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Reactive Aggression and Suicide-Related Behaviors in Children and Adolescents: A Review and Preliminary Meta-Analysis

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Abstract

The empirical literature on the association between reactive aggression and suicide-related behaviors in children and adolescents was reviewed. A narrative review of seven studies that met inclusion/exclusion criteria is followed by a preliminary meta-analysis to provide insight into the strength of the association between reactive aggression and suicide-related behaviors. Each of the seven studies reported a statistically significant association between reactive aggression and suicide-related behaviors, including suicide, nonfatal suicide attempt, and suicide ideation. Results from the meta-analysis indicated a consistent, medium-sized association ($k = 7$; $N = 4,693$; $r_{bar} = .25$). The narrative review and results of the preliminary meta-analysis support the promise of pursuing future research on reactive aggression and suicide-related behaviors in children and adolescents. A theoretical model is proposed to guide the development of future research.

Research and theory highlight a distinction between reactive aggression and proactive aggression (Dodge & Coie, 1987; Hubbard, McAuliffe, Morrow, & Romano, 2010; Waschbusch, Willoughby, & Pelham, 1998). *Reactive aggression*, also known as impulsive or spontaneous aggression, is a defensive or retaliatory aggressive act that is performed in response to real or perceived provocation (Hubbard et al., 2010). Reactive aggression includes anger outbursts, temper tantrums, or vengeful hostility. *Proactive aggression*, which is also referred to as instrumental or covert aggression, is a deliberate aggressive act that is performed to achieve a material or territorial gain. Proactive aggression is not driven by an emotional state or perceived provocation; rather, it is driven by the expectation of a reward (Dodge, Lochman, Harnish, Bates, & Pettit, 1997). Proactive aggression includes bullying, domination, teasing, or coercion.

Although the behavioral manifestations of reactive and proactive aggression often look similar, the functions, correlates, and outcomes of the aggressive behavior are distinct

(Polman, Orobio de Castro, Koops, van Boxtel, & Merk, 2007; Poulin & Boivin, 2000a). Reactive aggression is theorized to have roots in a temperamental disposition toward anxiety, angry reactivity, emotional dysregulation, and inattention (Vitaro, Brendgen, & Barker, 2006). Children with these temperamental characteristics display a low threshold for frustration and deficits in problem-solving strategies, and quickly react to disturbing and distracting stimuli with physical and/or verbal aggression (Hubbard et al., 2010; Vitaro, Brendgen, & Tremblay, 2002; Vitaro et al., 2006). Reactive aggression, but not proactive aggression, has been shown to be associated with internalizing symptoms and emotional dysregulation (Card & Little, 2006; Fite, Raine, Stouthamer-Loeber, Loeber, & Pardini, 2010; Vitaro et al., 2002). Children who display high levels of reactive aggression have fewer friends and experience more social rejection than children who display high levels of proactive aggression (Dodge et al., 1997; Poulin & Boivin, 2000b). Conversely, proactive aggression is theorized to have roots in the social learning model of aggression, which suggests children aggress due to an expectation of a reward (Vitaro et al., 2006). Proactive aggression has been shown to predict delinquency and disruptive behavior (Fite, Colder, Lochman, & Wells, 2008; Vitaro, Gendreau, Tremblay, & Oigny, 1998).

The focus of the present review is on reactive aggression, specifically the association between reactive aggression and suicide-related behavior in children and adolescents. It is possible that both reactive aggression and proactive aggression may be associated with an increased risk of suicide-related behaviors. However, given clear differences in the functions, correlates, and outcomes of reactive and proactive aggression, including clear differences in associations with internalizing symptoms and social rejection, it seems likely that pathways to suicide-related behaviors differ for reactive and proactive aggression.

Children who display high levels of reactive aggression are at a higher risk for a variety of negative outcomes, as compared to children who display low levels of reactive aggression. In the short term, children who react aggressively are often met with hostility and social rejection by peers (Dodge et al., 1997; Poulin & Bovin, 2000b). In the long term, children who display high levels of reactive aggression are at elevated risk for depressive symptoms, substance use, and impaired social relationships relative to children who display low levels of reactive aggression (Dodge et al., 1997; Fite et al., 2008; Vitaro et al., 2006). There also is evidence indicating an association between reactive aggression and suicide-related behaviors in children and adolescents (Fite, Stoppelbein, & Greening, 2009; Greening, Stoppelbein, Luebbe, & Fite, 2010; Vermeiren et al., 2003). Nevertheless, published studies on the association between reactive aggression and suicide-related behaviors in children and adolescents have used diverse sampling strategies and methodologies, making it challenging to integrate findings and draw conclusions.

To our knowledge, only one review of the association between reactive aggression and suicide-related behaviors has been published. Conner, Duberstein, Conwell, and Caine (2003) provided a narrative review of empirical studies published prior to 2000 on the association between reactive aggression and suicide among all age groups. Their review included three studies on children and adolescents. The majority of studies included in Conner et al. used broad measures of general aggression or proxy measures that were believed to tap into the construct of reactive aggression (e.g., explosiveness, irritability,

anger–hostility). Only one study in their review explicitly measured reactive aggression. Measurement issues aside, Conner et al. concluded that preliminary evidence supported an association between reactive aggression and suicide-related behaviors.

Since publication of the Conner et al. (2003) review, several additional empirical studies including samples of children and adolescents have reported on the association between reactive aggression and suicide-related behaviors. Moreover, an additional narrative review reported on the associations between impulsivity, aggression, and suicide across the life span (Gvion & Apter, 2011). Although impulsivity and aggression were significantly associated with suicide-related behaviors, Gvion and Apter (2011) concluded that the literature was “confusing and contradictory,” likely owing to the broad conceptualizations of aggression in past studies. In an effort to bring clarity to this literature and respond to the call for more research on the role of reactive aggression and suicide (Conner, Meldrum, Wiczorek, Duberstein, & Welte, 2004), in the current review we focused specifically on the association between reactive aggression and suicide-related behaviors. The primary aim was to summarize the empirical literature since Conner et al. (2003) on the association between reactive aggression and suicide-related behaviors in children and adolescents up to age 20 years. We focused on trait reactive aggression; that is, children and adolescents who chronically exhibit reactive aggression behaviors across contexts.

A secondary aim of this study was to conduct a preliminary quantitative review (i.e., meta-analysis) of the association between reactive aggression and suicide-related behaviors in children and adolescents, including studies published prior to and after the Conner et al. (2003) review. Given the small number of studies that met criteria for inclusion in this review (see Methods section), it would be premature to draw firm conclusions from a meta-analysis; however, a preliminary quantitative review provides insight into the strength of the association between reactive aggression and suicide-related behaviors. After summarizing the empirical literature and conducting a preliminary quantitative review, we then present a theoretical model of the association between reactive aggression and suicide-related behaviors to guide future research on this topic.

We focused our review on children and adolescents because levels of reactive aggression rise in childhood and peak in adolescence (Barker, Tremblay, Nagin, Vitaro, & Lacourse, 2006), and the rate of suicide-related behaviors increases dramatically during adolescence (Centers for Disease Control, 2013). Indeed, the rates of nonfatal suicide-related behaviors including suicide ideation and nonfatal suicide attempt peak in adolescence (Centers for Disease Control, 2013). According to the Centers for Disease Control (2013), 16% of adolescents reported seriously considering suicide and 8% reported making a suicide attempt in the previous 12 months. As such, childhood and adolescence represent important developmental periods in which to examine the influence of reactive aggression on suicide-related behaviors. We do not propose that reactive aggression represents the only pathway to suicide-related behaviors; however, it represents a pathway that has not been widely examined.

METHODS

A systematic search of the literature for all published studies on reactive aggression and suicide-related behaviors was conducted, using the electronic databases PsycArticles, PsycINFO, PubMed, Google Scholar, and reference lists of articles. Key words for the search were as follows: “suicide” or “suicidal” and “reactive aggression,” “spontaneous aggression,” or “impulsive aggression.” Only studies that included a measure of suicide-related behaviors and a measure of reactive or impulsive aggression were retained. For studies that included a measure of impulsive aggression, we examined the specific scales used to make sure they measured the construct of reactive aggression. Studies that purportedly measured “impulsive aggression” but used separate measures for impulsivity and general aggression were excluded. In such studies, as well as other studies that measured the general construct of aggression, it would have been impossible to determine the extent to which associations between aggression and suicide were due to reactive, proactive, or some other feature of aggression. Only studies that included children or adolescents aged up to 20 years in the sample were retained in this review. Given the small number of studies available, we retained studies with samples in which some participants were over age 20 years, as long as a portion of the sample fell between the ages of 6 and 20 years.

We used the nomenclature for suicide-related behaviors as delineated by Silverman, Berman, Sanddal, O’Carroll, and Joiner (2007): suicide, suicide attempts, and suicide ideation. *Suicide* is a fatal self-injurious behavior with an explicit or implicit desire to die. A *suicide attempt* is a self-inflicted behavior with a nonfatal outcome for which there is evidence of intent to die. *Suicide ideation* is any self-reported thought of killing oneself.

The search resulted in 1,032 studies. After removing duplicate search results, 351 studies remained. Two hundred seventy-eight studies were excluded for being unrelated to the aims of this review after reading the title. An additional 66 studies were excluded for being unrelated to the aims of this review after reading the abstracts and/or articles. Of these 66 excluded studies: 26 were excluded because the sample fell outside the age range for this review; 26 were excluded because they did not include a measure of reactive aggression or impulsive aggression; 10 studies were excluded because they were not empirical studies; one study was excluded because it did not include a measure of suicide-related behaviors; and one study was excluded because it duplicated a sample of another study included in the review. One additional study was excluded because data needed for a meta-analysis were not available in the results section and the author did not respond to requests for data. Finally, we excluded one study that examined the association between reactive aggression and suicide in a sample of participants aged 14–72 (Mann, Waternaux, Haas, & Malone, 1999) because the mean age of the sample was 32 and it was impossible to determine how many adolescents were included in the sample (inclusion of the study in the meta-analysis did not alter conclusions). After reviewing all studies, seven studies met inclusion criteria and were included in this review.

We first provide a narrative review of the seven studies that met inclusion criteria. We then present preliminary data on the strength of the associations across the seven studies that reported associations between reactive aggression and suicide-related behaviors in terms of

Pearson's product moment correlation (r) or data that would allow calculation of a Cohen's d index of effect size. Although the interpretation of d and r is different, they are both standardized; therefore, one can be transformed into the other using the formula:

$r = d / (\sqrt{d^2 + 4})$. We converted d s into r s because converting an r into a d usually involves a loss of information and measures of association have the unique advantage of being bounded from -1 to 1 , whereas Cohen's d has no upper limit (Ellis, 2010). Cohen's (1988) guidelines were used to interpret the results such that a small effect was constituted by an r value less than $.10$, a medium effect by an r value between $.11$ and $.24$, and a large effect by an r value of $.25$ or greater. The sample size and age range of participants, measuring of reactive aggression, measuring of suicide-related behavior, main finding, and association between reactive aggression and suicide were also extracted from each study and can be found in Table 1.

We used the meta-analytic program developed by Hunter and Schmidt (2004) to average the effect sizes across the identified studies while controlling for sampling error. Following Hunter and Schmidt's recommendations, we report the total number of correlations included (k), the total sample size across the k correlations (N), the sample size weighted average correlation (r_{bar}), and the sample size weighted standard deviation (SDr). R_{bar} and SDr reflect the observed distribution of correlations. We report the residual standard deviation ($ResSD$), which is the amount of observed variability that remains across the total number of correlations after sampling error variance has been removed. The $ResSD$ is used to establish the confidence intervals around the weighted mean average correlation (r_{bar}). In addition, we report the percent of variance accounted for by sampling error ($\%vase$). Lastly, we report the 90% credibility value (CV), which indicates that 90% of the studies reported a correlation above that value. For example, if the 90% CV is >0 , this indicates that 90% of the studies reported a positive correlation. If the 90% CV is above zero but there is sizable variance, this indicates that the estimate is positive but varies in magnitude across samples (Ones, Viswesvaran, & Schmidt, 1993).

RESULTS

Studies included in this review are listed in Table 1. Each of the seven studies reported a statistically significant association between reactive aggression and suicide-related behaviors, including suicide (Angst & Clayton, 1998; Renaud, Berlim, McGirr, Tousignant, & Turecki, 2008), suicide ideation (Conner et al., 2004; Fite et al., 2009; Vermeiren et al., 2003), and nonfatal suicide attempt (Brent et al., 2002; Greening et al., 2010). In the following section, we briefly elaborate on the findings of each of the seven studies.

Narrative Review

Angst and Clayton (1998) examined the association between reactive aggression among 19-year-old boys and subsequent death by suicide, death by accident, and living controls over a 17-year follow-up period. Reactive aggression was measured at age 19. Individuals who died by suicide or accident scored significantly higher on reactive aggression than living controls; there was no significant difference in levels of reactive aggression between individuals who died by suicide or accident.

Brent et al. (2002) examined the association between impulsive aggression and suicide attempt in 183 youth offspring of suicide attempters and 116 youth offspring of nonattempters. Levels of impulsive aggression were significantly higher among youth who made a suicide attempt compared with youth who did not make an attempt.

Vermeiren et al. (2003) examined the associations between overt aggression and suicide ideation and attempt in a school sample of boys aged 12–18 years. Overt aggression was conceptually and operationally congruent with reactive aggression (Mann et al., 1999). The authors placed participants into four groups: a violent-only group (participants who committed more than one violent act but did not report suicidal behavior), a suicidal-only group (participants who reported suicide ideation or a suicide attempt but had not committed any violent acts), a suicidal–violent group (participants who committed more than one violent act and who reported suicide ideation or a suicide attempt) and a control group (participants who reported no suicide ideation nor committed more than one violent act). The violent-only, the suicidal-only, and the suicidal–violent groups had significantly higher levels of overt aggression compared with controls. The suicidal–violent group was highest on overt aggression. Because the two suicide groups lumped participants who reported either suicidal ideation or suicide attempt, it was unclear the extent to which reactive aggression was associated with suicide ideation, suicide attempt, or both.

Conner et al. (2004) investigated the association between reactive aggression and suicide ideation in a community sample of adolescent males aged 15–20 years. Reactive aggression, operationalized as high irritability and impulsivity, was significantly associated with suicide ideation and remained significant after controlling for alcohol, guilt, suspiciousness, and psychopathy.

Renaud et al. (2008) examined the association between impulsive aggression and suicide in a sample of suicide decedents and living controls aged 11–18 years matched on psychiatric diagnostic status. Impulsive aggression was assessed using proxy interviews and questionnaires. Suicide decedents scored significantly higher on impulsive aggression than matched living controls.

Fite et al. (2009) examined reactive aggression and suicide-related behaviors among 105 children (aged 6–12 years) admitted to an inpatient psychiatric center. Reactive aggression was significantly associated with suicide-related behaviors [scores on the Suicide Behavior Questionnaire–Child Version (SBQ-C; Cotton & Range, 1993)]. Because the SBQ-C total score is a sum of items that assess suicide ideation and suicide attempt, it was unclear the extent to which reactive aggression was associated with suicide ideation, suicide attempt, or both.

Greening et al. (2010) examined reactive aggression and suicide-related behaviors among 223 psychiatric inpatient children aged 6–12 years that partially overlapped with the sample in Fite et al. (2009). Reactive aggression was significantly associated with the presence of a nonfatal suicide attempt and with scores on the Risk of Suicide Questionnaire (RSQ; Horowitz et al., 2001); these associations did not remain statistically significant after controlling for depressive symptom severity. However, Greening et al. found that reactive

aggression was a significant moderator of the associations between depressive symptoms, suicide-related behavior (previous attempt, self-harm behaviors, suicide ideation), and gender: The association between depressive symptoms and suicide-related behavior was stronger among girls who scored high on reactive aggression than among girls who scored low on reactive aggression. Reactive aggression scores were not significantly associated with suicide-related behavior among boys with high or low depression symptom levels.

Overall, each of the seven studies reviewed found a significant association between reactive aggression and suicide-related behaviors, including suicide (Angst & Clayton, 1998; Renaud et al., 2008), suicide ideation (Fite et al., 2009; Fite, Rathert, Stoppelbein, & Greening, 2012; Vermeiren et al., 2003), and nonfatal suicide attempt (Greening et al., 2010). These studies thus provide consistent evidence of an association between higher levels of reactive aggression and the presence and/or level of suicide-related behaviors. In the following section, we examine the strength of this association using meta-analytic techniques.

Preliminary Meta-Analysis

One study reported multiple correlation coefficients between suicide-related behaviors and reactive aggression (Greening et al., 2010). We used the correlation coefficient between reactive aggression and suicide attempt ($r = .21$) in the meta-analysis instead of the correlation coefficient between reactive aggression and scores on the Risk for Suicide Questionnaire (RSQ; $r = .26$). This decision was made because scores on the RSQ lump ideation and attempt; therefore, RSQ scores could not differentiate the degree to which reactive aggression was associated with ideation, attempt, or both. Of note, we selected the smaller coefficient, thus providing a more conservative estimate of the overall effect size.

As shown in Table 2, the overall association between reactive aggression and suicide-related behaviors using data from all seven studies was positive and of medium size ($r_{\text{bar}} = .25$; 95% CI = 0.17, 0.32). The 90% CV was 0.19, indicating that 90% of studies reported a correlation coefficient greater than 0.19. The low ResSD value (ResSD = 0.04, %varse = 42.50) indicates a generalizable effect size (i.e., the effect size was consistent across studies), although the generalizability of the effect size should be interpreted in the context of a low number of studies.

DISCUSSION

Each of the seven studies included in this review reported a statistically significant association between reactive aggression and suicide-related behaviors, including suicide (Angst & Clayton, 1998; Renaud et al., 2008), nonfatal suicide attempt (Brent et al., 2002; Greening et al., 2010), and suicide ideation (Conner et al., 2004; Fite et al., 2009; Vermeiren et al., 2003). Results from a preliminary meta-analysis on the seven studies indicate a consistent, medium-sized association between reactive aggression and suicide-related behaviors in children and adolescents. The extant literature, albeit small, thus provides preliminary evidence of a relationship between higher levels of reactive aggression and of the presence and/or severity of suicide-related behaviors in children and adolescents.

In spite of this evidence, there remain multiple unknowns about the association between reactive aggression and suicide-related behaviors in children and adolescents. For example, potential moderators and mediators of the association between reactive aggression and suicide-related behaviors have yet to be thoroughly examined, and the small existing empirical literature did not permit examination of variables like gender or psychopathology as moderators of the association in the preliminary meta-analysis. Also unknown is the extent to which reactive aggression increases the risk of suicide-related behaviors over time; only one study included in this review used a longitudinal design (Angst & Clayton, 1998), and the sample in that study was limited to male participants.

To inform future research to address these “unknowns,” in the following section we propose a theoretical model of the relationship between reactive aggression and suicide-related behaviors in children and adolescents. When possible, the model was informed by empirical findings. In the absence of empirical data, we drew upon theoretical literature relevant to reactive aggression, suicide-related behaviors, and child and adolescent development.

Proposed Theoretical Model Linking Reactive Aggression to Suicide-Related Behaviors

The proposed theoretical model of the distal processes by which reactive aggression increases the risk for suicide-related behaviors among children and adolescents is presented in Figure 1. The model does not include all potential risk factors for suicide-related behaviors and we acknowledge some paths in the model are likely to be bidirectional. This model also does not include potential precursors to reactive aggression (e.g., emotion dysregulation), as our focus was on the pathways from reactive aggression to suicide-related behaviors. However, we view this model as a reasonable launching point that attempts to provide a parsimonious account of key pathways from reactive aggression to suicide. The model draws upon research on reactive aggression and the interpersonal–psychological theory of suicide (IPTS; Joiner, 2005). The IPTS proposes that perceptions of social disconnection and being a burden on others lead to the desire for death, meaning suicide ideation. As Figure 1 shows, we propose that reactive aggression leads to suicide ideation indirectly through three paths: social disconnection, perceived burdensomeness toward others, and depression.

In the first path, reactive aggression leads to suicide ideation through interpersonal rejection and social disconnection. Chronic reactive aggression has been found to be associated with peer rejection and peer victimization (Card & Little, 2006; Hubbard et al., 2010; Salmivalli & Helteenvuori, 2007). Research supports a bidirectional association between reactive aggression and peer rejection and victimization: Displays of reactive aggression lead to peer rejection and victimization, which in turn lead to further displays of reactive aggression in response to rejection and victimization (Hubbard et al., 2010; Miller-Johnson, Coie, Maumary-Gremaud, & Bierman, & Conduct Problems Prevention Research Group, 2002; Salmivalli & Helteenvuori, 2007). Rejection, victimization, and interpersonal difficulties lead to loneliness and chronic social disconnection (Ladd & Troop-Gordon, 2003). Social disconnection and interpersonal rejection, in turn, are associated with suicide ideation (Buitron et al., 2016; Hill et al., 2015; Prinstein, Boergers, Spirito, Little, & Grapentine, 2000; Venta, Mellick, Schatte, & Sharp, 2014).

In the second path, reactive aggression is linked to disciplinary and legal problems, which indirectly leads to suicide ideation through perceptions of burdensomeness toward others. Reactive aggression has been found to be significantly associated with classroom rule violations, in-school detentions, suspensions, arrests, and gang involvement (Atkins et al., 2002; Barker et al., 2006; Brown, Atkins, Osborne, & Milnamow, 1996; Waschbusch et al., 1998), even after controlling for proactive aggression (Marsee et al., 2011). We are not aware of any published studies that have investigated the association between disciplinary problems and perceived burdensomeness, but we believe it is likely that as a consequence of disciplinary/legal problems, some reactive aggressive individuals may experience feelings of burdensomeness toward others such as family members (e.g., reactive aggression has been found to be associated with feelings of shame and remorse; Dodge et al., 1997). School disciplinary problems and legal problems such as arrests strain family resources in terms of time, finances, and emotional well-being (cf. Knapp, Scott, & Davies, 1999). Such strains may lead children and adolescents to perceive themselves as a burden on their families. Evidence indicates perceived burdensomeness toward others is significantly associated with suicide ideation in youth (Buitron et al., 2016; Hill et al., 2015; Venta et al., 2014).

In the third path, the interpersonal rejection and disciplinary/legal problems stemming from reactive aggression lead to depressive experiences and negative affect, which in turn lead to suicide ideation. Social problems have been shown to mediate the relationship between reactive aggression and depressive symptoms (Fite et al., 2012). Further, research has also shown that rejection is significantly associated with depression and negative affect in youth (Dill, Vernberg, Fonagy, Twemlow, & Gamm, 2004; Joiner, 1999) and that rejection precedes depression in youth (Nolan, Flynn, & Garber, 2003). Disciplinary/legal problems have also been found to be significantly associated with depression (Fergusson, Horwood, & Ridder, 2005; Furr, Westefeld, McConnell, & Jenkins, 2001). Depression and negative affect, in turn, are significant predictors of suicide ideation in adolescence (Hendin, Maltsberger, & Szanto, 2007; Kovacs, Goldston, & Gatsonis, 1993; Lewinsohn, Rohde, & Seeley, 1994). This path is consistent with findings that the associations between reactive aggression and suicide-related behaviors did not remain statistically significant after controlling for depressive symptom severity (Greening et al., 2010).

We propose bidirectional associations between social disconnection, perceived burdensomeness, and depression/negative affect (Figure 1). That is, distorted beliefs about social disconnection and/or being a drain on others are proposed to lead to escalations in depression and negative affective states, which may in turn lead to further escalations in the severity of cognitive distortions. To the extent these cognitive distortions and negative affective states become prolonged, individuals are likely to become hopeless about these states and suicide ideation is more likely to result (Van Orden et al., 2010).

The IPTS also proposes that, for individuals to die by suicide, they must be capable of enacting lethal self-harm (Joiner, 2005). Capability is viewed as a learned ability to overcome the fear of pain and death, acquired through repeated exposure to painful and provocative events. The IPTS proposes that the relationship between suicide ideation and a lethal or near-lethal suicide attempt is moderated by capacity for self-harm (Figure 1). That is, the relationship between suicide ideation and suicide attempt is stronger when an

individual has a high capacity for self-harm. We propose that reactive aggression leads to capacity for self-harm (Figure 1) through repeated experience with violent and hostile events (Dodge et al., 1997). Individuals high in reactive aggression, as compared to individuals low in reactive aggression, are more likely to be involved in gangs that engage in violent acts (Barker et al., 2006), to engage in physical violence against their partners (Brendgen, Vitaro, Tremblay, & Lavoie, 2001), and to experience painful and/or violent confrontations as part of the phenomenology of reactive aggression. The experience of violent and painful acts is proposed to contribute to an increased tolerance to pain and lowered fear of death, therefore increasing one's capability to enact self-harm (Christensen, Batterham, Soubelet, & Mackinnon, 2013; Van Orden, Witte, Gordon, Bender, & Joiner, 2008; Van Orden et al., 2010). The joint presence of suicide ideation and capacity for self-harm is proposed to predict suicide attempt (Joiner, 2005; Van Orden et al., 2010).

SUMMARY

Evidence supports a significant association between reactive aggression and suicide-related behaviors in children and adolescent. Nevertheless, questions remain regarding the nature of this association. The present review identified some of those questions and proposed a model to stimulate theory-driven research on this topic. There is a pressing need to examine the association between reactive aggression and suicide-related behaviors using prospective designs. Further, there is a need to systematically investigate potential moderators and mediators of the association between reactive aggression and suicide-related behaviors to inform suicide prevention strategies. Our theoretical model, informed by existing empirical literature and the IPTS, highlights social disconnection, perceived burdensomeness toward others, and depression as potential mediators and capacity for self-harm as a potential moderator. We encourage future research to test these components of our theoretical model and to consider possible points of convergence between our model and other theoretical accounts of aggression and suicidal behaviors, such as Joiner's account of murder-suicide as a misapplication of justice (Joiner, 2014). Our model and the misapplied justice account both posit aggressive acts performed in response to perceived provocation or injustice. An interesting avenue of inquiry would be to examine whether the distal pathways proposed in our model may set the stage for proximal processes involved in murder-suicide as a misapplication of justice.

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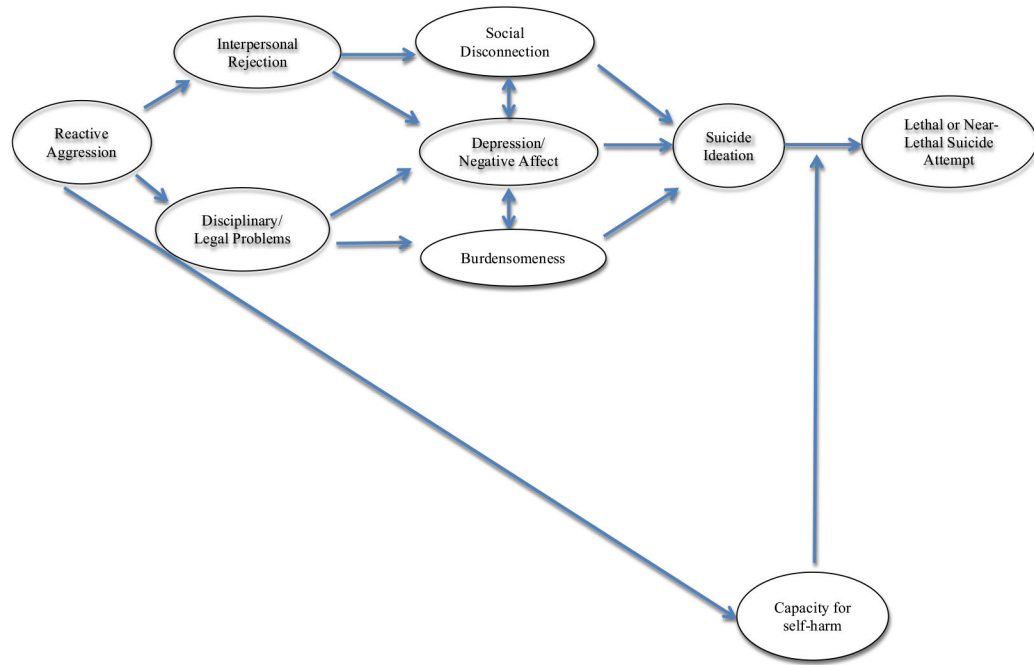


Figure 1. Theoretical model of distal paths by which reactive aggression leads to suicide-related behavior.

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TABLE 1
 Studies Examining the Association Between Reactive Aggression and Suicide-Related Behaviors in Children and Adolescents

| Authors | Sample | Reactive aggression measure(s) | Suicide-related behaviors measure(s) | Main finding | r |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----|
| Angst and Clayton (1998) | 2,754 living control subjects, 28 suicide decedents, 34 accidental death victims, all males aged 19 years | Freiburg Personality Inventory: Aggressivity factor | Suicide as indicated on Federal Register of Deaths | Reactive aggression was significantly higher in suicide decedents | .24 |
| Brent et al. (2002) | 19 attempters and 213 nonattempters aged 10–19 years (<i>M</i> age = 19.7 years) | Buss-Durkee Hostility Inventory/Child Hostility Inventory | Columbia University Suicide History Form, Medical Damage Lethality Rating Scale, Beck Suicide Intent Scale | Reactive aggression was significantly associated with the presence of a suicide attempt | .38 |
| Vermeiren et al. (2003) | 631 school students aged 12–18 years (<i>M</i> age = 14.9 years) | Buss-Durkee Hostility Inventory | Presence or absence of suicide ideation and attempt | Scores of reactive aggression were significantly higher among students who endorsed suicide ideation and a nonfatal attempt | .19 |
| Conner et al. (2004) | 625 males aged 15–20 years (<i>M</i> age was not reported) | Buss-Durkee Hostility Inventory/ Psychopathic States Inventory | Answer how often have you had thoughts of ending your life on a scale from “not at all” to “extremely” | Reactive aggression was significantly associated with suicide ideation | .23 |
| Renaud et al. (2008) | 49 suicide decedents and 49 controls aged 11–18 years (<i>M</i> age = 16.8 years for suicide decedents, <i>M</i> age = 16.9 years for controls) | Buss-Durkee Hostility Inventory | Death certificates obtained from coroner’s office | Suicide decedents scored significantly higher on reactive aggression | .35 |
| Fite et al. (2009) | 105 psychiatric inpatients aged 6–12 years (<i>M</i> age = 9.6 years) | Dodge and Coie’s (1987) proactive and reactive aggression measure | Suicide Behavior Questionnaire–Child Version (SBQ-C) | Reactive aggression was significantly associated with a higher score on the SBQ-C | .48 |
| Greening et al. (2010) | 223 psychiatric inpatients aged 6–12 years (<i>M</i> age = 9.49 years) | Dodge and Coie’s (1987) proactive and reactive aggression measure | Risk of Suicide Questionnaire (RSQ) and a clinical interview | Reactive aggression was significantly associated with a higher risk for suicide attempts and a higher score on the RSQ | .21 |

TABLE 2

Results of Preliminary Meta-Analysis

| Category | <i>K</i> | <i>N</i> | <i>Rbar</i> | <i>SDr</i> | <i>ResSD</i> | % <i>v</i> arse | 95% <i>CI</i> | 90% <i>CV</i> |
|----------|----------|----------|-------------|------------|--------------|-----------------|---------------|---------------|
| Overall | 7 | 4,693 | .25 | .05 | 0.04 | 42.50 | 0.17, 0.32 | 0.19 |

K, number of correlations meta-analyzed in that category; *N*, total sample size across the *k*-studies meta-analyzed; *rbar*, sample size weighted mean correlation coefficient; *SDr*, standard deviation of correlation coefficient; *ResSD*, standard deviation of the residual; %*v*arse, percent of variance accounted for by sampling error; 95% *CI*, 95% confidence interval; 90% *CV*, value that indicates that 90% of the estimates lie above that value or magnitude.