriented scales have demonstrated good internal consistency as well as convergent and discriminant validity with other parent- and self-report symptom scales and with *DSM-IV* diagnoses as determined by clinical interviews (Achenbach & Rescorla, 2001). Two items from the depression scale assess suicide risk and were thus removed from the depression scale. The CBCL SCT scale is a commonly-used measure of SCT in children and adolescents (Bauermeister et al., 2012; Garner et al., 2014), and the corresponding items from the *Teacher's Report Form* (TRF) are strongly correlated with the longer Penny et al. (2009) teacher-report measure of SCT in school-aged children (*r*=0.78) (unpublished data from (Becker et al., 2015). In a separate sample of children receiving care at the same inpatient facility as the one from which the current sample was recruited, three of the four CBCL SCT items loaded on a factor statistically distinct from ADHD, depression, anxiety, and ODD symptoms (Becker et al., 2014). Thus, these three items ("*confused or seems to be in a fog*", "*daydreams or gets lost in his/her thoughts*", "*stares blankly*") were used to assess SCT in the present study. Mean scale scores (as opposed to *T*-scores) were used for the CBCL variables in order to have each of these variables on the same metric (*T*-scores were

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[2]The CBCL *DSM*-based attention-deficit/hyperactivity problems (ADHP) scale was used in this study, which includes three ADHD inattention (ADHD-IN) items (α=.64) and four ADHD hyperactive-impulsive (ADHD-HI) items (α=.69). Primary study results were unchanged when the separate ADHD dimension scales were used as opposed to the combined scale. In particular, the ADHD-IN and ADHD-HI evinced similar bivariate associations with SCT (*r*s = .14 and .16, respectively), parent-rated suicide risk (*r*s = .08 and .13, respectively), and child-rated suicide risk (*r*s = .06 and .02, respectively; all *p*s > .05). Of note, previous studies have found SCT to be strongly associated with ADHD-IN (Becker et al., 2016), although SCT is somewhat less strongly associated with ADHD-IN in psychiatrically hospitalized children (Becker et al., 2014). There is some indication that SCT is associated with lower socioeconomic status (Becker et al., 2016) and less genetically heritable than ADHD symptoms (Moruzzi et al., 2014). We thus tentatively posit that SCT and ADHD-IN may be less strongly associated in high-risk samples such as ours that are characterized by adversities (e.g., poverty, trauma) that may have more clearly contribute to the manifestation of SCT symptoms as opposed to ADHD-IN symptoms. This possibility will of course need to be examined in future research, ideally with more optimal measures of both SCT and ADHD.

unavailable for the depression and SCT scales). In the present study, internal consistencies were .77, .72, .57, .73 and .67 for the ADHD, ODD, anxiety, depression, and SCT scales, respectively.

Child ratings of depressive symptoms—The *Children's Depression Inventory, 2nd Edition: Short Version* (CDI-2:SV) is a child self-report measure of depressive symptoms for use in children aged 7-17 years (Kovacs, 2010). The short version contains 12 items, none of which assess suicidal ideation. For each item, participants are asked to select one of three statements that best described how they had been feeling in the past 2 weeks. Each item is scored 0, 1, or 2, with higher scores reflecting more severe depression. The CDI-2:SV has excellent psychometric properties and yields a total score that is comparable to the one generated by the full-length version (Kovacs, 2010). In the present study, α=.69.

Suicide risk—Both parents and children completed items assessing suicide risk. The *Risk of Suicide Questionnaire* (RSQ) was designed to evaluate hospitalized children and adolescents for suicide risk (Horowitz et al., 2001). The RSQ was developed as a brief screening tool, and the initial validation study found that four items from the RSQ had optimal sensitivity and specificity (Horowitz et al., 2001). The use of these four items has been further validated in additional samples of youth and adults (Folse et al., 2006). Specifically, children are asked (1) Are you here because you hurt yourself?, (2) In the past week, have you been having thoughts about killing yourself?, (3) Have you ever tried to hurt yourself in the past *other than this time*?, and (4) Has something very stressful happened to you in the past few weeks? Children respond "yes" or "no" to each question, and the "yes" responses are summed to indicate a total suicide risk score. In our sample, 34% of children responded "no" to all four items; 33% responded "yes" to one item, 17% responded "yes" to two items, 13% responded "yes" to three items, and 4% responded "yes" to all four suicide risk items.

As in other studies (Herba et al., 2007; Resch et al., 2008), two items from the CBCL were used to assess parent ratings of their child's suicide risk. These items are "*deliberately harms self or attempts suicide*" and "*talks about killing self*". The mean of these two items was calculated and used in the present study, α=.77.

Loneliness—Children completed the *Loneliness Questionnaire* (Asher et al., 1984). Initial examination of the 24-item loneliness questionnaire with children aged 8 years and older demonstrated adequate internal consistency and associations with sociometric status (Asher et al., 1984). A shortened 9-item version (Ebesutani et al., 2012) was used in this study. Each item is rated on a five-point scale, with higher scores indicating more loneliness. In the present study, α=.89.

Parent anxiety and depressive symptoms—Parents' own anxiety and depression symptoms were assessed with the *Hopkins Symptom Checklist-25* (HSCL-25) (Derogatis et al., 1974). The HSCL-25, derived from the 90-item *Symptom Checklist* (SCL-90), is a 25-item measure of anxiety and depressive symptoms experienced in the past seven days. Participants indicate on a four-point scale ranging from 0 (*not at all*) to 3 (*extremely*) their level of distress for each item. A total score is calculated by summing the 25 items. The

HSCL-25 is a widely-used measure that has been found to be internally reliable and demonstrates good test-retest reliability (Derogatis et al., 1974). In the present study, α=.91 for the total HSCL-25 score.

Procedures

The hospital IRB approved all procedures. During the child's standard admission process, parents were asked to provide consent for their child's clinical data to be included in an ongoing research database. Parents were informed that their child's clinical care would not be contingent upon nor be affected by participation, and no incentive for participation was offered. Once written consent was obtained, parents completed a standard battery of measures that included the study measures. Staff members were available to answer any questions. After providing verbal assent, children completed the self-report measures within 48 hours of their admission to the unit.

Statistical Analyses

First, zero-order correlation analyses were conducted to examine the intercorrelations among the study variables. In addition to examining the correlations between SCT, depression, loneliness, and suicide risk, associations of ADHD, ODD, and anxiety symptoms with suicide risk were evaluated. If ADHD, ODD, and anxiety were significantly correlated with either of the suicide risk variables, it was retained for inclusion in the regression analyses. Second, hierarchical regression analyses were conducted in order to examine whether SCT was associated with parent- and child-rated suicide risk above and beyond children's depression (as rated by the child and the parent) and loneliness. Age, sex, race (dichotomized as non-White=0 and White=1), and parent anxiety/depression symptoms were entered as covariates in the regression models. Specifically, demographic characteristics, parent anxiety/depression, child depression, loneliness, and any other significantly correlated psychopathology dimensions were entered on Step 1, followed by SCT symptoms on Step 2. All participants had complete data.

Results

Correlation Analyses

For all study variables, the absolute values of skewness and kurtosis were below 1.5. Variable means, standard deviations, and intercorrelations are displayed in Table 1. Neither age nor ADHD symptoms were significantly correlated with either parent- or child-rated suicide risk. Being White was significantly associated with child-rated suicide risk (r=.34, p<.001) and being female was significantly associated with parent-rated suicide risk (r=.21, p=.045). Child- and parent-rated suicide risk were significantly correlated (r=.45, p<.001). Both parent-rated depression and SCT symptoms were significantly correlated with both child-rated suicide risk (rs=.21 and .31, ps=.04 and .002, respectively) and parent-rated suicide risk (rs=.24 and .31, ps=.02 and .002, respectively). Child-rated depressive symptoms and loneliness were also significantly correlated with child-rated suicide risk (rs=.40 and .29, ps=.001 and .005, respectively). Finally, anxiety symptoms were significantly correlated with child-rated suicide risk (r=.26, p=.01) and ODD symptoms were significantly correlated with parent-rated suicide risk (r=.24, p=.02).

SCT in Relation to Suicide Risk

Hierarchical regression analyses were conducted to examine whether SCT symptoms remained associated with suicide risk after controlling for demographic characteristics, parents' own anxiety/depression, child depressive symptoms (as rated by both the parent and child), anxiety symptoms, ODD symptoms, and loneliness. All VIF values were below 1.9 (values >10 are typically considered problematic) and all tolerance values were above .50 (values <.10 are typically considered problematic) (Cohen et al., 2003), indicating that the regression models did not suffer from problems with multicollinearity.

As shown in Table 2 (top panel), when the other variables were entered simultaneously in Step 1, being White remained significantly associated with child-rated suicide risk (β=.29, p=.003), as did child-rated depressive symptoms (β=.37, p<.001). Loneliness, parent-rated depressive symptoms, and anxiety symptoms were no longer associated with suicide risk when entered with the other variables in Step 1 (ps>.05). When SCT was added to the model at Step 2, it accounted for additional variance and remained significantly positively associated with child-rated suicide risk (β=.22, p=.03).

For the model examining parent-rated suicide risk (Table 2, bottom panel), sex and parent-rated depressive symptoms were no longer significantly associated with suicide risk when entered with the other variables in Step 1 (ps>.05); only ODD symptoms remained significantly associated with suicide risk in Step 1 (β=.23, p=.04). As with the model for child-rated suicide risk, SCT accounted for additional variance and remained significantly positively associated with parent-rated suicide risk (β=.27, p=.01). In sum and as hypothesized, over and above demographics and other psychopathologies, including both child- and parent-rated depressive symptoms, higher levels of SCT symptoms were related to increased suicide risk, with results consistent across both parent and child measures of children's suicide risk.

Discussion

Suicidal ideation and behaviors in children and adolescents have been identified as an important public health issue (World Health Organization, 2014). Nonetheless, few studies have examined correlates of suicide risk in school-aged children (Tishler et al., 2007) even though suicidal ideation in childhood is prospectively linked to suicidal ideation and attempts in adulthood (Herba et al., 2007). In addition, a growing body of research has recently linked SCT symptoms in children to a range of negative outcomes that are themselves associated with suicidality, including depressive symptomatology, emotion dysregulation, social withdrawal, peer impairment, loneliness, and lowered self-esteem (Becker, 2014; Becker et al., 2015; Jacobson et al., 2012; Lee et al., 2015, in press; Marshall et al., 2014; McBurnett et al., 2014; Willcutt et al., 2014). However, no study to date has examined whether SCT is associated with suicide risk. As such, the current study offers an important contribution to the literature on suicide risk in children, as well as to the burgeoning literature on SCT specifically.

Findings from this study provide preliminary support for an association between SCT symptoms and suicide risk in children. As hypothesized, SCT symptoms were not only

correlated with suicide risk but remained associated with suicide risk after controlling for a host of other variables, including demographic characteristics (i.e., age, sex, race), loneliness, parents' own mental health symptoms, and other domains of child psychopathology, including anxiety, oppositional behaviors, and, most importantly, both parent- and child-rated depressive symptoms. Notably, after controlling for these variables, SCT remained significantly associated with both parent- and child-rated suicide risk, which bolsters confidence in the findings and reduces the likelihood that results are attributable to shared method variance. That is, parent-rated SCT symptoms remained associated with children's self-rated suicide risk ratings above and beyond demographics, parental psychopathology, and children's own ratings of their loneliness and depressive symptoms. Likewise, SCT symptoms were more strongly associated with parent-rated suicide risk than were other psychopathology dimensions, including depression. Considered together, findings from this study provide important support for SCT symptoms as a correlate of suicide risk in children.

As descried above, the interpersonal theory of suicide provides some clues as to why SCT symptoms might be associated with suicide risk. Briefly, SCT symptoms are associated with lowered self-esteem, social withdrawal, and loneliness which are themselves indicators of the interpersonal theory of suicide constructs of thwarted belongingness and perceived burdensomeness (Van Orden et al., 2010). Further, several studies with adults demonstrate that daydreaming about suicide is associated with increased suicidality (Chan et al., 2009; Crane et al., 2012; Hales et al., 2011; Holmes et al., 2007; Miranda & Nolen-Hoeksema, 2007; Selby et al., 2007), perhaps contributing to a greater acquired capability for suicide (Van Orden et al., 2010). These theoretical considerations provide the foundation for the possibility of SCT being associated with suicide risk. Supporting this possibility, our findings point to the importance of conducting additional research investigating the association between SCT and suicide. In particular, it will be important for future studies to include direct measures of the interpersonal theory of suicide constructs, as well as other indicators of these constructs that have yet to be examined in relation to SCT. For example, it is unknown if SCT is associated with abuse/maltreatment and family conflict (other indicators of thwarted belongingness) or shame and beliefs that oneself is a liability to others (other indicators of perceived burdensomeness). In addition, impulsivity is one indicator of acquired capability for suicide (Van Orden et al., 2010), and SCT is unassociated or even *negatively* associated with impulsivity when accounting for the overlap between SCT and ADHD inattention (Bernad et al., 2015; Lee et al., 2014, in press). Thus, although some aspects of SCT may increase risk for suicide, other aspects of SCT may actually reduce risk for engaging in suicidal behaviors or attempts. This is an especially important distinction for future research since predictors of suicidal ideation or desire may differ from predictors of suicidal intent or attempts (Joiner et al., 1997). For instance, depression is associated with increased risk for suicidal ideation, whereas anxiety/agitation and impulse-control disorders contribute to the progression from ideation to suicide plans or attempts (Nock et al., 2010). Future research would benefit from using more comprehensive measures of self-harm behaviors, including non-suicidal self-injury (NSSI) and multiple indices of suicide which include passive suicidal ideation, suicidal intent, and suicide behaviors/attempts.

Another key direction for future research is to examine the daydreaming content of individuals with elevated SCT. In addition to the possibility of violent or death-related daydreams, it is possible that the "getting lost in one's thoughts" aspect of SCT is linked to rumination, and rumination (and brooding in particular) is associated with increased suicidal ideation (Chan et al., 2009; Miranda & Nolen-Hoeksema, 2007). These possibilities should be viewed tentatively since we did not directly measure rumination, violent daydreaming, or suicidal imagery in this study. As noted by McBurnett (2008), it remains unknown whether children with SCT symptoms who appear to be daydreaming are actively processing off-task information. Mind-wandering and thought sampling procedures (Mason et al., 2007) would be highly informative in advancing our understanding of the daydreaming content associated with SCT and the possible negative or positive aspects of such daydreaming.

It should be noted that we do not intend to suggest that all, or even most, individuals displaying elevated SCT symptomatology are daydreaming about violence or are suicidal. Rather, we posit that a subset of vulnerable individuals who are already at risk for suicidal ideation via depressive symptoms, social isolation, and/or emotion dysregulation may be at especially heightened risk when they also display elevated SCT symptoms. This possibility is consistent with the finding by Selby et al. (2007) that depressive symptoms and violent daydreaming *interacted* to predict higher rates of suicidality among young adults, and it will be important for future research to test this possibility with SCT specifically.

Limitations and Future Directions

The psychiatric inpatient unit sampling, multi-informant design, and inclusion of important covariates are strengths of the present study. Nevertheless, the study findings should be considered in light of several limitations that in turn point to other important directions for future research. First, we relied on screener parent- and child-report measures of suicide risk, and while such measures are optimal for clinical screening purposes they do not capture the full range of self-harm ideation or behavior. Second, our use of the CBCL measure of SCT is a limitation, particularly as newly-developed parent-, teacher-, and child-report measures of SCT are now available. However, it is worth noting that the CBCL SCT scale is frequently used (Bauermeister et al., 2012; Garner et al., 2014); is statistically distinct from ADHD, depression, and other psychiatric symptoms in hospitalized children (Becker et al., 2014); and generally evinces similar associations as longer measures of SCT with external correlates (Becker et al., 2016). Further, the SCT items of the CBCL do capture certain cognitive aspects of SCT (i.e., daydreaming, lost in one's thoughts, staring, mental confusion) that were of particular relevance for the present study but do not capture other aspects of SCT such as apathy, slowed behavior, or drowsiness. Future studies that use newly validated measures to assess the possibly multidimensional aspect of SCT will be important, especially if it is shown that the daydreaming/lost in thoughts aspect of SCT is uniquely associated with suicidal ideation or behavior. Likewise, our measure of ADHD symptoms was limited and did not include all *DSM* symptoms. This may have contributed to the lack of association between ADHD and suicide risk in this study, although previous research is somewhat mixed in terms of whether ADHD is uniquely associated with suicide risk/behaviors or whether the association is largely accounted for by psychiatric comorbidities (Agosti et al., 2011; Hinshaw et al., 2012; Impey & Heun, 2012) which are

certainly the norm rather than the exception in psychiatrically hospitalized children. Additional research is needed to clarify the association between ADHD and suicidality, particularly in children. Third, internal consistencies were lower than optimal for some of our measures, though the constructs assessed in this study do appear to have performed similarly to other samples of psychiatrically hospitalized children (Becker et al., 2014; Fite et al., 2011). Fourth, while our sample size was adequate for an initial test of our hypothesis, it was nevertheless too small to consider possible interaction effects or to evaluate possible mediators of the association between SCT symptoms and suicide risk. Finally, findings cannot be assumed to generalize to adolescents, adults, or non-hospitalized children and the cross-sectional design precludes drawing causal inferences. Certainly, psychiatrically hospitalized children are a particularly vulnerable subset of the population, and it would be informative to know whether SCT is concurrently and prospectively associated with suicide risk in less clinically severe samples.

Conclusions

There is growing interest in understanding the nature of SCT and its external correlates (Becker & Barkley, in press), particularly as it has been suggested that SCT may be its own psychiatric disorder (Barkley, 2014) or a construct of transdiagnostic import (Becker et al., 2016). This is the first study to examine SCT symptoms in relation to suicidality, and findings demonstrate that SCT is associated with suicide risk in psychiatrically hospitalized children, above and beyond loneliness, depression, and demographic characteristics. Of note, SCT was associated with suicide risk as assessed by parents as well as children themselves. Additional studies are needed to replicate and extend these findings, with a particular need for studies that examine the cognitive processes and daydreaming content of individuals displaying elevated SCT symptoms.

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Abbreviations

SCT   sluggish cognitive tempo

Key Points

- Suicide is recognized as a worldwide public health concern.

- Recent research demonstrates that sluggish cognitive tempo (SCT) is associated with increased loneliness, social withdrawal, and lowered self-esteem.

- No study to date has examined SCT in relation to suicide risk.

- Using a sample of psychiatrically hospitalized children, the current study demonstrated a significant association between SCT and both parent- and child-rated suicide risk, above and beyond demographics and other psychiatric symptoms.

- Findings from this multi-informant study provide strong preliminary support for an association between SCT symptoms and suicide risk in children.

Table 1

Means, Standard Deviations, and Intercorrelations of Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Sex	--	-.003	.17	.20	.12	.02	.15	.28**	.05	-.09	-.02	.21*	-.09
2. Race		--	-.01	.12	.05	-.03	.28**	.17	.08	.17	.004	.10	.34***
3. Age			--	-.21*	.05	.02	.01	.15	.09	-.01	-.11	.19	.03
4. Parent Anx/Dep Symptoms				--	-.02	-.08	.29**	.35***	.08	.07	-.02	.01	-.03
5. CBCL ADHD Symptoms					--	.59***	.39***	.32**	.17	-.02	-.05	.12	.04
6. CBCL ODD Symptoms						--	.24*	.14	.12	-.09	-.14	.24*	.03
7. CBCL Anxiety Symptoms							--	.56***	.39***	.11	.07	.18	.26*
8. CBCL Depression Symptoms								--	.38***	.15	.05	.24*	.21*
9. CBCL SCT Symptoms									--	-.01	.09	.31**	.31**
10. Child Loneliness										--	.39***	.16	.29**
11. CDI Depression Symptoms											--	.04	.40***
12. CBCL Suicide Risk												--	.45***
13. RSQ Suicide Risk													--
Mean	--	--	10.01	20.82	1.46	1.56	0.77	0.65	0.78	2.32	5.83	0.65	1.21
SD	--	--	1.50	14.89	0.45	0.48	0.43	0.39	0.59	1.11	3.80	0.72	1.17

Note. N=95. Age is calculated in years. For sex, boys=0, girls=1. For race, non-White=0, White=1.

*
p<.05.

**
p<.01.

***
p<.001.

Table 2

Regression Models Examining Sluggish Cognitive Tempo in Relation to Suicide Risk

	Step 1 Model Summary				Step 2 Model Summary			
	B	SE	β	t	B	SE	β	t
DV: RSQ Suicide Risk	$F_{(9,85)}=4.74$***, $R^2=.33$				$F_{(1,84)}=5.03$*, $R^2=.37$, $R^2=.04$			
Age	.04	.08	.05	0.53	.03	.07	.04	0.39
Sex	-.31	.25	-.12	-1.22	-.26	.25	-.10	-1.06
Race	.69	.23	.29	3.05**	.70	.22	.29	3.15**
Parent Anx/Dep	-.01	.01	-.10	-0.97	-.01	.01	-.09	-0.90
Loneliness	.07	.11	.06	0.65	.10	.10	.09	0.93
CDI Depression	.11	.03	.37	3.73***	.11	.03	.34	3.54**
CBCL Depression	.36	.35	.12	1.03	.18	.35	.06	0.50
CBCL Anxiety	.32	.31	.12	1.01	.16	.31	.06	0.52
CBCL Oppositional	.12	.23	.05	0.52	.11	.23	.05	0.49
CBCL SCT	--	--	--	--	.43	.19	.22	2.24*
DV: CBCL Suicide Risk	$F_{(9,85)}=2.01$*, $R^2=.18$				$F_{(1,84)}=6.35$*, $R^2=.23$, $R^2=.06$			
Age	.06	.05	.13	1.26	.06	.05	.12	1.12
Sex	.28	.17	.17	1.59	.31	.17	.19	1.84
Race	.10	.16	.06	0.61	.10	.15	.07	0.66
Parent Anx/Dep	-.002	.01	-.05	-0.39	-.002	.01	-.03	-0.29
Loneliness	.11	.07	.16	1.48	.13	.07	.20	1.82
CDI Depression	.002	.02	.01	0.11	-.003	.02	-.02	-0.17
CBCL Depression	.21	.24	.11	0.88	.07	.24	.04	0.30
CBCL Anxiety	.02	.22	.01	0.10	-.10	.22	-.06	-0.45
CBCL Oppositional	.34	.16	.23	2.14*	.33	.16	.22	2.15*
CBCL SCT	--	--	--	--	.33	.13	.27	2.52*

Note. N=95. For sex, boys=0, girls=1. For race, non-White=0, White=1. SCT = sluggish cognitive tempo.

*
 $p<.05$.

**
  $p<.01$.

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***
$p<.001$.