



Risk and Protective Effects of Need for Approval on Self-Injury in Adolescent Girls

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Abstract

The goal of this research was to expand theoretical models of adolescent suicide by exploring whether individual differences in adolescent girls' need for approval (NFA_{avoid} and NFA_{approach}) contribute to risk for, or protection against, self-injurious thoughts and behaviors (SITBs). We examined these novel hypotheses in a series of concurrent and longitudinal analyses in two samples of adolescent girls (Study 1: $N=89$, $M_{\text{age}}=16.31$ years, $SD=0.84$, 67.4% White; Study 2: $N=229$, $M_{\text{age}}=11.80$, $SD=1.80$, 49.8% White). Hierarchical linear and logistic regressions revealed that NFA_{avoid} was generally associated with higher risk for SITBs, whereas NFA_{approach} generally had a protective effect against SITBs; moreover, the strength of these associations depended on the extent to which girls engaged in rumination. Together, these results suggest that encouraging girls to develop diverse foundations for their sense of self-worth beyond peer judgements may protect against SITBs.

Keywords Adolescent girls · Need for approval · Rumination · Self-injurious thoughts and behavior

Introduction

In the United States, suicide is the 2nd leading cause of death among youth, with rates of suicide increasing by 33% from 1997 to 2017 [1]. Rates of self-injurious thoughts and behaviors (SITBs), including suicide ideation, suicidal behaviors,

and non-suicidal self-injury (NSSI), have increased over the past several years [2]. To address this epidemic among youth and create more effective suicide prevention and intervention programs, it is critical to identify relevant and modifiable psychosocial risk factors. The present research investigated novel risk and protective factors for SITBs in adolescents, namely the extent to which self-worth is depleted by peer disapproval (avoidance-oriented need for approval, NFA_{avoid}) or enhanced by peer approval (approach-oriented need for approval; NFA_{approach}). Further, we sought to understand the extent to which the impact of NFA is amplified by adolescents' tendency to engage in brooding rumination. In particular, this study investigated the independent and interactive contributions of NFA and rumination to the independent outcomes of suicide ideation, suicidal behaviors, and NSSI in the context of two longitudinal studies of girls, one involving a general community sample and the other involving an at-risk sample.

Self-Injurious Thoughts and Behaviors in Adolescent Girls

SITBs are a major public health concern for youth, particularly adolescent girls. According to the CDC, the largest percentage increase in rates of suicide from 2009 to 2019

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occurred in girls aged 10–14 years [3], and 30% of adolescents report thoughts about suicide at some point in their lives [4]. Suicide ideation, which involves thinking about or planning to engage in behavior with the intent to end one's life [5], tends to first emerge in adolescence, and is higher among adolescents compared to all other age groups [6], especially among girls [4]. Similarly, suicidal behaviors, which involve taking actions related to ending one's life, including suicide plans, aborted attempts, and actual attempts, also are exceptionally high during adolescence [7], and are more prevalent among teenage girls [8].

NSSI, or direct and deliberate destruction of one's own body tissue without suicidal intent, typically emerges between the ages of 11–15 [9, 10] and occurs in as many as 13–23% of community adolescents [9]. Further, some research suggests that NSSI is more common among females than males ([11], for a meta-analysis, see Bresin and Schoenleber [12]), and female adolescents report a significantly earlier age of NSSI onset than boys [13]. However, gender differences in the rates of NSSI appear to be stronger in clinical samples than community samples [12], and other research suggests similar patterns in features of NSSI across gender [14]. Although suicide ideation and NSSI are strong predictors of suicidal behavior [15, 16], there is not a one-to-one correspondence. Further, suicide ideation, suicide behaviors, and NSSI share overlapping characteristics, but are distinct constructs [17]. Therefore, it is important to examine how relevant psychosocial risk and protective factors contribute to each type of SITB, and if there are any differences among these associations in order to understand how to reduce all forms of SITBs. Further, because risk for SITBs is both imminent and tends to accumulate over time, particularly for individuals who have already engaged in SITBs [13], it is important to examine risk and protective factors for SITBs concurrently and longitudinally.

Need for Approval

The interpersonal theory of suicide [18] posits that SITBs develop when individuals experience feelings of thwarted belongingness and perceived burdensomeness. As humans have an innate need to belong and receive approval from significant others [19], thwarted belongingness occurs when humans' fundamental need to belong is challenged, such as through peer conflict or social exclusion. Supporting the role of thwarted belongingness, extensive research documents the links between social rejection experiences and SITBs [20–22]. Several components of peer functioning (e.g., peer rejection, low friendship support) are concurrently and longitudinally associated with higher levels of suicide ideation and behaviors [23, 24]. Further, adolescents frequently name interpersonal stressors as preceding their self-injurious behavior [25, 26]. Perceived burdensomeness occurs when

social disconnection is interpreted as a result of personal fault, resulting in the belief that one's death is worth more than their life [18]. Together, these feelings interact to foster the development of hopelessness, which increases individuals acquired capability for suicide, leading to higher risk for suicide ideation and behaviors. Further, behavioral models of self-harm highlight psychological and social pain as precipitants of NSSI, suggesting that NSSI is used as a means to modulate negative affect [10]. Other research suggests that NSSI has interpersonal functions, including facilitating peer-bonding and establishing social support. Thus, adolescents may be more likely to engage in NSSI in response to feelings of thwarted belongingness and perceived burdensomeness in order to improve affect and foster social connection.

Building on these ideas, sociometer theory suggests that self-worth is the psychological gauge used to determine this sense of belongingness [27]. During adolescence, peer relationships become particularly salient for developing self-worth [28] as adolescents become increasingly focused on peer affiliation and evaluation [29]. This is particularly true for adolescent girls (for a review, see [30]), as girls tend to show especially high levels of social-evaluative concerns [31], affiliative needs, and sensitivity to conflict and rejection [32]. Therefore, successful or unsuccessful peer affiliation may contribute to adolescent girls' sense of self-worth, particularly among girls whose self-worth is largely dependent on peer approval. This idea of contingent self-worth is reflected in the concept of need for approval (NFA; [33]), which refers to the extent to which self-worth is depleted by peer disapproval (avoidance-oriented need for approval, NFA_{avoid}) or enhanced by peer approval (approach-oriented need for approval; NFA_{approach}). In other words, NFA is an individual difference that may explain why certain adolescents are at heightened risk for SITBs. In support of this argument, past research on social rejection and the need to belong has asserted that individual-level differences are a significant factor in one's ability to cope with distress [34]. Further, other research has demonstrated that subjective (but not objective) feelings of rejection precipitate NSSI [35]. Therefore, NFA may explain why certain adolescents seem to particularly benefit or suffer in the context of peer relationships.

If girls have high levels of NFA, their self-worth will likely fluctuate depending on their current social context. Specifically, girls with high NFA_{avoid} will be particularly sensitive to negative feedback from peers (e.g., peer rejection), leaving them vulnerable to feelings of thwarted belongingness. However, girls with high NFA_{approach} will be particularly sensitive to positive feedback from peers (e.g., peer acceptance), thus creating a sense of belonging. Therefore, we hypothesized that girls high in NFA_{avoid} would be at higher risk for suicide ideation and behaviors, whereas those high in NFA_{approach} would be protected against suicide

ideation and behaviors, concurrently and over time. Further, as NSSI has been shown to have both intrapersonal functions (e.g., reducing negative affect) and interpersonal functions (e.g., facilitating peer-bonding) [10, 36], girls with high NFA_{avoid} may be more likely to engage in NSSI to modulate affect and reestablish a sense of social connection. In contrast, girls with high NFA_{approach} may be more likely to emotionally and socially benefit from positive peer feedback, protecting them from NSSI. Therefore, we hypothesized that girls high in NFA_{avoid} would be at more risk for NSSI, whereas those high in NFA_{approach} would be protected against NSSI, concurrently and over time.

The Moderating Role of Brooding Rumination

Given that adolescence is a time when emotion regulation skills are still developing [37] and adolescents are less likely to use adaptive emotion regulation strategies (e.g., problem solving, acceptance) compared to younger and older age groups [38], adolescents' ability to regulate affective states resulting from high levels of NFA may modify the respective effects of NFA_{avoid} and NFA_{approach} on SITB risk. Specifically, when adolescents are still developing emotion regulation skills, they often resort to an involuntary response to stress called *brooding rumination* [39]. Brooding rumination involves passive, repetitive, and judgmental thoughts about emotions or stress, and is associated with a higher risk of SITBs (for a review, see [40]).

Adolescents with high NFA_{avoid} may experience lower self-worth, and more negative emotional arousal if they engage in high levels of brooding rumination compared to low levels of brooding rumination, exacerbating their risk of SITBs. Conversely, the protective effects of high levels of NFA_{approach} may be particularly relevant to girls who engage in frequent brooding rumination as compared to infrequent brooding rumination, lowering their risk of SITBs. Given that brooding rumination is especially high during adolescence [39], particularly among girls [41], is stable over time [42], and is significantly associated with suicide risk [40], understanding how this cognitive tendency interacts with NFA may help inform how to lower short- and long-term risk of SITBs in this high-risk population by highlighting specific skills to target in prevention and intervention efforts [43]. To explore these issues, we examined whether brooding rumination moderates the association between NFA and SITBs among girls.

Study Overview

Based on theory and past research [18, 19, 36, 40], we hypothesized that NFA_{avoid} would be associated with higher

risk of SITBs, whereas NFA_{approach} would have a protective effect against SITBs. Further, we hypothesized that NFA_{avoid} would be more strongly associated with SITBs in adolescent girls who engage in high levels of brooding rumination as compared to those who engage in low levels of brooding rumination. Conversely, we hypothesized that the protective effects of NFA_{approach} would be particularly relevant to girls who engage in high levels of brooding rumination, as girls who are low in brooding rumination would already generally be protected against SITBs [44, 45]. NFA and rumination may contribute to proximal risk for, or protection from, SITBs, moreover, levels of NFA [46] and rumination [42] have been found to be increasingly stable in adolescence, thus making them viable candidates for trait markers of risk/resilience. We therefore examined the predictive power of NFA and rumination over both the short-term (i.e., concurrently) and the long-term (i.e., across several months). To create a comparable timeframe for assessing longitudinal SITB risk across two separate studies, we selected similar follow-up time points (nine months post-baseline in Study 1 and eight months post-baseline in Study 2). Moreover, given that NFA and rumination may contribute to risk for (or protection from) internalizing symptoms through more feelings of thwarted belongingness (or more sense of belonging), leading to higher (or lower) levels of depression, we conducted supplemental analyses to examine whether depressive symptoms mediated the contribution of NFA or $NFA \times$ Rumination interactions to SITBs (see *Supplemental Material* for details).

We examined these hypotheses using two distinct groups of adolescent girls. Although this framework is applicable to adolescents in general, we focused on adolescent girls because relative to boys, adolescent girls show particularly high levels of emotional intensity and instability [47]. Girls also demonstrate a heightened need to belong, which more strongly predicts self-esteem and internalizing symptoms in girls than in boys [48, 49]. Moreover, relative to boys, girls show more connection-oriented goals, heightened sensitivity to peer evaluations, and more reactivity to interpersonal stress [30, 50]. Given that adolescent girls are at particularly high risk for social-evaluative concerns, in addition to brooding rumination [41] and SITBs [3, 4], it is important to investigate how these factors interact in this population, specifically. Further, we examined these hypotheses in a community sample (Study 1) and an at-risk sample (Study 2) in order to understand how these psychosocial risk and protective factors interact across varying levels of SITB severity, allowing for generalization of our findings to both community and at-risk populations.

Study 1

Method

Participants and Procedures

Participants were 89 adolescent girls ($M_{\text{age}} = 16.31$, $SD = 0.84$, range = 14–17 years; 67.4% White, 21.3% African American, 3.4% Latinx, 1.1% Asian, 6.8% “other”) with diverse socioeconomic backgrounds (43.3% under \$60,000, 17.8% \$60,000–89,000, and 38.9% over \$90,000) who were recruited from high schools in the central Midwest region of the United States after the summer of 9th, 10th, or 11th grade (for additional details about the sample, see [51]). Girls participated in a laboratory visit during which they completed several questionnaires as well as other tasks unrelated to these analyses. At baseline and a nine-month follow-up, participants completed the Mini International Neuropsychiatric Interview. One participant in the study did not complete the baseline suicide ideation measure and three other participants did not complete the follow-up assessment, resulting in an analytic sample of 89 participants for analyses involving the baseline data and 86 participants for analyses involving the follow-up data. Participants received monetary compensation for both visits. Parents provided written consent and youth provided written assent. All procedures were approved by the university Institutional Review Board.

Measures

Supplemental Table 1 presents descriptive and psychometric data for the measures (see *Supplemental Material*).

Need for Approval Participants completed an eight-item measure assessing the extent to which they rely on peer approval to determine their self-worth [33]. The NFA_{avoid} subscale assesses the extent to which peer disapproval weakens a child’s sense of self-worth (4 items; e.g., “I feel ashamed of myself when other kids don’t like me.”). The NFA_{approach} subscale assesses the extent to which peer approval augments a child’s sense of self-worth (4 items; e.g., “I feel proud of myself when other kids like me.”). Each item was rated on a scale of 1 (*Not at All*) to 5 (*Very Much*). Scores were computed as the mean of the items, with higher scores indicating higher levels of NFA. This measure demonstrates strong reliability and validity [52]. NFA_{avoid} ($\alpha = 0.92$) and NFA_{approach} ($\alpha = 0.91$) showed good reliability in the current sample.

Rumination Participants completed a five-item measure assessing the extent to which they engage in brooding rumination when they have a problem or feel stressed. Items were drawn from the brooding subscale of the Rumination Response Scale (RRS; [53], e.g., “I think ‘why can’t I handle things better?’”). To focus specifically on stress-reactive rumination, instructions for the measure were modified slightly from: “People think many different things when they feel stressed or upset” to: “People think many different things when they feel stressed.” The rest of the instructions were unchanged: “Please read each of the items below and fill in the appropriate bubble indicating whether you almost never, sometimes, often, or almost always think each one when you feel stressed.” Each item was rated on a 4-point scale from 1 (*Almost Never*) to 4 (*Almost Always*). Scores were computed as the mean of the five items, with higher scores indicating more rumination. The RRS has been shown to have strong reliability and validity [54] and showed good reliability in the present sample ($\alpha = 0.82$).

Suicide Ideation At baseline, participants completed the Suicide Ideation Questionnaire Inventory-Junior (SIQ-Jr; [55]), which is a 15-item questionnaire for adolescents designed to assess suicide ideation in the past month (e.g., “I thought that killing myself would solve my problems.”). Each item was rated on a 7-point scale from 0 (*Almost Every Day*) to 6 (*I Never Had this Thought*). All items were reverse-scored such that that higher scores indicated more suicide ideation; scores were computed as the sum of the items. Prior research has established strong reliability and validity for the SIQ-Jr [56] and showed strong reliability in the present sample ($\alpha = 0.97$).

At baseline and follow-up, participants completed one item from the Mini International Neuropsychiatric Interview (MINI; [57]) to assess presence of suicide ideation over the past three months. For each episode of depressive symptoms (including up to three episodes, reflecting the maximum number reported by any participant), participants were asked the questions: “Did you feel so bad that you wished you were dead? Did you think about hurting yourself? Did you have thoughts of death? Did you think about killing yourself?” If participants responded yes to any of these questions, they received a score of 1, otherwise they received a score of 0. Responses were summed across all three potential depressive episodes and calculated as total scores for baseline and for follow-up, with potential scores ranging from 0 (*no suicide ideation*) to 3 (*three experiences of suicide ideation*) for each time point. This item was chosen to assess suicide ideation as it captures a range of suicidal thoughts similarly assessed by other validated measures of suicide ideation (e.g., SIQ-Jr).

The MINI has been found to be a valid and reliable tool for assessing suicide ideation in adolescents [58].

Concurrent analyses were conducted using the baseline SIQ-Jr. scores, which provide a comprehensive assessment of suicide ideation, whereas follow-up analyses were conducted using the baseline and follow-up MINI scores because the SIQ-Jr was not administered at follow-up.

Data Analysis Plan

First, correlations among all study variables were examined. Next, two hierarchical linear regression analyses were conducted to examine the independent and interactive contributions of NFA (NFA_{avoid} and NFA_{approach}) and rumination to baseline suicide ideation (SIQ-Jr) and follow-up suicide ideation (MINI). Given that past research has found NFA_{avoid} and NFA_{approach} to be positively correlated [46, 51] and there was a positive correlation between NFA_{avoid} and NFA_{approach} in our sample ($r=0.57$), their main effects and interactions with rumination were entered into the same models to examine their distinct effects (for a similar approach, see [51]). All predictor variables were standardized prior to creating the interaction terms and entering them into the models. The main effects of NFA_{avoid} , NFA_{approach} , and rumination were entered at the first step, and the two-way interactions ($NFA_{\text{avoid}} \times \text{Rumination}$ and $NFA_{\text{approach}} \times \text{Rumination}$) were entered at the second step. Longitudinal analyses using the 9-month follow-up scores adjusted for baseline MINI scores. To decompose significant interactions, simple slopes were estimated at low ($-1 SD$) and high ($+1 SD$) levels of rumination [59]. Regions of Significance (RoS) testing [60] was conducted to determine at what levels of rumination differences emerged in the associations between NFA and SITBs. Supplemental analyses controlled for age and race (see *Supplemental Material* for details).

Results

Intercorrelations Among the Variables

Supplemental Table 1 presents the intercorrelations among the variables (see *Supplemental Material*). NFA_{avoid} was significantly positively correlated with NFA_{approach} , rumination and baseline suicide ideation (both SIQ-Jr. and MINI). NFA_{approach} was significantly positively correlated with rumination. Rumination was significantly positively correlated with baseline suicide ideation (both SIQ-Jr. and MINI) and marginally significantly positively correlated with follow-up suicide ideation (MINI). SIQ-Jr. baseline suicide ideation was significantly positively correlated with MINI baseline suicide ideation and marginally positively significantly correlated with follow-up suicide ideation (MINI).

Rates of Suicide Ideation

At baseline, 10.1% of participants reported experiencing suicide ideation within the past month on the SIQ-Jr, with three of these participants reporting suicide ideation above the clinical cut-off. Additionally, 10.0% of participants reported experiencing suicide ideation within the past 3 months at baseline on the MINI. At the follow-up, 5.7% of participants reported experiencing suicide ideation within the past 3 months on the MINI. Given the relatively low rates of suicide ideation in this community sample, results should be interpreted with caution.

NFA and Rumination Predicting Suicide Ideation

Baseline Suicide Ideation

The regression predicting past-month suicide ideation (SIQ-Jr.) assessed at baseline revealed a significant positive main NFA_{avoid} , a significant positive main effect of rumination, a marginally significant negative main effect of NFA_{approach} , and a significant $NFA_{\text{avoid}} \times \text{Rumination}$ interaction (see Table 1). As hypothesized, simple slope analyses revealed

Table 1 Study 1: contributions of need for approval and rumination to suicide ideation

Variable	β	SE	t
Suicide ideation			
Suicide ideation: baseline			
Step 1			
Baseline NFA_{avoid}	0.33	1.39	2.62*
Baseline NFA_{approach}	-0.20	1.29	-1.69 [^]
Baseline Rumination	0.31	1.17	2.95**
Step 2			
Baseline $NFA_{\text{avoid}} \times \text{Rumination}$	0.34	1.25	2.95**
Baseline $NFA_{\text{approach}} \times \text{Rumination}$	-0.10	1.28	-0.89
Suicide ideation: follow-up			
Step 1			
Baseline suicide ideation	0.04	0.08	0.37
Step 2			
Baseline NFA_{avoid}	0.14	0.06	0.98
Baseline NFA_{approach}	-0.12	0.05	-0.89
Baseline rumination	0.20	0.05	1.59
Step 3			
Baseline $NFA_{\text{avoid}} \times \text{Rumination}$	0.30	0.05	2.21*
Baseline $NFA_{\text{approach}} \times \text{Rumination}$	-0.12	0.05	-0.98

At baseline, suicide ideation was assessed using the SIQ-Jr. At follow-up, suicide ideation was assessed using the MINI. Follow-up analyses controlled for the MINI suicide ideation at baseline

NFA_{avoid} need for approval, NFA_{approach} need for approval

[^] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

that NFA_{avoid} was significantly associated with more past-month suicide ideation in girls with high, $B = 7.59$, $SE = 1.46$, $t(84) = 5.22$, $p < 0.001$, but not low, $B = -0.35$, $SE = 2.21$, $t(84) = -0.16$, $p = 0.876$ levels of rumination (see Fig. 1a). RoS tests indicated that a significant positive association between NFA_{avoid} and past-month suicide ideation emerged at ≥ -0.17 SDs on rumination. The remaining effects were nonsignificant (see Table 1).

Follow-up Suicide Ideation

The regression predicting follow-up suicide ideation (MINI) revealed a significant $NFA_{\text{avoid}} \times$ Rumination interaction (see Table 1). As hypothesized, simple slope analyses revealed that NFA_{avoid} significantly predicted more follow-up suicide ideation in girls with high, $B = 0.17$, $SE = 0.06$, $t(84) = 2.70$, $p = 0.008$, but not low $B = -0.06$, $SE = 0.09$, $t(84) = -0.70$, $p = 0.483$, levels of rumination (see Fig. 1b). RoS tests indicated that a significant positive association between NFA_{avoid} and follow-up suicide ideation emerged at ≥ 0.42 SDs on rumination. The remaining effects were nonsignificant (see Table 1).

See *Supplemental Material* for a summary of the results.

Study 2

Method

Participants and Procedures

The sample included 229 participants (90.4% girls, 9.6% transgender, gender-fluid, or non-binary; $M_{\text{age}} = 11.8$, $SD = 1.80$, range 9–15 years; 49.8% White, 27.5% African

American, 7.4% Latinx, 1.3% Asian, 1.3% American Indian or Alaska Native, and 12.7% more than one race or “other”), with diverse socioeconomic backgrounds (15.0% under \$60,000, 52.4% \$60,000–89,000, and 32.6% over \$90,000) who were recruited as part of a larger longitudinal study investigating responses to stress and risk for psychopathology and SITBs in girls (see *Supplemental Material* for details). Participants completed self-report questionnaires and a structured interview at baseline during a laboratory visit, and again at an eight-month follow-up visit during a laboratory visit or phone call. Participants received monetary compensation at each visit. Parents provided written consent and youth provided written assent. All procedures were approved by the university Institutional Review Board. There are a handful of studies that have been published with this dataset (e.g., [61–63]); however, this study is the first using this dataset to examine how NFA and its interaction with rumination predict SITBs.

Measures

Supplemental Table 2 presents descriptive and psychometric data for the measures (see *Supplemental Material*).

Need for Approval To assess need for approval, participants completed the Need for Approval Questionnaire ([33], see Study 1 for details). Both NFA_{avoid} ($\alpha = 0.91$) and NFA_{approach} ($\alpha = 0.90$) showed good reliability in the current sample.

Brooding Rumination To assess brooding rumination, participants completed two items from the Responses to Stress Questionnaire (RSQ; [64]). Responding to the prompt “When I have problems with other kids...” participants rated on a 4-point scale from 1 (*Not at All*) to 4 (*A Lot*): the

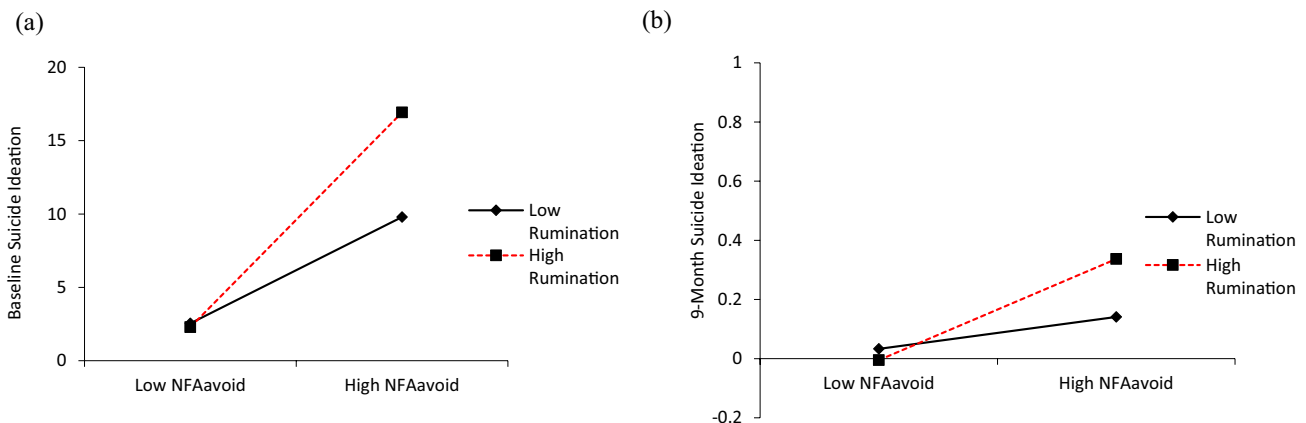


Fig. 1 Study 1: predicting SITBs at (a) baseline and (b) 9 months later from the interactive contribution of need for approval (NFA) and rumination. (a) Higher levels of NFA_{avoid} were associated with more past-month suicide ideation assessed at baseline for youth exhibiting

high levels of rumination. In addition, (b) higher levels of NFA_{avoid} were associated with more suicide ideation at the 9-month follow-up for youth exhibiting high levels of rumination

extent they agreed with the following two items: “I keep remembering what happened with the other kids or can’t stop thinking about what might happen.” and “I can’t stop thinking about what I did or said.” These two items assessed brooding rumination similarly to the brooding rumination items used in Study 1. Scores were computed as the mean of the items, with higher scores indicating more rumination. The RSQ has been shown to have strong internal consistency, retest reliability, and concurrent validity [64, 65]. This measure showed good reliability in the current sample ($\alpha=0.79$).

Suicide Ideation To assess recent suicide ideation, participants completed the Suicide Ideation Questionnaire—Junior (SIQ-Jr; [55], see Study 1 for details). This measure showed good reliability in the current sample at baseline ($\alpha=0.96$) and follow-up ($\alpha=0.94$).

Suicidal Behaviors To assess suicidal behaviors, participants completed three items from the Self-Injurious Thoughts and Behaviors Interview (SITBI; [66]) assessing presence of a suicide plan (“... actually made a plan to kill yourself?”), an aborted suicide attempt (“... been close to killing yourself and at the last minute decided not to kill yourself?”), and a suicide attempt (“... made an actual attempt to kill yourself in which you had at least some intent to die?”). At baseline, questions assessed presence of these three suicidal behaviors at any time prior to the initial assessment, at the 8-month follow-up, questions assessed presence of these three suicidal behaviors in recent months. Each item was coded 0 (*No*) or 1 (*Yes*). Responses were then recoded into a binary variable of 0 (no suicide behaviors endorsed) or 1 (any or multiple suicide behaviors endorsed). The SITBI has been shown to have strong reliability and validity in an adolescent sample [66].

Non-suicidal Self-Injury To assess presence of non-suicidal self-injury (NSSI), participants completed one dichotomous item from the SITBI [66]: “... purposely hurt yourself without wanting to die?” At baseline, this question assessed presence of NSSI at any time prior to the initial assessment; at the 8-month follow-up, this question assessed presence of NSSI in recent months. This item was coded 0 (*No*) or 1 (*Yes*).

Data Analysis Plan

To create a comparable timeframe for assessing longitudinal SITB risk in line with Study 1, we selected the 8-month follow-up for our analyses. To account for missing data, which ranged from 3 participants missing data at baseline to 57 participants missing data at the 8-month follow-up (see *Supplemental Material* for details), data imputation

was performed with SPSS. The Multiple Imputations model included the means or sums of central variables used in the analyses as well as key demographic variables, including age, sexual orientation, race, and ethnicity, and who the participants lived with. Correlations among all study variables were examined post imputation. Two hierarchical linear regression analyses were conducted to examine the independent and interactive contributions of NFA (NFA_{avoid} and NFA_{approach}) and rumination to baseline and 8-month follow-up suicide ideation; four hierarchical logistic regression analyses were conducted to examine the independent and interactive contributions of NFA (NFA_{avoid} and NFA_{approach}) and rumination to baseline and 8-month follow-up suicide behaviors and NSSI. Supplemental analyses included suicide behaviors as a continuous variable to provide more variability to detect this low prevalence behavior (see *Supplemental Material* for details). Given that past research has found NFA_{avoid} and NFA_{approach} to be positively correlated [46, 51] and that there was a positive correlation between NFA_{avoid} and NFA_{approach} in our sample ($r=0.64$), their main effects and interactions with rumination were entered into the same models to examine their distinct effects. All predictor variables were standardized prior to creating the interaction terms and entering them into the models. The main effects of NFA_{avoid} , NFA_{approach} , and rumination were entered at the first step, and the two-way interactions ($NFA_{\text{avoid}} \times \text{Rumination}$ and $NFA_{\text{approach}} \times \text{Rumination}$) were entered at the second step. Longitudinal analyses using the 8-month follow-up scores adjusted for baseline scores for each type of SITB. To decompose significant interactions, simple slopes were estimated at low ($-1 SD$) and high ($+1 SD$) levels of rumination [59]. RoS testing [60] was conducted to determine at what levels of rumination differences emerged in the associations between NFA and SITBs. Supplemental analyses controlled for age and race (see *Supplemental Material* for details).

Results

Intercorrelations Among the Variables

Supplemental Table 3 presents the intercorrelations among the variables. NFA_{avoid} was significantly positively correlated with all study variables. Rumination was significantly positively correlated with all study variables except baseline NSSI (see *Supplemental Material* for details). NFA_{approach} was significantly positively correlated with rumination. All three SITB variables were significantly intercorrelated within and across assessments; however, correlations were moderate, suggesting they are not overlapping and should be treated as distinct outcomes.

Rates of SITBs

At baseline, 67.3% of participants reported experiencing suicide ideation within the past month, with 10.5% of participants reporting suicide ideation above the clinical cut-off on the SIQ-Jr. At the follow-up, 51.7% reported experiencing suicide ideation within the past 4 months, with 7.0% reporting suicide ideation above the clinical cut-off on the SIQ-Jr. At baseline, 41.1% of participants reported engaging in suicide behaviors within their lifetime; at the follow-up, 6.1% of participants reported engaging in suicide behaviors within the past 4 months. At baseline, 33.6% of participants reported engaging in NSSI within their lifetime; at the follow-up, 12.1% of participants reported engaging in NSSI within the past 4 months.

NFA and Rumination Predicting Baseline and 8-Month Follow-up Suicide Ideation

As hypothesized, the regression predicting past-month suicide ideation assessed at baseline revealed significant positive main effects of NFA_{avoid} and rumination and a significant negative main effect of $NFA_{approach}$ (see Table 2). The regression also revealed a significant $NFA_{avoid} \times$ Rumination interaction and a marginally significant $NFA_{approach} \times$ Rumination

interaction. Consistent with expectations, simple slope analyses revealed that NFA_{avoid} was significantly associated with *more* past-month suicide ideation in girls with high, $B = 8.36$, $SE = 1.64$, $t(223) = 5.09$, $p < 0.001$, but not low, $B = 1.81$, $SE = 2.21$, $t(223) = 0.82$, $p = 0.41$, levels of rumination (see Fig. 2a). RoS tests indicated that a significant positive association between NFA_{avoid} and past-month suicide ideation emerged at $\geq -0.50 SD$ on rumination. Consistent with expectations, simple slope analyses revealed that $NFA_{approach}$ was significantly associated with *less* past-month suicide ideation in girls with high, $B = -6.27$, $SE = 1.88$, $t(223) = -3.33$, $p = 0.001$, but not low, $B = -1.75$, $SE = 1.94$, $t(223) = 0.90$, $p = 0.368$, levels of rumination (see Fig. 2b). RoS tests indicated that a significant negative association between $NFA_{approach}$ and past-month suicide ideation emerged at $\geq -0.49 SD$ on rumination. Contrary to hypotheses, the effects for 8-month follow-up suicide ideation were nonsignificant (see Table 2).

NFA and Rumination Predicting Baseline and 8-Month Follow-up Suicidal Behaviors

As hypothesized, the logistic regression predicting lifetime engagement in suicidal behaviors assessed at baseline revealed that NFA_{avoid} and rumination were significantly

Table 2 Study 2: contributions of need for approval and rumination to SITBs

Variable	Suicide ideation			Suicidal behaviors			NSSI		
	B	SE	t	B	SE	OR	B	SE	OR
DV: baseline SITBs									
Step 1									
Baseline NFA_{avoid}	6.11	1.32	4.64***	0.78	0.21	2.18***	0.52	0.20	1.67**
Baseline $NFA_{approach}$	-4.49	1.27	-3.53***	-0.70	0.21	0.50***	-0.43	0.19	0.65*
Baseline rumination	3.94	1.08	3.66***	0.53	0.16	1.70**	0.12	0.16	1.13
Step 2									
Baseline $NFA_{avoid} \times$ Rumination	3.28	1.33	2.46*	0.23	0.23	1.26	0.09	0.21	1.10
Baseline $NFA_{approach} \times$ Rumination	-2.26	1.27	-1.77 [^]	0.04	0.21	1.04	0.34	0.20	1.41 [^]
DV: follow-up SITBs									
Step 1									
Baseline SITBs	0.46	0.08	6.12***	2.31	0.78	10.06**	1.40	0.43	4.06**
Step 2									
Baseline NFA_{avoid}	0.01	0.98	0.01	0.40	0.37	1.49	0.82	0.31	2.27**
Baseline $NFA_{approach}$	0.49	0.98	0.50	-0.02	0.42	0.98	-0.40	0.34	0.67
Baseline Rumination	0.86	0.78	1.11	0.35	0.33	1.41	0.35	0.25	1.41
Step 3									
Baseline $NFA_{avoid} \times$ Rumination	0.45	1.02	0.44	0.67	0.43	1.95	-0.05	0.30	0.95
Baseline $NFA_{approach} \times$ Rumination	-0.20	0.93	-0.22	-0.30	0.44	0.74	-0.36	0.35	0.70

Baseline refers to lifetime engagement for suicide behaviors and NSSI

DV dependent variable. SITBs self-injurious thoughts and behaviors. NFA_{avoid} need for approval_{avoid}. $NFA_{approach}$ need for approval_{approach}. NSSI non-suicidal self-injury

[^] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$

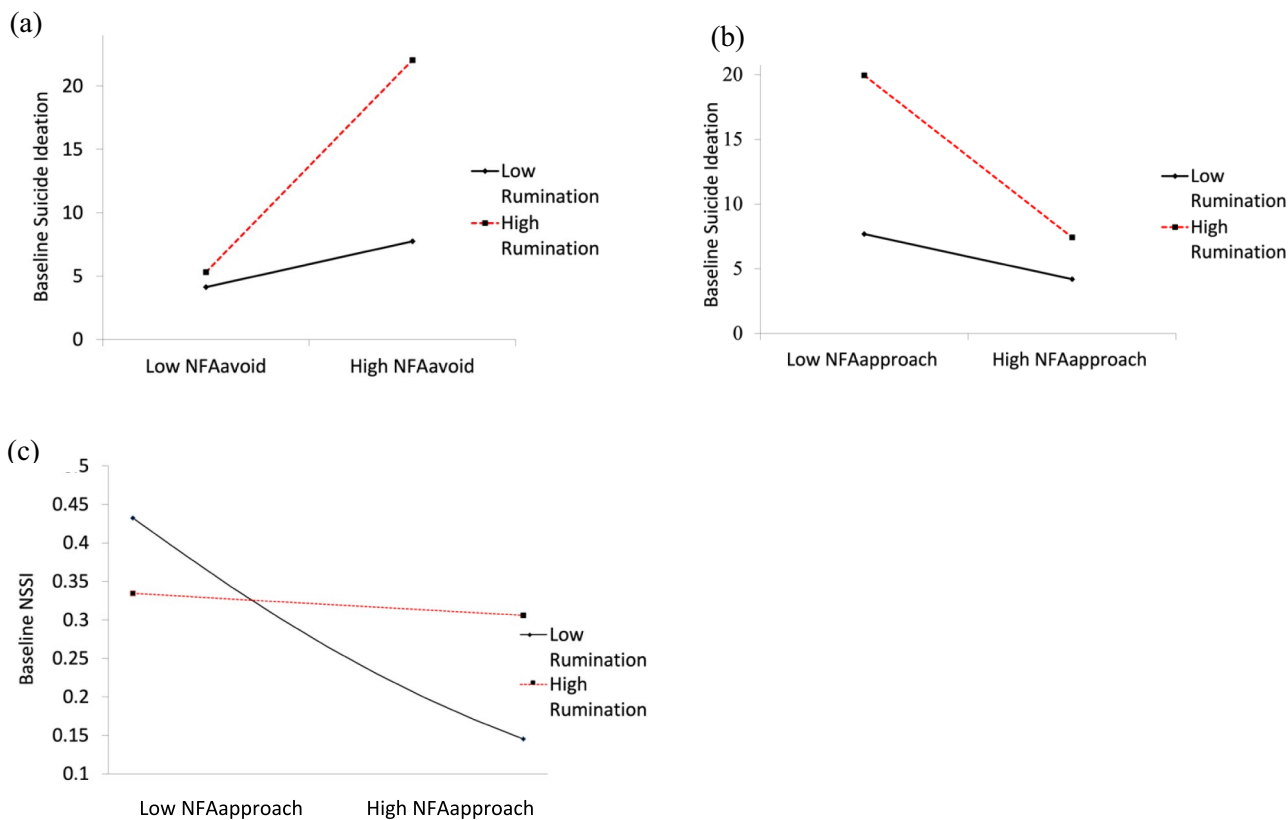


Fig. 2 Study 2: predicting SITBS at baseline from the (a) interactive contribution of avoidance-oriented need for approval and rumination and from the (b) and (c) interactive contribution of approach-oriented need for approval and rumination. (a) Higher levels of NFA_{avoid} were associated with more past-month suicide ideation assessed at baseline for youth exhibiting high levels of rumination. In addition, (b)

higher levels of NFA_{approach} were associated with less past-month suicide ideation assessed at baseline for youth exhibiting high levels of rumination and (c) higher levels of NFA_{approach} were associated with less NSSI at the 8-month follow-up for youth exhibiting low levels of rumination

associated with higher odds of lifetime suicide behaviors, whereas NFA_{approach} was significantly associated with lower odds of lifetime suicide behaviors (see Table 2). Contrary to hypotheses, the remaining effects were nonsignificant. Also contrary to hypotheses, the logistic regression predicting 8-month follow-up revealed that only lifetime suicide behaviors were significantly associated with higher odds of 8-month suicide behaviors; the remaining effects were nonsignificant. Supplemental analyses using suicide behaviors as a continuous variable, however, found a significant NFA_{avoid} × Rumination interaction at follow-up (see *Supplemental Material* for details).

NFA and Rumination Predicting Baseline and 8-Month Follow-up NSSI

As hypothesized, the logistic regression predicting baseline NSSI revealed that NFA_{avoid} was significantly associated with higher odds of lifetime NSSI assessed at baseline, whereas NFA_{approach} was significantly associated with

lower odds of lifetime NSSI (see Table 2). The regression also revealed a marginally significant NFA_{approach} × Rumination interaction (see Table 2). In line with our hypotheses, simple slope analyses revealed that NFA_{approach} was significantly associated with *less* lifetime NSSI in girls; however, contrary to hypotheses, this association was significant among girls with low, $B = -0.75, SE = 0.06, t(223) = 11.86, p < 0.001$, but not high, $B = -0.07, SE = 0.06, t(223) = -1.06, p = 0.291$, levels of rumination (see Fig. 2d). RoS tests indicated that a significant negative association between NFA_{approach} and lifetime NSSI emerged at ≤ 0 SD of rumination. The remaining effects were nonsignificant (see Table 2). As hypothesized, the logistic regression predicting 8-month follow-up NSSI revealed that NFA_{avoid} was significantly associated with higher odds of 8-month follow-up NSSI. Contrary to hypotheses, the remaining effects were nonsignificant (see Table 2).

See *Supplemental Material* for a summary of the results.

Discussion

Suicide ideation, suicidal behaviors, and NSSI are significant public health concerns among teenage girls, with rates of each continuing to rise over time [2]. To further elucidate psychosocial risk factors for SITBs among adolescent girls, we explored the concurrent and longitudinal associations between NFA, rumination, and SITBs in two independent samples of adolescent girls spanning a wide age range. As hypothesized, analyses revealed that NFA_{avoid} was generally associated with higher risk of SITBs concurrently and prospectively, whereas NFA_{approach} generally had a protective effect against SITBs, concurrently. Furthermore, the strength of these associations depended on the extent to which girls engaged in brooding rumination, concurrently and prospectively. The specific pattern of findings differed across outcomes (suicide ideation, suicidal behaviors, and NSSI), suggesting that different forms of SITBs may require individual prevention and intervention plans.

NFA_{avoid} and SITBs

Consistent with and expanding on the interpersonal theory of suicide [18], and in line with our hypotheses, adolescents who were high in NFA_{avoid} were more at risk for SITBs, concurrently and prospectively. When examining lifetime suicidal behaviors assessed at baseline, lifetime NSSI assessed at baseline, and 8-month follow-up NSSI, we found a significant main effect of NFA_{avoid} ; when examining past-month suicide ideation in Studies 1 and 2, follow-up suicide ideation in Study 1, and follow-up suicide behaviors as a continuous variable in supplemental analyses (see *Supplemental Material* for details), the effect of NFA_{avoid} was contingent on brooding rumination, such that NFA_{avoid} was associated with SITB risk among girls who engaged in high but not low levels of rumination.

Prior research has revealed that youth with high NFA_{avoid} report more social-evaluative concerns, particularly when they have low levels of NFA_{approach} [33], suggesting that they may be especially preoccupied with social cues indicating disapproval. Consequently, girls with high NFA_{avoid} may experience more feelings of thwarted belongingness, shame, rejection, negative self-worth, and negative affect, leading to a higher risk of SITBs [18, 36]. Further, girls with high NFA_{avoid} are more likely to disengage from peers, perhaps in an attempt to evade social disapproval, and they experience more peer victimization and exclusion [52]. The resulting social isolation may further increase their sensitivity to negative feedback and undermine their access to supportive social networks, thereby increasing their risk of SITBs.

Engaging in brooding rumination may heighten the shame and distress associated with negative interactions experienced by girls whose self-worth is depleted in the face of negative social feedback. Specifically, self-worth depletion in girls with high NFA_{avoid} may be more short-lived and less impactful if they do not spend time ruminating for hours or days following stressful peer interactions. In contrast, if these youth spend time ruminating, the initial feelings of rejection, helplessness, and self-doubt are likely to be maintained. Moreover, because of the negative self-focus characteristic of rumination, these girls may internalize negative encounters in terms of personal faults or character flaws, thereby increasing their risk of SITBs.

NFA_{approach} and SITBs

Also consistent with and expanding on the interpersonal theory of suicide [18] and in line with our hypotheses, Study 2 revealed that girls with high NFA_{approach} were concurrently protected against risk of SITBs. Adolescent girls who are focused on positive peer encounters and tuned into positive social cues may have a higher sense of peer belonging and be better able to adjust their behaviors in a way that is beneficial to their group belonging, thereby protecting them against SITBs. For example, if girls are strongly motivated to receive positive appraisals, they may adopt normative social goals and avoid conflicts, decreasing their chance of exclusion or aggressive encounters with peers. As a result, these girls may have more chances for positive peer feedback, consequently increasing self-worth and protecting against suicide ideation. Further, they may be less likely to engage in NSSI for the purposes of social facilitation [36]. Indeed, previous research reveals that youth with high NFA_{approach} are less likely to engage in avoidant (e.g., withdrawn) and harmful (e.g., aggressive) behavior and have more positive relationships with their peers [33, 52].

As hypothesized, we also found that NFA_{approach} was protective against suicide ideation concurrently among high but not low ruminators. However, contrary to predictions, NFA_{approach} was protective against NSSI among low but not high ruminators. The difference in these findings could speak to the different functions that suicide ideation and NSSI serve. Specifically, NSSI is associated with high impulsivity [67] and more difficulties tolerating distress and using emotion regulation strategies [68]. Although suicide ideation also may stem from negative emotions and ineffective emotion regulation, it can be used as a form of passive escapism [69], and may not involve the same intensity of emotions as NSSI. Consequently, having a high level of NFA_{approach} may not be sufficient to protect girls who are experiencing and ruminating on extremely intense emotions from engaging in NSSI, but it may be enough to protect against suicide ideation. Of note, these protective effects

were only apparent at baseline and did not persist across the follow-up; thus, future studies should investigate other factors that may buffer youth against SITBs over time.

Conclusions, Limitations, and Future Directions

This longitudinal, two-sample study design supports the novel idea that NFA_{avoid} is associated with higher risk of SITBs, concurrently and prospectively, whereas NFA_{approach} is associated with a lower risk of SITBs, concurrently. Further, this research highlights how the effect of NFA differs based on adolescents' tendency to engage in brooding rumination. Moreover, this study expands on the interpersonal theory of suicide by identifying who may be most impacted by, or sensitive to, thwarted belongingness and perceived burdensomeness (i.e., those with high levels of NFA_{avoid} and brooding rumination). Broadly, this research demonstrates that adolescents' reliance on peer approval significantly influences mental health outcomes during this critical developmental period. These findings highlight the importance of helping youth orient away from peer approval and develop diverse foundations for self-worth.

However, several limitations should also be noted. First, our longitudinal analyses spanned an 8/9-month time frame to assess SITB risk within a comparable time frame across the two studies and to assess accumulated risk over time. Because suicidal behaviors and NSSI may not occur very frequently in a short period of time [13], perhaps explaining the lack of findings for follow-up suicide behaviors (although supplemental analyses with suicide behaviors as a continuous variable showed significant results in the expected pattern, perhaps as a result of more variability), it is important to examine SITBs across a longer assessment span (e.g., several years) to better understand how NFA and rumination independently and interactively contribute to girls' long-term risks of SITBs.

Second, these analyses did not examine adolescents' actual experiences with peer rejection. As girls with high levels of NFA_{avoid} and NFA_{approach} may be particularly sensitive to negative or positive feedback from peers, it is important to better understand how NFA and rumination interact with peer encounters to influence SITBs. Moreover, because social rejection serves as a direct threat to one's need to belong and self-esteem [19], adolescents' levels of NFA may be directly impacted by their experiences with peer rejection or acceptance. Indeed, past research has shown that peer victimization predicts higher levels of NFA_{avoid} among youth; in turn, higher levels of NFA_{avoid} predict more peer victimization [46]. Future research should expand on these findings to investigate how social experiences and NFA interact to predict SITBs. In addition, integrating ecological momentary

assessments would enable us to better capture the proximal cognitions, experiences, and behaviors that lead to engagement in SITBs, as well as to understand how better to provide support to adolescents who may be suffering.

Third, there may be other psychological symptoms (e.g., depression, social anxiety) that impact adolescents' levels of NFA. Higher levels of NFA and rumination may lead to the development of (or protection from) depressive and social anxiety symptoms by impacting youths' sense of belonging. Supplemental analyses investigated some of these hypotheses by examining whether depressive symptoms mediated the contribution of NFA or $NFA \times$ Rumination interactions to SITBs (see *Supplemental Material* for details). However, future research should also consider how social anxiety symptoms influence the associations between NFA, rumination and SITBs.

Fourth, Study 1 included a community sample, which is important for understanding risk and protective factors against SITBs in the general public. However, because the rates of SITBs are low in community samples, as they were in our sample, this may limit the generalizability of our findings to more severe SITBs. Moreover, because the rates of suicide ideation were low, results from Study 1 should be interpreted with caution. Study 2 sought to address this issue by including an at-risk sample. However, it is also important for this study to be replicated in other clinical, high-risk samples in order to better understand risk and protective factors for youth with more severe and frequent SITBs.

Fifth, both samples included only assigned female sex at birth. Although Study 2 did include transgender, non-binary, and gender fluid participants, the number of participants who identified as such were low. Thus, future research is needed to investigate whether the results generalize to males and across gender identities, particularly as gender non-conforming youth may experience especially high levels of NFA.

Sixth, it would be helpful for future research to elucidate the psychosocial processes through which NFA_{avoid} and NFA_{approach} and their interactions with rumination exert risk and protective effects on SITBs, respectively. For example, it may be that high levels of NFA_{avoid} and rumination interact to create excessive fixation or concern with others' social judgments, leading to distress and embarrassment about one's identity and less capacity to cope with negative feelings, consequently increasing SITB risk. In contrast, high levels of NFA_{approach} may promote a focus on the positive ways in which adolescents are fitting in with their peers, consequently working to protect girls who are prone to worrying about their level of belonging. Future work should clarify the processes underlying the joint impact of NFA_{avoid} and rumination on SITBs.

Likewise, research is needed to elucidate biological processes linking need for approval, rumination, and SITBs.

One possibility is that NFA_{avoid} interacts with rumination to foster neurocognitive representations of the social environment that involve greater perceived social threat, which have been hypothesized to engage neurobiological threat pathways and upregulate components of the immune system involved in inflammation that have been associated with risk for SITBs [70]. To our knowledge, however, these associations have not been tested. Indeed, relatively little research has connected social-cognitive processes with mechanistically relevant biological processes in SITB research, pointing to a critical direction for future research.

Conclusion

Despite these limitations, this research sheds new light on psychosocial risk for SITBs and may help inform prevention and intervention efforts aimed at protecting youth from SITBs. Helping adolescents direct more of their sense of self-worth toward NFA_{approach} and less toward NFA_{avoid} may help to protect them against SITBs. More broadly, encouraging adolescent girls to develop diverse foundations for their sense of self-worth beyond peer judgments may help alleviate negative feelings of distress and shame and boost self-esteem. In particular, future programs may want to focus on helping adolescent girls develop bases for self-worth that rely on internal standards of success. However, given the saliency of peers during adolescence as well as the importance of social acceptance over the life course, programs also may want to help minimize the potential negative effects of peer judgments by encouraging adolescents to develop healthy emotion regulation strategies. Further, this research reinforces the importance of helping adolescent girls interrupt patterns of brooding rumination that put them at higher risk of SITBs.

Summary

The current study expanded theoretical models of adolescent suicide by investigating novel risk and protective factors for self-injurious thoughts and behaviors (SITBs) in adolescents. In particular, this research investigated the independent and interactive contributions of NFA and rumination to the independent outcomes of suicide ideation, suicidal behaviors, and NSSI in the context of two longitudinal studies of girls, one involving a general community sample and the other involving an at-risk sample. Participants reported on their levels of NFA, rumination, and SITBs at baseline and either a 9-month follow-up (Study 1) or an 8-month follow-up (Study 2). Findings revealed that NFA_{avoid} was generally associated with

higher risk for three types of SITBs (suicidal behavior, suicide ideation, and non-suicidal self-injury), whereas NFA_{approach} generally had a protective effect against SITBs; moreover, the effect of NFA differed based on adolescents' tendency to engage in brooding rumination. Of note, the precise pattern of results differed across SITBs. This research highlights the importance of helping youth expand their sources of self-worth beyond peer approval and interrupt brooding rumination in order to protect against SITBs.

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Author Contributions R.B.C. performed the statistical analysis, interpreted the data, and drafted the full manuscript; Z.Y. helped perform the statistical analysis and contributed to the draft of the manuscript; L.H.S. conceived of the study and participated in the design and coordination of the study; A.B.M. conceived of the study and participated in the design and coordination of the study; M.G. conceived of the study and participated in the design and coordination of the study; P.D.H. conceived of the study and participated in the design and coordination of the study; G.M.S. conceived of the study and participated in the design and coordination of the study; M.K.N. conceived of the study and participated in the design and coordination of the study; M.J.P. conceived of the study and participated in the design and coordination of the study and performed the measurement; K.D.R. conceived of the study, participated in the design and coordination of the study, and helped to draft the manuscript. All authors reviewed and approved the final manuscript. All authors agree to the authorship order and content of the manuscript.

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Data Availability The data that support the findings of the study are available from the corresponding author, R.B.C., upon reasonable request.

Declarations

Competing Interests The authors declare no competing interests.

Ethical Approval The studies in this paper were conducted in accordance with the ethical standards of the American Psychological Association. We certify that we have complied with APA ethical standards in the treatment of our samples and all procedures in both studies were approved by the respective university Institutional Review Boards. For both studies, parents provided written consent and youth provided written assent.

Research Involving Human Participants All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Both studies were approved by the respective university Institutional Review Boards. For both studies, parents provided written consent and youth provided written assent.

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