

Indicators of Suicidal Outcomes Among 6 to 12-Year-Old Treatment Seeking Youth

By

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Abstract

Suicide among elementary school-age youth is vastly understudied, partially because of a misconception about children's capacity to understand the gravity of death, and partially because of the relatively low base rates of this behavior. Nevertheless, this topic remains a major health concern. This study seeks to investigate both a mediation model and a moderation model to elucidate the nature of risk factors for suicide by examining the effect emotion dysregulation (in the domains of anger, sadness, and worry) has on the relation between ADHD symptoms (i.e. hyperactivity/impulsivity and inattention) and suicidal outcomes (e.g. suicide behavior and risk for suicide). Participants include 232 children ranging from ages 6 to 12 and their primary caregiver who sought services and consented to research at a small Midwest outpatient training clinic. Anger dysregulation was positively associated with risk for suicide. Further, when accounting for sex, age, depressive symptoms, and emotion dysregulation in all three domains, high levels of hyperactivity/impulsivity were associated with high levels of suicide *behavior*. In contrast, high levels of inattention were associated with low levels of suicide *behavior*. Finally, two interaction effects were evident for suicide *risk*. An interaction effect between hyperactivity and sadness dysregulation was found for suicide risk, and an interaction effect between hyperactivity and worry dysregulation was found for suicide risk. At low levels of sadness and worry dysregulation, hyperactivity was positively associated with risk for suicide. However, at high levels of sadness and worry dysregulation, hyperactivity was not related to risk for suicide. Findings support moderation over mediation. Emotion dysregulation and hyperactivity are discussed as potentially important intervention targets for youth suicide prevention.

Keywords: Suicidal Ideation/Behavior, Attention-Deficit Hyperactivity Symptoms, Emotion Dysregulation

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Introduction

According to a recent study, sixty-six percent of medical examiners indicated that they would never classify a child's death as a suicide below a certain age cutoff (ranging from 2-12 years old, $M=8$), regardless of circumstances (Crepeau-Hobson, 2010). Some of these medical examiners state that children do not have the capacity to understand the gravity of death and that a death in this age group would be more accurately deemed accidental. However, some research has shown that children ages 5 to 9 can exhibit clear and intended suicidal behavior (Cohen-Sandler, Berman, & King, 1982; Greene, 1994; Sheftall et al., 2016). Additionally, there may be increased stigma around parents reporting a child's death as a suicide instead of reporting it as an accidental death. The misbelief that children are incapable of suicide and increased stigma surrounding having a young child die by suicide can lead to classification errors. Some research suggests that the prevalence of suicidal ideation and behavior in children is exceptionally underestimated due to these potential classification errors (Crepeau-Hobson, 2010; Greene, 1994; Wise & Spengler, 1997). Given this difficulty in accurately measuring suicide rates, the reported suicide rates in children under 12 vary significantly. One study reported that the average suicide rate for children 5-11 was 1.09 per 1 million in 2012 (Bridge et al., 2015). According to the Centers for Disease Control and Prevention statistics for 2014, the suicide rate in the United States for children ages five to eleven is 0.17 per 100,000 youth (cited in Sheftall et al., 2016), making suicide the second leading cause of death in the United States and surpassing cancer for children ages 10 to 14 (Center for Disease Control and Prevention, 2016). A recent study found rates as high as 2.87 per 100,000 for children 12 or younger in Taiwan (Harnod, Lin, & Kao, 2018). In addition to difficulties in accurately understanding suicide rates, it is also difficult to

find consistent rates of suicidal ideation. In one study on preschool children presenting to a psychiatric day school, 13% of children ages 3-7 were reported to have suicidal thoughts or behaviors (Martin et al., 2016). In a study of 9- and 10-year-old urban youth (90% African American/Caribbean), 14.5% of youth reported suicidal ideation (O’Leary et al., 2006).

Although rare, suicide, suicidal ideation, and suicide attempts in elementary school-age children do happen.

Given the consequences of misunderstanding youth suicide rates, it is imperative to examine the biopsychosocial processes that underlie suicidality in young children. However, these processes are vastly understudied and not well understood (Soole, Kõlves, & De Leo, 2015). Current research has linked suicidal ideation and attempts with psychopathology including Attention Deficit/Hyperactivity Disorder (ADHD; Chronis-Tuscano et al., 2010; Sheftall et al., 2016), Major Depressive Disorder (Chachamovich, Stefanello, Botega, & Turecki, 2009), Generalized Anxiety Disorder (Brent, Baugher, Bridge, Chen, & Chiappetta, 1999), Oppositional Defiant Disorder (Mayes, Calhoun, Baweja, & Mahr, 2015) and Conduct Disorder (Brent et al., 1999; Shaffer & Pfeffer, 2003). However, only roughly 50% of children ages 14 and younger who die by suicide have a psychiatric disorder (Dervic, Brent, & Oquendo, 2008), leaving 50% of children who die by suicide as having sub-clinical psychopathology. Not much is known about suicidal ideation or behaviors in a young outpatient sample. Accordingly, the current study seeks to address the dearth of research on outpatient elementary school-age children’s suicidal outcomes by examining the associations among ADHD symptoms (e.g. hyperactivity/impulsivity and inattention), emotion dysregulation (in the domains of anger, sadness, and worry) and suicidal outcomes (e.g. risk for suicide, and suicide behaviors) among 6 to 12-year-old youth receiving psychological services.

Theories of Suicide

Although strong evidence supports examining relations between DSM diagnoses and suicidal outcomes (Bertolote, Fleischmann, De Leo, & Wasserman, 2004), leading theories of suicidality, such as Joiner's Interpersonal Theory of Suicide (IPT; Joiner, 2005) and Bridge et al.'s Developmental Transactional Model of Suicide (DTM; Brent & Mann, 2003; Bridge, Goldstein, & Brent, 2006), focus additionally on core constructs that are linked with suicide. Joiner's IPT (Joiner, 2005) was developed to examine components of suicide that were more specific than depression and hopelessness, which were seen as the leading motivations for suicide at the time. According to IPT, suicide is a product of two components: the desire to kill oneself and the capability to commit suicide. Joiner further breaks down desire to kill oneself into two factors: thwarted belongingness and the perception of burdensomeness (Horton et al., 2016; Joiner, 2005; Van Orden et al., 2010). Each of these domains have dimensions and influencers; for example, impulsivity and emotion regulation are associated with acquired capability (Anestis, Bagge, Tull, & Joiner, 2011; Heffer & Willoughby, 2018).

Another model of suicide, DTM, focuses on not only psychiatric diagnoses, but also risk across other domains. DTM proposes that suicidal behavior results from the interaction of two primary vulnerabilities: a major psychiatric disorder and the tendency for impulsive aggression (Bridge et al., 2006). Research shows that this tendency for impulsive aggression is correlated with impaired executive functioning such as with impaired inhibitory control (Dawes, Mathias, Richard, Hill-Kapturczak, & Dougherty, 2008). As such, both of these models of suicidal ideation have been theorized to include impulsivity (Gvion & Apter, 2011), emotion dysregulation (Sullivan, Helms, Kliewer, & Goodman, 2010), and depressed mood (Freuchen, Kjelsberg, Lundervold, & Grøholt, 2012). Although it is important to target proximal risk factors

for suicidal desire such as impulsive aggression, thwarted belongingness, and perceived burdensomeness, individuals who are at proximal risk for suicide may not present for therapy (Witte, 2010). However, distal risk factors for suicidal behaviors such as symptoms of ADHD and emotion dysregulation may be important therapeutic targets in order to prevent possible future suicidal behavior (Witte, 2010). Accordingly, the current study focuses on these risk factors for suicidal outcomes among school age youth.

ADHD Symptoms and Suicide

The diagnosis of ADHD has been consistently linked with completed suicide, suicide attempts, and suicidal ideation in adolescents and adults (for a review, see Balazs & Keresztesy, 2017), and research is beginning to show this link in children (for a review, see Balazs & Keresztesy, 2017; Impey & Heun, 2012). Children who attempt or complete suicide are 1.5-2 times as likely as children who don't attempt suicide to also have an ADHD diagnosis, and those who have suicidal ideation are twice as likely to have an ADHD diagnosis as children without suicidal ideation (Impey & Heun, 2012). A prospective study found that children ages 4 to 6 diagnosed with ADHD are more than 5.5 times as likely as children not diagnosed with ADHD to ever engage in suicidal ideation in the following 6 to 14 years (Chronis-Tuscano et al., 2010). Further, data suggests that a diagnosis of ADHD may be more of a factor for children than for adolescents or adults (Sheftall et al., 2016). One review found that on average, 25.6% of suicidal children under the age of 12 were diagnosed with ADHD, while only 5.7% of suicidal adolescents (13 and older) were diagnosed with ADHD (Balazs & Keresztesy, 2017).

ADHD consists of two primary components: hyperactivity/impulsivity and inattention. Data on the specific link between ADHD symptoms and suicidal outcomes has been mixed. Some research suggests that hyperactive/impulsive symptoms were associated with suicidal

behaviors, but not inattentive symptoms among youth ages 4 to 6 (Chronis-Tuscano et al., 2010). Other research has shown that inattentive symptoms of ADHD in a predominantly female sample are associated with increased odds of suicidal behavior among youth ages 12 to 18 (Manor et al., 2010). Further, some studies have reported that children with symptoms of both hyperactivity/impulsivity and inattention are more likely to report suicidal behavior than children with only inattentive symptoms (Hinshaw et al., 2012; Mayes, Calhoun, Baweja, Feldman, et al., 2015; Mayes, Calhoun, Baweja, & Mahr, 2015). Given the mixed literature, the current study evaluates the associations between both hyperactive/impulsive symptoms and inattentive symptoms with suicidal outcomes.

Emotion Dysregulation

There is variation in the field in how emotion regulation is conceptualized; for example, Compas et al. suggest that emotion regulation consists of 5 domains: total coping, emotion regulation, emotion dysregulation, adaptive coping, and maladaptive coping (2017). Generally, however, current research suggests that emotion regulation is dichotomized into 2 main constructs: emotion regulation and emotion dysregulation (Rajappa, Gallagher, & Miranda, 2012; Zeman, Shipman, & Penza-Clyve, 2001). Emotion regulation refers to the positive aspects of emotion regulation – the ability to monitor, evaluate, and modify emotional reactions in order to reach one’s goal (Thompson, 1994). Productive emotion regulation skills allow one to react to negative emotional situations in a constructive manner rather than becoming overwhelmed and incapable of pursuing one’s goals. Emotion dysregulation therefore refers to the negative aspects of emotion regulation – the inability to regulate strong negative emotions (Blossom, Fite, Frazer, Cooley, & Evans, 2016; Suveg & Zeman, 2004). Current suicide research in these domains tend

to focus on emotion dysregulation or on lack of emotion regulation (Rajappa et al., 2012). As such, this study uses emotion dysregulation as a construct of interest.

Some research has begun to look at regulation and dysregulation of specific emotions instead of studying global negative emotional states; Suveg & Zeman suggest investigating the emotions of anger, sadness, and worry as these emotions tend to be at the core of emotion regulation research (2004). In developing the Children's Emotion Management Scales, Zeman and colleagues found that in children ages 9 to 12 (95.6% Caucasian) emotion dysregulation in both anger and sadness were correlated with internalizing symptoms (e.g. depressive and anxious symptoms) and externalizing symptoms (e.g. hyperactivity/impulsivity and aggressive behavior; Zeman, Shipman, & Suveg, 2002). Further, in a recent study of at-risk youth ($M_{age} = 9.65$, 77.5% Black), Folk and colleagues found that more dysregulation in each of the three emotion domains (anger, sadness, and worry) at T1 predicted more anxiety at T2, while only worry dysregulation at T1 predicted depression at T2 (Folk, Zeman, Poon, & Dallaire, 2014). This research suggests that all three emotion dysregulation domains are at work to predict outcome variables related to psychopathology; however, a consistent pattern has not been suggested at this time. As such, this study considers dysregulation in anger, sadness, and worry independently.

Emotion Dysregulation and Suicide

Links between emotion dysregulation and suicidal outcomes are consistent with both IPT and DTM theories of suicide. IPT suggests suicidal outcomes are a result of suicidal desire and acquired capability for suicide (Joiner, 2005). Some research suggests a positive relation between emotion dysregulation and the first component of IPT: suicidal desire (Anestis et al., 2011; Heffer & Willoughby, 2018; Pisani et al., 2013). Studies show that in undergraduate students, emotion dysregulation is associated with high levels of suicidal desire (Anestis et al., 2011;

Heffer & Willoughby, 2018) and in high school students, increased risk in making a suicide attempt in the past year (Pisani et al., 2013). Here, it is theorized that when individuals are frequently unable to regulate their negative emotions, they are at greater risk to develop suicidal desire. Other research suggests a mixed relation between emotion dysregulation and the second component of IPT: acquired capability for suicide (Anestis et al., 2011; Bender, Anestis, Anestis, Gordon, & Joiner, 2012; Heffer & Willoughby, 2018). Some studies report that undergraduate students with high levels of emotion dysregulation exhibit lower levels of acquired capability for suicide (Anestis et al., 2011; Heffer & Willoughby, 2018) and another study reports that for undergraduate students higher levels of emotion regulation in conjunction with high levels of sensation seeking were more strongly linked with higher levels of acquired capability for suicide (Bender et al., 2012). Here, it is theorized that when individuals are able to regulate their negative emotions, they may also be able to regulate their tolerance for pain and are therefore able to attempt suicide with a more lethal means (Bender et al., 2012). Another theory with research support is that emotion dysregulation is positively associated with non-suicidal self-injury (NSSI), which is in turn positively associated with acquired capability for suicide (Heffer & Willoughby, 2018). Thus, emotion dysregulation may in fact be both a protective factor and a risk factor for individuals with suicidal ideation (Anestis et al., 2011; Bender et al., 2012; Heffer & Willoughby, 2018; Pisani et al., 2013).

DTM suggests that suicide is a result of the combination of a major psychiatric disorder and the tendency for impulsive aggression (Bridge et al., 2006). Emotion dysregulation has consistently been linked with both of these factors (Cisler, Olatunji, Feldner, & Forsyth, 2010; Compas et al., 2017; Martel, 2009; Miles et al., 2017; Sullivan et al., 2010). Research shows that in children, emotion dysregulation has been linked with anxiety disorders (e.g. Cisler, Olatunji,

Feldner, & Forsyth, 2010), a diagnosis of ADHD (e.g. Martel, 2009), and depressive symptoms (Compas et al., 2017). Poor emotion regulation skills may increase the impact that a psychiatric diagnosis has on a child and can therefore strengthen this pathway from psychiatric diagnosis to suicidal ideation. Additionally, aggression has been linked with emotion dysregulation in terms of dysregulation of the emotions sadness and anger (Miles et al., 2017; Sullivan et al., 2010). In one study, youth with poor sadness regulation were more likely to engage in relational aggression than those with higher sadness regulation. Further, the study found that difficulties with anger regulation were associated with physical aggression (Sullivan et al., 2010). Specifically, in adult Veterans with PTSD, emotion dysregulation was found to account for the relation between PTSD and impulsive aggression (Miles et al., 2017). Impulsive aggression may lead an individual to react too quickly and too strongly to a situation, which can often result in negative outcomes. These impulsive decisions and subsequent negative outcomes may increase an individual's suicidal ideation and likelihood of impulsively attempting suicide (Van Orden et al., 2010). Accordingly, this study seeks to evaluate the influence of emotion dysregulation on suicidal outcomes among treatment seeking youth.

ADHD Symptoms, Emotion Dysregulation, and Suicide

Extant research suggests that although emotion dysregulation and ADHD symptoms are each individually related to suicidal outcomes, it is possible that emotion dysregulation and ADHD symptoms work together to increase risk for suicidal outcomes. In one study, emotion regulation fully mediated the relation between an ADHD diagnosis and depressive symptoms at a single time point in children ages 10 to 14 (Seymour et al., 2012). A further study by Seymour and colleagues found the same mediation in a longitudinal design with a diverse community sample of children ages 9 to 12 (Seymour, Chronis-Tuscano, Iwamoto, Kurdziel, & MacPherson,

2014). Given the strong link in the literature between depression and suicidal ideation (Carballo et al., 2019; Freuchen et al., 2012; Pfeffer, 1981), these studies support further investigation of the mediation of emotion regulation on ADHD symptoms and suicidal outcomes among youth. In contrast, moderating effects may best describe the association. For example, in college-age students, Van Eck and colleagues (Van Eck et al., 2015) found that emotion regulation deficits moderated the effect of ADHD on suicidal ideation such that emotion dysregulation amplified the effects of ADHD on suicidal ideation. Taken together, these results suggest that there are varying associations among ADHD symptoms, emotion regulation, and suicidal outcomes which warrants further research. Accordingly, the current study evaluates emotion dysregulation as a mediator and moderator of the associations between inattention and hyperactivity/impulsivity symptoms of ADHD and suicidal outcomes.

Current Study

This study investigates the associations that symptoms of ADHD (i.e. hyperactivity/impulsivity and inattention), and emotion dysregulation (in the domains of anger, sadness, and worry) have with suicidal outcomes (i.e. suicide behavior and risk for suicide) in a sample of treatment seeking school-age youth. The primary symptoms of ADHD – hyperactivity/impulsivity and inattention – have been shown to be associated with suicidal outcomes in youth as young as 4-years-old (Chronis-Tuscano et al., 2010). Emotion dysregulation has been shown to be associated with various psychopathological outcomes in youth, including outcomes that are common correlates of suicidal outcomes (e.g. internalizing and externalizing symptoms, depression and anxiety; Folk et al., 2014; Zeman et al., 2002). Extant theories on suicide in both children and adults, such as the DTM model of suicide and the IPT model of suicide, suggest that these constructs may be precursors to suicidal behavior (Brent

& Mann, 2003; Joiner, 2005). Current theory and research provide support for both a mediation model (Seymour et al., 2012) and a moderation model (Van Eck et al., 2015) among ADHD symptoms, emotion dysregulation, and suicidal outcomes, and as such, this study investigates both of these models.

Depression has long been shown to be a primary predictor of suicidal ideation in youth and adults (Carballo et al., 2019; Freuchen et al., 2012; Pfeffer, 1981) and is central to some leading theories of suicide (e.g. DTM; Bridge et al., 2006). As such, much current research investigates the associations over-and-above the influence of depressive symptoms (e.g. O’Neil Rodriguez & Kendall, 2014). Thus, this study includes depressive symptoms as a control variable in all models.

Measures for internalizing symptoms (i.e. depressive symptoms, emotion regulation, and suicidal outcomes) are child self-report measures, while measures used to target externalizing symptoms (i.e. ADHD symptoms) are caregiver reports. For children in the target age group, research has shown that while caregivers are the most accurate reporters of externalizing behaviors, children are more accurate when reporting their own internalizing symptoms (De Los Reyes & Kazdin, 2005).

First, we hypothesized that emotion dysregulation in the domains of sadness, anger, and worry, hyperactivity/impulsivity, and inattention would each be positively associated with suicidal outcomes (i.e. suicidal behavior and suicide risk). Additionally, we hypothesized that the positive association between hyperactivity/impulsivity and suicidal outcomes would be stronger than the positive association between inattention and suicidal outcomes.

Second, we tested two competing models to evaluate which model is a better representation of the data. Given the research indicating support for both models, no a priori

hypothesis regarding which model would be a better fit to the data was posited. Instead, we hypothesized that both the mediation model and the moderation model would have empirical support. For the mediation model, we hypothesized that emotion dysregulation (in the domains of sadness, anger, and worry) would mediate the relation between each ADHD symptom (i.e. hyperactivity/impulsivity and inattention) and suicidal outcomes (i.e. suicidal behavior and suicide risk), such that emotion dysregulation would account for the link between ADHD symptoms and suicidal outcomes. For the moderation model, we hypothesized that ADHD symptoms (i.e. hyperactivity/impulsivity and inattention) would be most strongly linked with suicidal outcomes (i.e. suicidal behavior and suicide risk) when emotion dysregulation (in the domains of sadness, anger, and worry) was also high.

Methods

Participants

Participants were 232 youth (64.7% male) and their primary caregiver (81% biological mother, 7.3% adopted mother, 7.3% biological father, 4.4% other relative) who sought services at a psychiatric outpatient training clinic between the years 2015 and 2019 in a small Midwest city and provided consent for their data to be used for research purposes. In order to receive services at the training clinic, youth were screened out for active suicidal ideation. Youth who were considered to be at high risk for suicide were referred to more intensive services and would not be seen in this clinic. Therefore, this sample is an at-risk sample, rather than a high-risk sample. Out of those with available race and ethnicity data (96.1% of participants reported race and ethnicity), 83.0% of participants were Caucasian, 4.0% were Black, 1.3% were Asian, 0.9% were Native American, 1.3% selected other race, 7.6% selected multiple races, and 4.5% were Hispanic/Latinx. Ages of youth range from 6 to 12 years ($M_{\text{age}} = 8.63$, $SD = 1.60$). Average

family annual income reported was \$64,482. Primary presenting concern per caregiver report was 43% externalizing problems (inattention, hyperactivity, oppositional defiant behaviors, and conduct problems), 23% internalizing problems (anxiety, depression, and other mood disorders), and 34% other problems (enuresis/encopresis, learning difficulties, autism spectrum disorder, developmental delay, and intellectual disability).

Measures

Demographic Information

Caregivers reported on the child's age, sex, ethnicity, race, and approximate annual income.

Depressive Symptoms

Depressive symptoms were assessed using the Children's Depression Inventory Self-Report Short Form (2nd edition; CDI-2 Short; Kovacs, 2011). The CDI-2 Short is a 12-item self-report measure, with each item having three choices ranging in severity. Youth were asked to select the option that best described them in the past two weeks. Items were averaged, with higher scores representing higher levels of depressive symptoms. This self-report scale has been previously found to be a good screening tool for depression, correctly differentiating between children with and without major depressive disorder (Cohen's $d = .39 - 2.09$; Bae, 2012). The CDI-2 Short has shown good test-retest stability over a 2 to 4 week period and has been found to have internal consistency of $\alpha = .67$ to $.91$ in similar samples (Abel, Poquiz, Fite, & Doyle, 2020; Allgaier et al., 2012; Bae, 2012; Folk et al., 2014). Cronbach's alpha for the current sample was $\alpha = .80$.

Suicide Risk

Suicide risk was assessed using the 14-item Risk of Suicide Questionnaire (RSQ; Horowitz et al., 2001). Items ask about recent events and risk factors (e.g. “Are you here because you tried to hurt yourself?” and “Do you use alcohol or drugs?”) with possible answers of *Yes* (1) and *No* (0). Total number of items endorsed was computed, with a higher score reflecting higher risk for potential suicide behaviors. The RSQ has been found to have criterion-related validity with chief complaint, primary diagnosis, and suicide diagnosis ($r = .49-.97, p < .01$) and an internal consistency of $\alpha = .63$ in a similar sample (Folse, Eich, Hall, & Ruppman, 2006). Cronbach’s alpha for the current sample was $\alpha = .72$.

Suicide Behaviors

Suicidal behavior was assessed using the 4-item self-report Suicide Behaviors Questionnaire (SBQ; Cotton & Range, 1993). Each item is rated on a different Likert scale: “Have you ever thought about or tried to kill yourself?” (0 = *Never* to 5 = *All the Time*); “How many times have you thought about killing yourself?” (0 = *Never* to 5 = *All the Time*); “Have you ever told someone that you were going to kill yourself?” (0 = *Never* to 2 = *Often*); and “Do you think you might kill yourself someday?” (0 = *Never* to 4 = *Definitely Will*). Items were summed with higher scores indicating more intense or more frequent levels of suicidal behaviors. This self-report scale has been shown to be a reliable and valid measure in children and has good test-retest stability over a 2 to 4 week period ($r = .92$) and internal consistency of $\alpha = .57 - .86$ in similar samples (Abel et al., 2020; Cotton, Peters, & Range, 1995; Cotton & Range, 1993). Cronbach’s alpha for the current sample was $\alpha = .81$.

Emotion Dysregulation

Emotion dysregulation was assessed through the Children’s Emotion Management Scale (CEMS; Zeman, Cassano, Suveg, & Shipman, 2010; Zeman, Shipman, & Penza-Clyve, 2001).

Caregivers completed the Anger, Sadness, and Worry versions of the CEMS (CEMS-A, CEMS-S, and CEMS-W, respectively), providing information about emotional regulation across domains. This study utilized the Dysregulation Subscale from each CEMS version. Each Dysregulation Subscale of the CEMS is on a 3-point Likert scale (1 = *Hardly Ever*, 2 = *Sometimes*, 3 = *Often*) and is comprised of 3 items (e.g. CEMS-A: “My child does things like slam doors when he/she is mad,” CEMS-S: “My child whines/fusses about what’s making him/her sad,” CEMS-W: “My child shows his/her worried feelings.”). For each scale, the 3 items were averaged, with higher scores indicating higher levels of emotional dysregulation. This caregiver-report scale has been previously found to successfully discriminate between a group of children with DSM-IV disorders and control children (Zeman et al., 2010). In studies with similar samples, the CEMS has displayed test-retest stability over 2 weeks ($r = .80$) and internal consistencies of $\alpha = .69 - .77$ (Zeman et al., 2010, 2001). Cronbach’s alphas for the current sample were $\alpha = .53 - .63$.

Hyperactivity/Impulsivity and Inattentive Symptoms

Symptoms of hyperactivity/impulsivity and inattention were assessed through the Conners Parent Short Rating Scale (3rd edition; Conners 3-P(S); Conners, 2008). Out of the 43 items on this caregiver-report measure, this study utilized 11 items to assess for these ADHD-related symptoms. The 11 items are on a 4-point Likert scale (0 = *Not True at All*, 1 = *Just a Little True*, 2 = *Pretty Much True*, 3 = *Very Much True*), with 5 items comprising the Inattention Subscale (e.g., “doesn’t pay attention to details; makes careless mistakes”) and 6 items comprising the Hyperactivity/Impulsivity Subscale (e.g., “fidgets or squirms in seat”). Items for each scale were averaged, with higher scores representing higher levels of symptoms. These subscales have been previously found to have convergent/divergent validity ($r = .42 - .96$ with

related measures), discriminative validity (classification rate = 75.6%), interrater reliability ($r = .52 - .94$), test-retest stability ($r = .71 - .98$), and internal consistency ($\alpha = .77 - .97$) in similar samples (Conners, Pitkanen, & Rzepa, 2011). Cronbach's alpha for the current sample was $\alpha = .93 - .94$.

Procedures

As part of a routine clinical intake assessment, all clients and their primary caregivers completed measures on the aforementioned domains within the first few weeks of the initial appointment. Researchers received approval from the University's Institutional Review Board, and each child's primary caregiver provided consent to have their data included in the clinic's data repository for research purposes. Assent was obtained from all youth and participants were informed that opting to have their data included in the research data repository would have no influence on their clinical care. Primary caregivers completed caregiver-report questionnaires on their own, with the clinician available to answer questions. Depending on reading comprehension skills, youth completed questionnaires either on their own or with the clinician reading items aloud. Caregivers were not involved in youth's completion of questionnaires.

Data Analytic Plan

Prior to conducting analyses, data were prepared in SPSS (IBM Corp, 2017). Note that each variable was standardized prior to models that examined interaction effects in order to reduce multicollinearity concerns and to aid in interpretation of interaction effects (Aiken & West, 1991). The data was inspected to evaluate multivariate collinearity using tolerance values and variance inflation factor (VIF) values. Tolerance values $< .10$ or VIF > 10.0 would suggest that the variable in question may be redundant (Kline, 2016). No variables were found to have

Tolerance values $< .10$ or VIF $< 10.0^1$. Next, data were inspected for univariate and multivariate outliers. Univariate outliers were indicated by a score more than 3 standard deviations from the mean (e.g. $|z| > 3.00$ indicates an outlier; Kline, 2016). Multivariate outliers were detected via use of the Mahalanobis distance (D) statistic. A value of D^2 with a p -value $< .001$ in the χ^2 -distribution would indicate a multivariate outlier (Kline, 2016). Univariate and multivariate outliers indicated participants with very high or very low scores on each of the measures. Here, 10 cases were identified as outliers. Each of these cases scored high on the SBQ, RSQ, or CDI, indicating that these participants had high scores on suicide behavior, suicide ideation, or depressive symptoms. This is likely due to the low base rates of suicidal outcomes in youth; given the goals of the current study, outliers were retained.

Next, missing data and normality were inspected in the data set. Using the Missing Values procedure of SPSS, the data loss pattern was found to be random (Little's MCAR test: $\chi^2 = 173.53$, $df = 155$, $p = .147$; IBM Corp, 2017). Data was evaluated for multivariate normality via evaluating univariate normality of each variable. Univariate normality was evaluated via skew index and kurtosis index, with the cutoff of 3 for skewness index and 10 for kurtosis index indicating concern for Maximum Likelihood Estimation (Kline, 2016). As expected given previous research (e.g. Van Eck et al., 2015; Van Orden, Witte, Gordon, Bender, & Joiner, 2008), scores on the RSQ were positively skewed (skew = 3.12; kurtosis = 13.59). All other variables had skew index < 3 and kurtosis index < 10 . Full Information Maximum Likelihood

¹ Given the statistically significant correlation between inattention and hyperactivity/impulsivity ($r = .626$, $p < .01$), we ran a series of models in which inattention and hyperactivity/impulsivity were combined into a single composite variable (ADHD). However, no statistically significant direct effects were evident in the mediation model (ADHD and anger, sadness, and worry dysregulation $\beta_s = -0.078 - 0.050$; $p_s = 0.333 - 0.765$, and anger, sadness, and worry dysregulation and risk for suicide and suicide behaviors $\beta_s = -0.023 - 0.126$; $p_s = 0.282 - 0.905$), and there were no statistically significant relations in the moderation model ($\beta_s = -0.213 - 0.053$; $p_s = 0.059 - 0.888$), which further supported the need to separate inattention and hyperactivity/impulsivity symptoms as variables in our analysis.

Estimation with Robust (Huber-White) standard errors and a scaled test statistic that is (asymptotically) equal to the Yuan-Bentler test statistic (MLR/FIMLRE) was used to accommodate missing data while also producing estimates that were robust to non-normality, allowing a skewness index > 3 and a kurtosis index > 10 (Kline, 2016). FIMLRE has been found to be more efficient and less biased than other missing data techniques, such as pairwise and listwise deletion (Arbuckle, 1996; Kline, 2016). Using FIMLRE, all model parameters were calculated at once (i.e., means, intercepts, covariates, and path coefficients Kline, 2016).

Correlations between variables were examined in SPSS for bivariate associations and to help evaluate potential mediated pathways. Path models were estimated via R, using RStudio and the lavaan package to evaluate mediation and moderation (R Core Team, 2019; Rosseel, 2012; RStudio Team, 2019). In order to detect medium effect sizes ($f^2 > 0.15$; power = .80; $\alpha = .05$), Aiken & West (1991) power tables suggest a minimum sample size of 108 for the interaction model. Further, considering 10 predictor variables in the most complex path model proposed, G*Power (Erdfelder & Buchner, 2003) suggests a minimum sample size of 118 is needed to detect medium effects. Given this study's sample size ($n = 232$), the study has power to detect medium to large direct and interaction effects (Aiken & West, 1991; Erdfelder & Buchner, 2003). This is consistent with effects found in the literature, as other studies examining the associations among ADHD symptoms, emotion dysregulation, and suicidal outcomes have previously found medium to large effects in their analyses (Hinshaw et al., 2012; Van Orden et al., 2008).

For analysis of the mediation model, one model was analyzed (as shown in Figure 1) that includes all of the variables of interest. That is, inattention and hyperactivity/impulsivity symptoms were examined simultaneously in the model along with all three emotion

dysregulation variables as mediators in the pathways from ADHD symptoms to suicidal outcomes. Note that depressive symptoms, sex, and age were evaluated as covariates.

For analysis of the moderation model, four models were analyzed. One model with first order effects examined associations between the independent and dependent variables. Specifically, relations between inattention, hyperactivity/impulsivity, worry dysregulation, sadness dysregulation, anger dysregulation, depressive symptoms, age, sex, risk for suicide, and suicide behaviors were assessed. Three path models (one for each emotion dysregulation domain) were then estimated to examine the interaction effects of ADHD symptoms (inattention and hyperactivity/impulsivity) and emotion dysregulation (worry, sadness, and anger) on suicidal outcomes. Each model contained 10 variables (1. Depressive symptoms, 2. Sex, 3. Age, 4. Hyperactivity/Impulsivity, 5. Inattention, 6. Anger dysregulation, 7. Sadness dysregulation, 8. Worry dysregulation, 9. Emotion dysregulation X Hyperactivity/Impulsivity, 10. Emotion dysregulation X Inattention). Due to power considerations, the moderating effects of the 3 dysregulation scales were examined separately. Post hoc tests were performed when statistically significant interactions were evident. Models were conditioned at high (+1 SD) and low (-1 SD) levels of emotion dysregulation to determine the nature of the moderating effect (Aiken & West, 1991).

Results

Descriptive Statistics and Correlates

In order to evaluate univariate relations between variables, correlations and descriptive statistics were conducted. Correlations among variables and variable means and standard deviations are presented in Table 1. High levels of hyperactivity/impulsivity were associated with high levels of inattention, anger dysregulation, and depressive symptoms. Boys had higher

hyperactivity/impulsivity scores than girls, and younger children had higher levels of hyperactivity/impulsivity than older youth. High levels of inattention were associated with high levels of depressive symptoms, and boys had higher inattention scores than girls. High levels of anger dysregulation were associated with high levels of worry dysregulation and depressive symptoms. Boys had higher anger dysregulation scores than girls. High levels of sadness dysregulation were associated with higher levels of worry dysregulation and depressive symptoms, and high levels of worry dysregulation were associated with high levels of depressive symptoms. High levels of anger dysregulation were associated with high risk for suicide. However, no other emotion dysregulation domain or either ADHD symptom cluster were associated with either suicidal outcome. Finally, suicidal behavior and risk for suicide were found to be positively correlated with each other, and with depressive symptoms.

Mediation Model

In order to evaluate mediated pathways, direct pathways from each ADHD symptom to each emotion dysregulation domain as well as each suicidal outcome were estimated. Additionally, pathways from each emotion dysregulation domain to each suicidal outcome were estimated. See Figure 1 for the simplified mediation model, and Table 2 for mediation results.

Note that all exogenous variables, emotion dysregulation variables, and suicidal outcomes were allowed to covary. Covariances indicated that hyperactivity/impulsivity was positively associated with inattention ($r = .622$), and negatively associated with age ($r = -.559$). Inattention was positively associated with depressive symptoms ($r = .209$). Both hyperactivity/impulsivity and inattention were more prevalent for boys than for girls ($r = .105$, $r = .082$ respectively). Worry dysregulation and sadness dysregulation were positively associated ($r = .394$). Further, risk for suicide and suicide behavior were positively associated ($r = .183$). No

other covariances were statistically significant.

Path coefficients indicated that boys reported higher levels of anger dysregulation, but no other sex effects were evident (See Table 2). Age was not associated with any variable. Depressive symptoms were positively associated with worry dysregulation, sadness dysregulation, anger dysregulation, risk for suicide, and suicide behavior. Inattention was negatively associated with suicide behavior but was not associated with any emotion dysregulation domain or risk for suicide. Hyperactivity/impulsivity was positively associated with suicide behavior but was not associated with any emotion dysregulation domain or risk for suicide. Anger dysregulation, sadness dysregulation, and worry dysregulation were not associated with risk for suicide or suicide behavior. Given that no mediated pathways from ADHD symptoms to emotion dysregulation domains were evident, indirect effects were not examined. Additionally, we can conclude that the strength of the positive association between hyperactivity/impulsivity and suicidal outcomes is stronger than the hypothesized positive association between inattention and suicidal outcomes since the latter did not have a positive association.

Moderation Model

An initial first-order effects model was estimated, whereby suicide risk and suicide behavior were regressed on age, sex, depressive symptoms, the 3 emotion dysregulation domains, hyperactivity/impulsivity, and inattention (see Table 3). Depressive symptoms were positively associated with risk for suicide as well as suicide behavior. Additionally, hyperactivity/impulsivity was positively associated with suicide behavior, while inattention was negatively associated with suicide behavior. No other first-order effects were evident.

Moderating effects of emotion dysregulation domains were evaluated by adding interaction terms between symptoms of ADHD and emotion dysregulation domains to the first order effect model one at a time. An interaction effect between hyperactivity/impulsivity and sadness dysregulation was found for suicide risk. Additionally, an interaction effect between hyperactivity/impulsivity and worry dysregulation was also found for suicide risk. No other interaction effects were evident (see table 3).

As depicted in Figure 2, at low levels of sadness dysregulation, hyperactivity/impulsivity was positively associated with risk for suicide ($\beta = .326$ $p < .05$). However, at high levels of sadness dysregulation, hyperactivity/impulsivity was not related to risk for suicide ($\beta = -0.183$ $p = 0.190$). Additionally, at low levels of worry dysregulation, hyperactivity/impulsivity was positively associated with risk for suicide ($\beta = .262$ $p = 0.052$; see Figure 3). However, at high levels of worry dysregulation, hyperactivity/impulsivity was not related to risk for suicide ($\beta = -0.173$ $p = 0.197$). The lowest levels of risk are at low levels of hyperactivity/impulsivity combined with low levels of emotion dysregulation; however, the highest levels of risk are when high levels of hyperactivity/impulsivity are combined with low levels of emotion dysregulation.

Discussion

The current study sought to advance extant literature regarding the associations between ADHD symptoms and suicidal outcomes by evaluating emotion dysregulation as both a mediator and moderator of these links in youth ages 6 to 12 in an outpatient setting. Specifically, we examined the influence of ADHD symptoms (inattention and hyperactivity/impulsivity), and emotion dysregulation (in the domains of sadness, worry, and anger) on risk for suicide and suicide behavior. Contrary to our hypothesis that both symptom clusters of ADHD and all domains of emotion dysregulation would be positively associated with suicidal outcomes, zero-

order correlations revealed that only anger dysregulation was positively associated with suicide *risk*. In contrast, however, path models that examined unique associations indicated that high levels of hyperactivity/impulsivity were associated with high levels of suicide *behavior*, which supports our hypothesis that hyperactivity/impulsivity would have a stronger association with suicidal outcomes than the association between inattention and suicidal outcomes. Further, high levels of inattention were associated with low levels of suicide *behavior*. Additionally, no dysregulation domain was uniquely associated with either suicidal outcome. As such, data did not support our mediation hypothesis. However, two interaction effects were evident for suicide *risk*: the interaction effect between hyperactivity/impulsivity and sadness dysregulation and between hyperactivity/impulsivity and worry dysregulation. High levels of hyperactivity/impulsivity and low levels of sadness and worry dysregulation were associated with high levels of suicide risk. Although interaction effects were evident, they were not fully consistent with our hypothesis that interaction effects between high levels of ADHD symptoms and high levels of emotion dysregulation would be found for high levels of both suicidal outcomes. Findings and their implications are further detailed and discussed below.

Correlation analyses indicated a positive association between hyperactivity/impulsivity and anger dysregulation, which is consistent with current research. Extant literature suggests that anger dysregulation is related to externalizing symptoms such as aggression and hyperactivity/impulsivity (Leaberry, Rosen, Slaughter, Reese, & Fogleman, 2019; Zeman et al., 2002; Zhang, Li, Zhang, Lin, & Hou, 2015). It is likely that the relation between anger dysregulation and hyperactivity/impulsivity was bolstered in our treatment-seeking sample given the high prevalence of these symptoms. Many children in our sample may have been seeking treatment for these precise problems, and 43% presented to the clinic with externalizing

disorders (see participants section for details). The prevalence rates of these difficulties are lower in the general community: the prevalence rate of ADHD world-wide is roughly 5% (Polanczyk, De Lima, Horta, Biederman, & Rohde, 2007), and the prevalence of frequent, severe anger tantrums in youth is roughly 13% (Copeland, Angold, Costello, & Egger, 2013). This distinct relation with only anger dysregulation may be because worry and sadness dysregulation have been consistently linked with internalizing symptoms (e.g. Cooley, Blossom, Tampke, & Fite, 2020), but the link between worry and sadness dysregulation and externalizing symptoms such as hyperactivity/impulsivity is less clear as this has not been well researched. Additionally, this link may be present for symptoms of hyperactivity/impulsivity and not symptoms of inattention because symptoms of hyperactivity/impulsivity have been more robustly linked with emotion dysregulation than symptoms of inattention (Seymour et al., 2014). Further, our findings are supported by the DTM model of suicide, which suggests that poor executive functioning (here, emotion dysregulation) may be associated with impulsive aggression (Bridge et al., 2006). Given these considerations, it is likely that the relation between hyperactivity/impulsivity and emotion dysregulation in the domain of anger is nuanced and may be different for different populations of children. Accordingly, further research examining these associations is justified.

Our finding that anger dysregulation was positively associated with risk for suicide is consistent with some, but not all, of the current literature. On one hand, this finding is consistent with literature on high school and undergraduate students that found a positive relation between emotion dysregulation and suicidal desire – a key component of the IPT model of suicide (Anestis, 2011; Joiner, 2005; Pisani et al., 2013). Here, it is theorized that when individuals are frequently unable to regulate their negative emotions (particularly the emotion anger), they are at greater risk to develop suicidal desire. On the other hand, our finding is in contrast to literature

on undergraduate students that suggests a negative relation between emotion dysregulation and acquired capability for suicide – another key component of the IPT model of suicide (Anestis, 2011; Bender et al., 2012; Heffer & Willoughby, 2018; Joiner, 2005). Here, it is theorized that individuals who are better able to regulate their emotions may have more capacity for attempting suicide with a more lethal means, and those with higher emotion dysregulation may have a lower capacity for suicide given their inability to regulate their tolerance for pain (Bender et al., 2012). One possible reason for the discrepancy in the literature is some of these studies (including ours) did not consider the variance accounted for by non-suicidal self-injury (NSSI). Heffer and Willoughby found a negative association between emotion dysregulation and acquired capability for suicide, however also found a positive association via the indirect path through NSSI (2018). It is recommended that future research further examine the influence of NSSI on the association between emotion dysregulation and acquired capability for suicide.

Consistent with extant literature (Chronis-Tuscano et al., 2010; McGirr et al., 2008), the IPT model of suicide (Joiner, 2005), and the DTM model of suicide (Bridge et al., 2006), we found that hyperactivity/impulsivity was positively associated with suicide behavior after considering the variance accounted for by all other study variables. Studies have demonstrated this association in youth ages 4 – 6 (Chronis-Tuscano et al., 2010) and suggest that impulsivity may be particularly characteristic of suicidal youth (McGirr et al., 2008; Sheftall et al., 2016). IPT posits that impulsivity increases risk for suicidal behavior because it allows an individual to habituate to the pain or fear related with self-harm (Joiner, 2005; Van Orden et al., 2010). For example, an impulsive individual is more likely to engage in behaviors that are painful such as physical fights because they often act without thinking through the harmful consequences of their behaviors. This repeated exposure to painful experiences would increase an individual's

level of acquired capability for suicide, making them more at risk for suicide behavior. Further, impulsivity is a key component of the DTM model of suicide such that impulsive aggression is a primary facilitating factor that may allow an individual who has suicidal thoughts to make a suicide attempt (Bridge et al., 2006). Given these key empirical and theoretical associations between hyperactivity/impulsivity and suicide behavior, it is strongly recommended that further research build upon the current study and investigate the nature of this association in school age youth.

Regarding the other primary symptom cluster of ADHD, inattention was unexpectedly found to be negatively associated with suicide behavior. This finding is discrepant with some research that found a positive association between inattention and increased odds of suicide behavior in a predominately female sample of youth ages 12 to 18 (Manor et al., 2010). Another study found no statistically significant difference in suicide behavior for girls ages 6-12 between those with ADHD predominantly inattentive type and girls with no ADHD diagnosis (Hinshaw et al., 2012). Given these findings, it is possible that the difference in results was due to the different sex-ratio of each study. Our sample was 64.7% male whereas the two studies mentioned were predominately or completely female. Potentially, girls with inattention are more at risk for suicidal outcomes than boys with inattention. Alternatively, it is possible that the difference in results is due to the difference in age between the studies. Our study had an average age of 8.63, compared to a mean age of 15.5 (Manor et al., 2010) and 9.5 (Hinshaw, Carte, Sami, Treuting, & Zupan, 2002). Perhaps in a younger sample inattention served as a protective factor, such that they were unable to maintain sufficient attention in order to act on their suicidal thoughts, which would decrease their acquired capability for suicide. Inattention may serve different purposes for different populations of youth, and therefore this relation merits future investigation.

There is a dearth of literature examining the complex relation among hyperactivity/impulsivity, emotion dysregulation, and suicidal outcomes, particularly for school-age youth; data from the current study begin to fill this gap. Prior studies have found mediating effects of emotion dysregulation on the link between a diagnosis of ADHD and depressive symptoms (Seymour et al., 2012, 2014), however no studies to date examine the mediating effect of emotion dysregulation on ADHD symptoms and suicidal outcomes. Although there is a strong association between depressive symptoms and suicidal outcomes, our study suggests that the mediation effect Seymour et al (2012, 2014) found for depression does not generalize to suicidal outcomes. Current leading models of suicide such as IPT and DTM may explain this discrepancy (Bridge et al., 2006; Joiner, 2005). The IPT model suggests that depression alone is insufficient to lead to suicidal outcomes and that a combination of thwarted belongingness, perceived burdensomeness, and acquired capability for suicide are required (Joiner, 2005; Van Orden et al., 2010). The DTM model also suggests that a major psychiatric disorder alone is insufficient, and that impulsive aggression is necessary in order for suicidal ideation to develop (Bridge et al., 2006). Given that the current study found no support for mediating effects, it is possible that emotion regulation mediates the relation between ADHD symptoms and depression, but that emotion regulation is insufficient to mediate the relation between ADHD symptoms and suicidal outcomes.

In contrast, the current study provided some evidence of moderating effects. In a sample of college students, one study found that emotion dysregulation amplified the effects of ADHD on suicidal ideation (Van Eck et al., 2015). However, some studies indicate that hyperactivity may be more of a risk factor for suicidal outcomes in children than in adolescents or adults (Sheftall et al., 2016), suggesting that the associations seen in college students may be different

from the associations seen in school-age youth. In the current study, the interaction effect between hyperactivity/impulsivity and sadness or worry dysregulation was found for suicide risk such that at low levels of sadness or worry dysregulation, hyperactivity/impulsivity was positively associated with risk for suicide. However, there was no relation between hyperactivity/impulsivity and risk for suicide at high levels of sadness or worry dysregulation. Youth with low levels of sadness or worry dysregulation – that is, youth who are generally good at regulating their feelings of sadness or worry – were found to have an increased suicide risk if they also had high hyperactive/impulsive symptoms. It is possible that this association is because youth with high levels of hyperactivity/impulsivity in combination with low emotion dysregulation have higher levels of acquired capability for suicide, a key component in the IPT model of suicide (as suggested in Bender et al., 2012), while this association is not as strong for those with higher levels of emotion dysregulation in combination with higher levels of hyperactivity/impulsivity. This data suggests that, contrary to our initial hypothesis, there is not a compounded risk of having high behavioral dysregulation (i.e. hyperactivity/impulsivity) and high emotional dysregulation, but alternatively that having high behavioral dysregulation and high emotional *regulation* may make a school-age treatment-seeking youth at a higher risk for suicide.

Limitations, Implications, and Future Directions

There are some limitations to the current study that need to be acknowledged. First, there are some considerations regarding our research design. As a cross-sectional study with data collected at a single time point, directionality of the relations cannot be established. Replication of this study longitudinally would allow for better understanding of these risk factors for suicide. Given this study's sample size, the current study only had the power to detect medium to large

effects and were unable to detect small effects. Although medium to large effects have been found in studies examining ADHD symptoms, emotion dysregulation, and suicidal outcomes (Hinshaw et al., 2012; Van Orden et al., 2008), further studies with larger sample sizes would allow for detection of small effects. Additionally, we selected youth reports of emotion dysregulation and suicidal outcomes. Although some literature indicates youth are the most accurate reporters of their own internalizing symptoms (De Los Reyes & Kazdin, 2005), given the risk of common method variance and age of our sample, it would be useful to incorporate reports from multiple informants in order to confirm these results. Further, given the low to modest internal consistency of the CEMS ($\alpha = .53-.63$), using additional observational or interview measures of emotion dysregulation would allow for more robust measurement. Additional methods beyond questionnaires have been developed to assess for symptoms of ADHD. For example, behavioral paradigms such as a Go/No-Go task, a Stop-Signal task, or a Flanker task all test the ability for a person to inhibit an automatic response (Lindqvist & Thorell, 2009). It is theorized that individuals who are highly impulsive may have poor response inhibition (Schachar, Tannock, & Logan, 1993). Additionally, Conners' Continuous Performance Test (Conners, 2014) is a task-oriented assessment of attention difficulties that is validated for children as young as 8 years old. Future studies should examine if the results found in this study differ when behavioral tasks are used to measure symptoms of ADHD. Second, there are some limitations regarding our sample. As a predominately Caucasian sample community seeking psychological outpatient services in a small Midwest city, these results may not be generalizable to other populations, including high suicide risk youth. Additionally, 88% of informants for ADHD symptoms were mothers, and 65% of children were male. It is possible that there are gender differences in caregiver reports or for groups of children, however our study did not have

sufficient power to examine these influences. Finally, there are a few limitations given our analyses. Replication of this study with a greater sample size and more power would allow for clarity of these effects. Additionally, it is important to note that out of those with available suicidal outcome scores, only 23.5% reported any suicide behaviors, 31.4% reported 1 risk factor for suicide, and 22.7% reported 2 or more risk factors for suicide. These low numbers, although higher than seen in the community (Martin et al., 2016; O’Leary et al., 2006), may contribute to the non-significance of some of our findings. Item level analyses were beyond the scope of this study, however, may be important to examine in future research studies. Item-level analysis would also allow for examination of risk thresholds (i.e. at what point should various intervention strategies be implemented). Some suicide evaluation measures such as the Columbia Suicide Severity Rating Scale has been used with children as young as 5 and has triage suggestions based on severity score (Glennon et al., 2014; Posner et al., 2011). Future studies may consider evaluating the relation between these cut off points and risk for suicide as assessed by the RSQ (Horowitz et al., 2001).

Despite the aforementioned limitations, the many strengths of this study may have implications for better understanding children at risk for suicide. There is a lack of research published on suicidal outcomes in youth younger than 13, and as such, this study is particularly important for understanding the needs of this population. Further, most research conducted with youth in this age group is completed in schools, representing a lower level of severity than the current outpatient sample. This data suggests that it is imperative to be asking questions about suicidal ideation and suicide behaviors to youth ages 6 to 12, and further, to be obtaining information about levels of emotion dysregulation, inattention, and hyperactivity/impulsivity. Additionally, this study suggests that particular clinical attention should be given to children who

present to psychological outpatient clinics with hyperactivity/impulsivity in combination with low emotion dysregulation as these children may be at particular risk for suicide.

The distal risk factors investigated in this study may be important treatment targets for children endorsing suicidal ideation. Although current leading treatments for youth suicidal behavior are primarily validated in adolescent populations (McCauley et al., 2018; Stanley et al., 2009), discussion regarding the mechanisms of change in these treatments may prove beneficial for younger youth (Ridge Anderson, Keyes, & Jobes, 2016). Current suicide prevention treatments focus specifically on suicidality and are usually employed regardless of co-occurring psychopathology (Henriques, Beck, & Brown, 2003). For example, Cognitive Behavior Therapy for Suicide Prevention (CBT-SP; Henriques, Beck, & Brown, 2003; Stanley et al., 2009) is a targeted intervention aimed at preventing the recurrence of suicidal behavior. It has been shown to be feasible, acceptable, and effective (Bryan, 2019; Stanley et al., 2009). In this treatment, adolescents analyze the series of events leading up to a prior suicide attempt, create a safety plan, receive psychoeducation about suicide behavior, develop reasons for living, and build hope. Adolescents learn individual CBT skills such as behavioral activation, mood monitoring, emotion regulation, distress tolerance techniques, cognitive restructuring, problem solving, goal setting, mobilizing social support, and assertiveness skills. Families of adolescents learn similar CBT skills targeted for a family model. At the end of treatment, the adolescent focuses specifically on relapse prevention strategies (Stanley et al., 2009). Another empirically supported treatment for suicide prevention is Dialectical Behavior Therapy (DBT), which has also shown to be effective for reducing and preventing suicide behaviors in adolescents (McCauley et al., 2018). DBT is similar to CBT in that it aims to teach skills such as social support, communication, validation, self-regulation, and distress tolerance to both the adolescent and the

family (McCauley et al., 2018). Both of these therapeutic techniques include skills training in emotion regulation and distress tolerance, but do not explicitly focus on management of hyperactive or impulsive behaviors. Results of the current study suggest that while skills training in emotion regulation may be beneficial for some youth with suicidal behaviors, caution should be used when working with youth with high levels of hyperactivity/impulsivity. Perhaps skills regarding hyperactivity/impulsivity should be targeted prior to targeting emotion dysregulation. Behavior management techniques for parents may be particularly beneficial for these youth (Evans, Owens, & Bunford, 2014; Perepletchikova et al., 2011). Further, the need for management of hyperactive/impulsive symptoms may be unique to younger children, (McGirr et al., 2008; Sheftall et al., 2016) while inattention may be more of a risk factor for older girls (Manor et al., 2010). Therefore, future research should investigate suicide prevention treatments for youth that include skills training regarding symptoms of ADHD.

Additionally, current treatments for ADHD should consider possible co-occurrences of suicidal behaviors. Leading empirically based treatments for ADHD include behavioral parent training, behavioral classroom management, behavioral peer interventions and organizational training (Evans et al., 2014). Except for organizational training, these interventions are largely focused on training an adult to control the environment in which the child with ADHD is having difficulties. These treatments rarely include assessment or monitoring of the youth's psychopathology or suicide risk (e.g. Defiant Children (Barkley, 1997), Parent-Child Interaction Therapy (PCIT; Eyberg & Funderbuck, 2011)). However, results from the current study indicate that for children with high levels of hyperactivity/impulsivity, behavior management should be augmented by risk assessment for suicidal thoughts and behaviors. Future research should

investigate suicide prevention treatments that target youth ages 6 to 12 with high levels of hyperactivity/impulsivity and low levels of emotion regulation.

In addition to being important treatment targets, symptoms of hyperactivity/impulsivity and emotion dysregulation may indicate to clinicians to frequently assess for suicide risk throughout treatment. Existing literature suggests that children ages 4 to 6 diagnosed with ADHD are more than 5.5 times as likely as children not diagnosed with ADHD to ever engage in suicidal ideation between the ages of 10 and 20 (Chronis-Tuscano et al., 2010). Further, the current study suggests that high levels of hyperactivity/impulsivity independent of diagnosis may put children at increased risk for suicidal behaviors. Clinicians must be attentive to the potential for children with hyperactive/impulsive symptoms developing suicidal behaviors throughout elementary, middle, and high school.

Summary

In sum, the current study provided preliminary evidence for hyperactivity/impulsivity as a risk factor for suicidal outcomes among children, with hyperactivity directly positively associated with suicide behavior and the interaction effect between hyperactivity/impulsivity emotion dysregulation associated with suicide risk. Additionally, anger dysregulation appears to be directly associated with suicide risk, while sadness and worry emotion dysregulation moderate associations between hyperactivity/impulsivity and suicide risk. Further, there was some evidence to suggest that inattention is negatively associated with suicide behavior.

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Tables and Figures

Table 1

Correlations and Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Age	-									
2. Sex	-.026	-								
3. Depression	-.069	-.064	-							
4. Hyper	-.283**	.218**	.164*	-						
5. Inattention	.017	.175*	.219**	.626**	-					
6. Anger EDR	-.117	.209*	.356**	.197*	.163	-				
7. Sadness EDR	-.144	-.095	.248**	-.019	-.074	.170	-			
8. Worry EDR	-.176	.080	.251**	.044	.069	.208*	.471**	-		
9. Suicide behavior	.016	.047	.443**	.127	.009	.132	.144	.115	-	
10. Suicide risk	.083	-.081	.462**	.064	.070	.251**	.136	.132	.496**	-
Mean	8.63	-	0.42	1.36	1.63	1.67	1.77	1.59	0.89	1.03
SD	1.96	-	0.33	1.00	0.93	0.53	0.55	0.51	2.11	1.56
Minimum	6.00	-	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00
Maximum	12.00	-	1.75	3.00	3.00	3.00	3.00	3.00	12.00	11.00

Note. EDR = Emotion Dysregulation; Hyper = Hyperactivity/Impulsivity; Depression = Depressive Symptoms
 * $p < 0.05$; ** $p < 0.01$

Table 2*Mediation Results*

	Anger EDR		Sadness EDR		Worry EDR		Suicide risk		Suicide behavior	
	β	$\frac{SE}{\beta}$	β	$\frac{SE}{\beta}$	β	$\frac{SE}{\beta}$	β	$\frac{SE}{\beta}$	β	$\frac{SE}{\beta}$
Age	-0.039	0.048	-0.070	0.049	-0.094	0.050	0.056	0.041	0.043	0.038
Sex	0.387*	0.182	-0.156	0.176	0.165	0.181	-0.186	0.158	0.114	0.152
Depression	0.323**	0.085	0.241**	0.092	0.220**	0.085	0.415**	0.095	0.455**	0.110
Hyper	0.052	0.119	-0.000	0.122	-0.099	0.134	0.066	0.083	0.233*	0.111
Inattention	0.004	0.112	-0.085	0.113	0.068	0.123	-0.061	0.100	-0.235*	0.108
Anger EDR	-	-	-	-	-	-	0.128	0.116	-0.025	0.093
Sadness EDR	-	-	-	-	-	-	0.016	0.128	0.041	0.106
Worry EDR	-	-	-	-	-	-	0.047	0.117	0.030	0.088

Note. EDR = Emotion Dysregulation; Hyper = Hyperactivity/Impulsivity; Depression = Depressive Symptoms
 * $p < 0.05$; ** $p < 0.01$

Table 3

Moderation Results

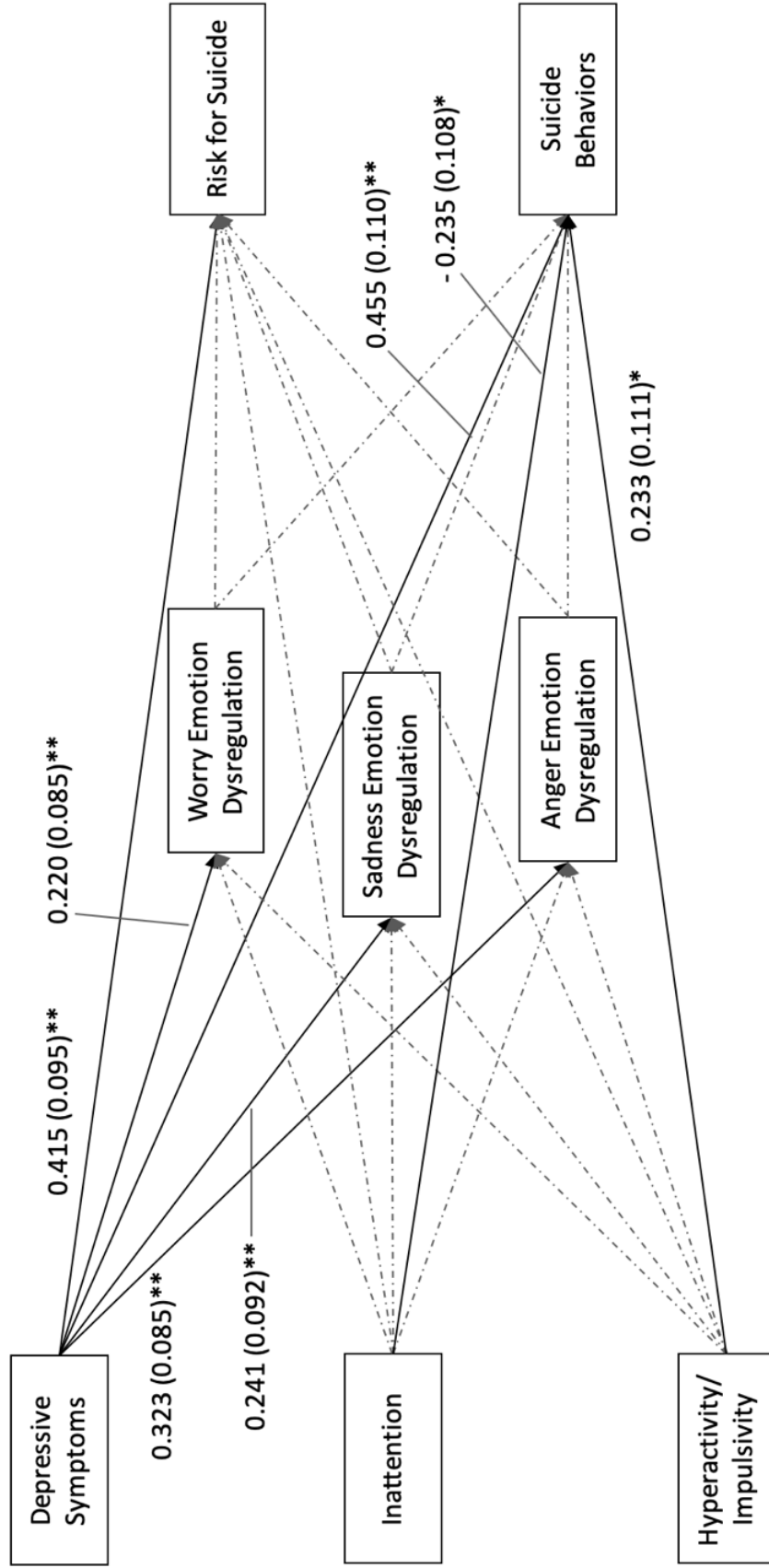
	RISQ (Suicide Risk)							
	1 st -order		Sadness EDR Interaction		Worry EDR Interaction		Anger EDR Interaction	
	β	SE	β	SE	β	SE	β	SE
Age	0.056	0.041	0.052	0.041	0.059	0.039	0.060	0.042
Sex	-0.186	0.158	-0.134	0.166	-0.213	0.157	-0.180	0.165
Depression	0.415**	0.095	0.418**	0.090	0.439**	0.095	0.414**	0.096
Hyper	0.066	0.083	0.072	0.088	0.044	0.086	0.090	0.087
Inattention	-0.061	0.100	-0.085	0.108	-0.066	0.097	-0.067	0.110
Anger EDR	0.128	0.116	0.092	0.109	0.124	0.114	0.107	0.107
Sadness EDR	0.016	0.128	-0.012	0.128	-0.007	0.130	0.000	0.127
Worry EDR	0.047	0.117	0.040	0.116	0.053	0.124	0.041	0.124
Hyper x EDR	-	-	-0.254*	0.119	-0.217*	0.103	-0.155	0.114
Inattention x EDR	-	-	0.066	0.130	-0.002	0.121	0.192	0.114
				SBQ (Suicide Behavior)				
Age	0.043	0.038	0.043	0.038	0.043	0.038	0.047	0.039
Sex	0.114	0.152	0.106	0.147	0.095	0.152	0.092	0.154
Depression	0.455**	0.110	0.452**	0.109	0.466**	0.111	0.458**	0.108
Hyper	0.233*	0.111	0.231*	0.106	0.221*	0.111	0.261*	0.123
Inattention	-0.235*	0.108	-0.232*	0.106	-0.237*	0.105	-0.254*	0.118
Anger EDR	-0.025	0.093	-0.014	0.085	-0.025	0.090	-0.043	0.098
Sadness EDR	0.041	0.106	0.055	0.117	0.027	0.108	0.021	0.100
Worry EDR	0.030	0.088	0.030	0.091	0.037	0.085	0.036	0.091
Hyper x EDR	-	-	0.117	0.162	-0.101	0.090	-0.135	0.105
Inattention x EDR	-	-	-0.081	0.132	-0.036	0.091	0.057	0.088

Note. EDR = Emotion Dysregulation; Hyper = Hyperactivity/Impulsivity; Depression = Depressive Symptoms. Bold indicates moderation of interest.

* $p < 0.05$; ** $p < 0.01$

Figure 1

Mediation Model



Note. For clarity purposes, covariances between variables as well as sex and age variables are not included in figure. Non-significant relationships indicated by dashed lines. Significant relationships indicated by solid lines. Only significant pathways labeled with parameter estimates. * $p < 0.05$; ** $p < 0.01$

Figure 2

Association between Hyperactivity/Impulsivity and Risk for Suicide at High and Low Levels of Sadness Dysregulation

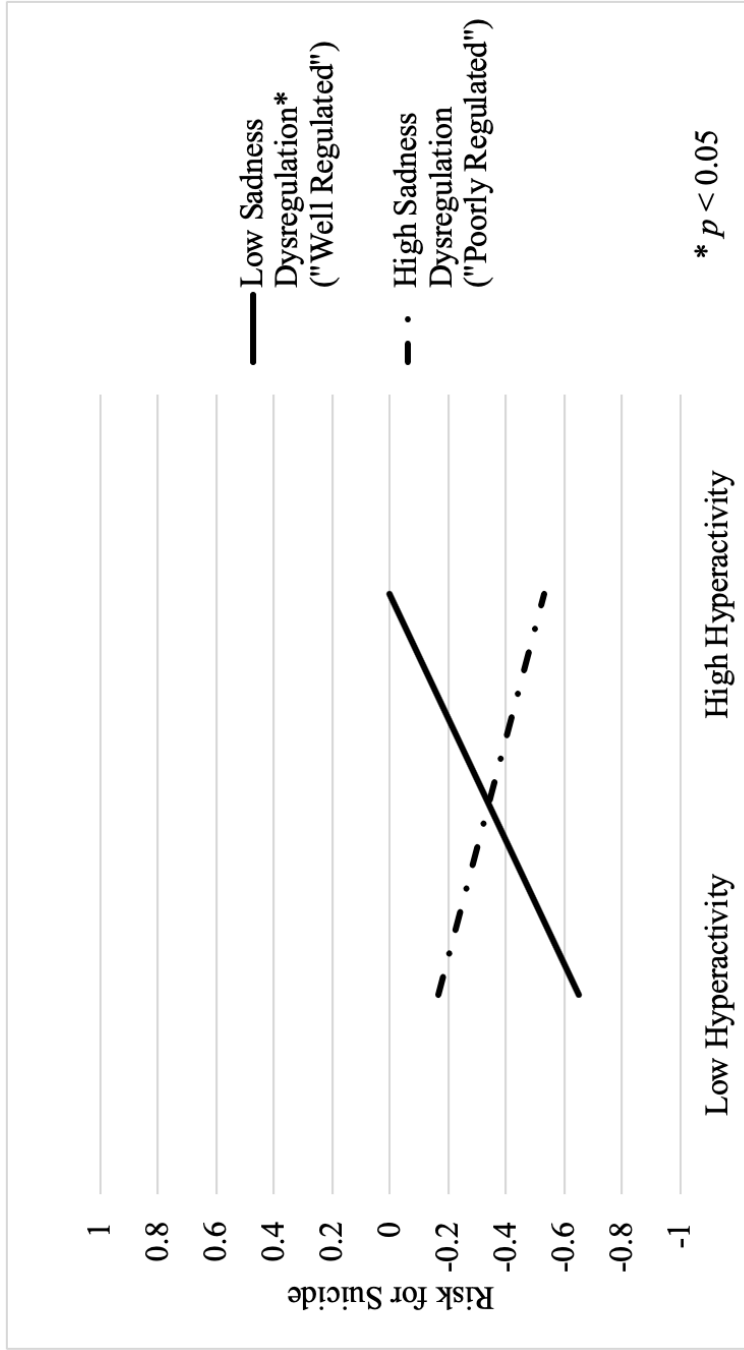


Figure 3

Association between Hyperactivity/Impulsivity and Risk for Suicide at High and Low Levels of Worry Dysregulation

