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ORIGINAL ARTICLE

The Relationship Between Negative Cognitive Styles and Lifetime Suicide Attempts is Indirect Through Lifetime Acute Suicidal Affective Disturbance Symptoms

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Abstract
Previous evidence suggests an association between negative cognitive styles and suicide-related outcomes. Recently, Acute Suicidal Affective Disturbance (ASAD) was proposed to characterize the phenomenology of acute suicidal crises, with key features being the rapid onset of suicidal intent, social- or self-alienation, perceptions of intractability, and overarousal. ASAD may account for the association between negative cognitive styles and suicide-related outcomes. Students ($N = 177$) selectively recruited based on their history of suicidality completed self-report measures. ASAD symptoms explained the association between rumination subtypes (brooding and reflection), as well as anxiety sensitivity cognitive concerns, and lifetime number of suicide attempts. Further, ASAD symptoms significantly accounted for the relationship between a latent negative cognitive styles variable and lifetime number of suicide attempts. Together, these findings are consistent with theoretical conceptions of negative cognitive styles being an associated feature of ASAD, and that ASAD symptoms may account for the relationship between negative cognitive styles and suicidal behavior.

Keywords Rumination · Brooding · Reflection · Anxiety sensitivity · Suicide · ASAD

Suicide is a preventable public health concern that claims approximately 800,000 lives each year worldwide at a rate of approximately 11.4 per 100,000 (World Health Organization [WHO] 2014). In 2008, suicide became the 10th leading cause of death in the United States and has maintained this position since (CDC 2016). Additionally, it is estimated that there are approximately 25 suicide attempts for each death by suicide (CDC 2016). Despite the breadth and depth of research identifying risk factors for suicide, our current ability to characterize acute suicide risk is limited (Franklin et al. 2017), and suicide rates have been increasing rather than decreasing (CDC 2016; WHO 2014), illustrating a need for more nuanced examinations of suicide risk.

Negative cognitive styles have been linked to vulnerability to suicidal thoughts and behaviors (Abramson et al. 1998; Ellis 2006; Kleiman et al. 2014). For instance, the combination of a negative attributional style (i.e., perceiving events and future implications as having internal, stable, and global causes) and negative life events appear to contribute to the development of suicidal ideation (Joiner and Rudd 1995; Priester and Clum 1992). Likewise, negative thinking patterns have been identified as transdiagnostic processes that not only influence the onset and maintenance of affective disorders (Ehring and Watkins 2008; McEvoy et al. 2013), but also confer risk for suicidal thoughts and actions (Law and Tucker 2018; Rogers and Joiner 2017). One such negative cognitive style is rumination, characterized as a perseverative fixation on the experiences, causes, and consequences of a negative mood state (Nolen-Hoeksema 1991); rumination and its subtypes—brooding and reflection (Treynor et al. 2003)—have been associated with suicidal thoughts

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and attempts (Morrison and O'Connor 2008; see Rogers and Joiner 2017, for meta-analysis). Further, anxiety sensitivity to cognitive concerns (ASCC) is another cognitive style implicated in the development of suicidal ideation and attempts (Capron et al. 2012). ASCC, defined as the belief that concentration and cognitive difficulties means that one is losing control or "going crazy" (Taylor et al. 2007), has been robustly linked to suicidal ideation, though associations with suicidal behavior remain understudied (Stanley et al. in press). Nonetheless, these separate lines of research on negative cognitive styles together suggest that they may be a transdiagnostic vulnerability for suicide-related outcomes (Kerkhof and van Spijker 2011).

Examination of transdiagnostic risk factors for suicide is crucial, given that suicide occurs in the context of nearly every psychiatric disorder (Harris and Barraclough 1997) and that the vast majority of individuals who die by suicide have a diagnosable mental health condition at the time of their deaths (Cavanagh et al. 2003; Robins 1981). However, negative cognitive styles are typically viewed as a distal vulnerability, as opposed to a proximal risk factor for suicidal behavior (cf., Kerkhof and van Spijker 2011). Rather than directly resulting in suicidal behavior, negative cognitive styles may be precipitating factors that influence the onset and maintenance of acute risk factors, or warning signs, for suicide. One such possibility is Acute Suicidal Affective Disturbance (ASAD), a time-limited clinical syndrome that was recently proposed to characterize the phenomenology of acute suicidal crises (Rogers et al. 2017). The proposed key features of ASAD have a rapid onset and occur simultaneously with a deliberate behavioral intention to die by suicide. Specifically, these symptoms include: (a) a drastic increase in suicidal intent over the course of hours or days (as opposed to weeks or months); (b) marked social alienation (e.g., severe social withdrawal, perceptions that one is a liability on others) and/or self-alienation (e.g., views that one's self is a burden, self-hatred); (c) perceptions that the aforementioned criteria are permanent; and (d) two or more manifestations of overarousal (i.e., agitation, insomnia, nightmares, irritability).

Beyond the symptoms associated with ASAD, it is worth considering the nature of ASAD as a syndrome. For instance, should ASAD be considered an entity, as discussed by Borsboom et al. (2003)? Latent variable theory adheres to entity realism, particularly a reflective model (Borsboom et al. 2003), such that the pattern of covariation between indicators of a latent variable can be fully explained by a regression of the indicators on the latent variable. The conceptualization of ASAD as a construct may follow this approach; on the other hand, it may be more closely akin to the formative model proposed by Borsboom et al. (2003), such that changes in indicators precede variations in the latent variable. For instance, considering the case of ASAD, changes in self-hatred and agitation might lead to changes in ASAD more generally; such an interpretation does not necessarily require a realist interpretation of the latent construct. Either view is plausible, particularly as the nature of ASAD has not been fully arbitrated empirically to date. Likewise, network theory, with disorders/syndromes resulting from the causal interplay between symptoms (Borsboom and Cramer 2013) is another way to conceptualize the nature of ASAD symptoms.

Overall, research to date supports the unidimensionality and cohesion of ASAD as a construct. This evidence has been obtained across a diverse set of analytical methodologies and samples, including using principal axis factoring in undergraduate students with a history of suicidality (Tucker et al. 2016), confirmatory factor analysis in psychiatric outpatients and inpatients (Rogers et al. 2017; Stanley et al. 2016), and network analysis in undergraduate students with a history of suicidality and psychiatric inpatients (Rogers et al. under review), using both proxy items/scales and measures specifically designed to assess ASAD symptoms. Further, convergent and discriminant validity, as well as differences in ASAD episodes between suicide attempters and ideators, have been demonstrated across samples (Rogers et al. 2017; Stanley et al. 2016; Tucker et al. 2016). These preliminary findings suggest that ASAD may be a factor that facilitates the transition from suicidal thoughts to actions (Klonsky and May 2014; Nock et al. 2008); however, longitudinal follow-up in higher risk samples is necessary. In addition, more work is needed on what specific factors may precipitate an ASAD episode.

It is possible that ASAD may emerge or be exacerbated by negative cognitive styles in conjunction with certain contexts, such as in combination with stressful life events. Extant literature has linked the aforementioned cognitive styles (i.e., rumination, ASCC) to components of ASAD. For instance, rumination may increase perceptions of social- and self-alienation, as it has been associated with the perceived quality of close relationships, feelings of alienation from peers (Ruijten et al. 2011), and difficulties recovering from feelings of rejection (Wesselmann et al. 2013). Further, rumination and suicidal ideation are impacted by increasing levels of hopelessness (Krajniak et al. 2013; Miranda et al. 2013; Smith et al. 2006) that, in the context of ASAD, may impact perceptions that suicidal intent and social-/self-alienation are intractable. Finally, rumination has been linked to overarousal more generally (Johnson et al. 2008; Thomas and Bentall 2002), as well as specific sleep disturbances (Pillai et al. 2014; Takano et al. 2012); indeed, one study demonstrated that manifestations of overarousal accounted for the associations between rumination and suicidal ideation and attempts (Rogers et al. 2017).

Similarly, it is also possible that ASCC may influence other ASAD symptoms beyond suicidal ideation/intent. One study found that ASCC is uniquely related to perceived burdensomeness, above and beyond depression and anxiety symptoms, demographic characteristics, and other anxiety sensitivity subfactors (Hudiburgh et al. 2017). Further, anxiety sensitivity more generally is linked to interpersonal dysfunction, self-derogation and self-devaluation, and physiological arousal (Benton and Allen 1996). The depression-distress amplification model (Capron et al. 2013) proposes that ASCC accentuates the effects of mood and related pathology on suicidality—more specifically, that uncomfortable sensations that occur in the context of depression (e.g., sleep disturbances, difficulties concentrating, psychomotor agitation) are amplified in the presence of elevated ASCC, thereby increasing severity of suicidal ideation. This model has been supported by past research (Capron et al. 2014, 2015); furthermore, indirect effects between ASCC and suicidal ideation through various overarousal symptoms (agitation, insomnia, nightmares, anger) have been identified (Rogers et al. 2016). Given the literature on ASCC to date, it is plausible that those who are prone to this cognitive style may have increased risk for ASAD symptoms and thereby suicidal behavior.

To better understand the nature of negative cognitive styles—particularly rumination and ASCC—on ASAD and suicidal behavior, the present study examined indirect effects of brooding, reflection, and ASCC on lifetime number of suicide attempts through lifetime worst-point ASAD symptoms. First, we tested cognitive styles individually, with the expectation that ASAD symptoms would account for the relationship between each negative cognitive style and lifetime number of suicide attempts. Next, we entered each negative cognitive style into the model jointly as correlated predictors to investigate which, if any, cognitive style conferred the most risk for suicide attempts through ASAD symptoms. Finally, given past research demonstrating that these thinking patterns may be better characterized as a single transdiagnostic factor rather than distinct but correlated entities (Arditte et al. 2016), we tested a model to examine the indirect effect of a latent negative thinking pattern variable on lifetime number of suicide attempts through ASAD symptoms.

Methods

Participants and Procedures

Participants were 177 undergraduate students (78.5% female) between the ages of 18 and 54 years ($M = 19.65$, $SD = 3.61$), who were selectively recruited from a large southern state university based on their history of suicidality. Namely, oversampling procedures were utilized such that suicidal ideation and past suicide attempts were present in the sample. All research pool participants who indicated past year suicidal ideation on the first item of the Suicidal Behavior Questionnaire—Revised (SBQ-R; Osman et al. 2001) were recruited to participate. A smaller portion of students without past-year suicidal ideation (approximately 10% of the remaining prescreen pool of 1500–2000 students) were also recruited. Overall, 20.9% of the sample reported past week suicidal ideation (i.e., non-zero score on the Beck Scale for Suicide Ideation), and 16.9% reported at least one previous suicide attempt (range = 0–4; $M = 1.77$, $SD = .97$ for those with prior suicide attempts; 13 participants reported multiple suicide attempts). The majority of participants self-identified as being White/Caucasian (83.6%), 5.1% as Native American, 5.1% as Black/African American, 4.0% as Hispanic/Latino(a), 1.7% as Asian/Pacific Islander, and 0.6% as another ethnicity. Participants were allowed to select multiple ethnicities to ensure cultural sensitivity; thus, cumulative percentages are above 100%.

Participants provided written informed consent and completed each of the following measures on an online survey platform. Upon completion of the study, all participants were provided with local and national mental health resources and were compensated with course credit. All procedures were approved by the university's Institutional Review Board.

Measures

Ruminative Responses Scale (RRS; Nolen-Hoeksema and Morrow 1991)

The RRS is a 22-item measure that assesses the extent to which individuals repeatedly focus on the causes, meanings, and consequences of their negative mood. Five items comprise the *brooding* subscale ($\alpha = .88$), which assess the degree to which individuals passively focus on reasons for their distress, and five items comprise the *reflection* subscale ($\alpha = .86$), which assess the degree to which individuals engage in cognitive problem-solving to improve their mood (Treynor et al. 2003). Responses are on a 4-point scale, ranging from 1 (*Almost Never*) to 4 (*Almost Always*); higher scores indicate greater frequency of rumination. The brooding and reflection subscales were utilized in analyses due to their significant associations with suicidal ideation and attempts in past research (Rogers and Joiner 2017). These subscales have demonstrated strong psychometric properties in previous research (Treynor et al. 2003).

Anxiety Sensitivity Index 3—Cognitive Concerns Subscale (ASI-3; Taylor et al. 2007)

The 6-item cognitive concerns subscale of the ASI-3 was administered to assess anxiety regarding the fear of losing

control of one's cognitions and emotions (e.g., "When my thoughts seem to speed up, I worry that I might be going crazy"). Participants rated each item on a 5-point scale, ranging from 1 (*Very Little*) to 5 (*Very Much*); higher scores represent more severe cognitive anxiety sensitivity. The ASI-3 and its subscales have demonstrated high reliability and validity in previous studies (Kemper et al. 2012; Taylor et al. 2007). In the present sample, internal consistency was high (α = .91).

Acute Suicidal Affective Disturbance Inventory—Lifetime (ASADI-L; Tucker et al. 2016)

The ASADI-L is a 28-item measure of ASAD symptoms within the context of the worst episode across the lifespan. Items reflect the presence and severity of suicidal intent, as well as presence, severity, and intractability of feelings of social disconnection, disgust with self and others, and perceptions of burdensomeness, anchored within the most severe time that suicidal intent drastically increased. Finally, four items assess the severity of agitation, insomnia, nightmares, and irritability during the most severe time that suicidal intent drastically increased. Although the ASADI-L contains 28 items, only 13 items (i.e., items assessing severity and intractability of symptoms) are computed in the total score;[1] the additional 15 items are used to assess for the presence of a particular symptom, and responses are used to skip items assessing symptom severity and intractability if the symptom was not endorsed. Of note, individuals who deny ever experiencing a drastic increase in suicidal intent do not complete the remaining items, ensuring that all scores are anchored within one's most drastic increase in intent. Higher scores on the ASADI-L reflect greater severity of worst-point ASAD symptoms. Mean ASADI-L scores for suicide attempters in other samples have ranged from 145.16 to 208.53; mean scores for ideators have ranged from 34.86 to 43.47 (Rogers and Joiner 2018; Tucker et al. 2016). Internal consistency in the present sample was excellent (α = .98). This high coefficient is consistent with past research showing the coherence of the ASAD construct (Rogers et al. 2017; Rogers et al. under review).

Past Suicide Attempts

One item ("How many times have you attempted suicide or tried to end your own life?") was used to assess the presence and number of lifetime suicide attempts.

[1] Scoring for the ASADI-L is as follows: $2c \times 10 + (4b \times 4c + 5b \times 5c + 6b \times 6c)/3 + 7b \times 7c + ([8 + 9 + 10 + 11a]/4) \times 10$. This scoring algorithm was designed to give equal weight to each ASAD criteria (suicidal intent, social alienation, self-alienation, and overarousal); potential scores range from 0 to 400.

Data Analytic Strategy

Descriptive statistics and bivariate correlations were computed to determine the normality and interrelatedness of all study variables. Variables that were significantly positively skewed and/or leptokurtic underwent a logarithmic transformation (due to expectations that these variables would have a log-normal distribution) to correct for a non-normal distribution (McDonald 2014). Descriptive statistics refer to non-transformed variables for ease of interpretability; however, all multivariate analyses were conducted after the transformation of non-normally distributed variables in order to meet assumptions for parametric/regression-based analyses. Path analysis with zero-inflated negative binomial regression, given the overdispersion of lifetime number of suicide attempts as an outcome variable, was then utilized to test our primary hypotheses. Analyses were conducted using MPlus version 6.11 utilizing maximum likelihood estimation to test conditional and indirect effects. Negative cognitive styles (i.e., ASCC, brooding, reflection) served as the independent variables; lifetime worst-point ASAD symptoms represented the indirect effects variable; and lifetime number of suicide attempts served as the outcome variable. Multicollinearity indices were examined prior to conducting analyses; variance inflation factor and tolerance were within normal limits (> 4 and < .2, respectively). There were no missing data for the variables of interest.

Results

Means, standard deviations, ranges, skewness, kurtosis, and bivariate correlations for all variables are presented in Table 1. ASCC and ASAD were positively skewed and leptokurtic; these variables therefore underwent a logarithmic transformation to correct for non-normality, resulting in normalized skew and kurtosis in each case. As expected, all variables were positively correlated with each other with at least a small-to-moderate effect size, though effect sizes between negative cognitive styles and between worst-point ASAD symptoms and lifetime suicide attempts were larger in magnitude. Consistent with other samples (Rogers and Joiner 2018; Tucker et al. 2016), individuals with a history of suicide attempts had significantly higher scores on the ASADI-L ($M = 195.27$ $SD = 131.24$) than those without a history of suicide attempts ($M = 13.44$, $SD = 48.95$, $t[22.93] = 6.58$, $p < .001$).

ASCC, ASAD, and Suicide Attempts

ASCC was significantly associated with ASAD symptoms ($B = 1.30$, $SE = .43$, $p = .002$, 95% CI [.46, 2.14]) and lifetime number of suicide attempts ($B = .73$, $SE = .33$, $p = .026$,

Table 1 Descriptive statistics and bivariate correlation coefficients of study variables

Variable	1	2	3	4	5
1. ASCC	1				
2. Brooding	.62***	1			
3. Reflection	.43***	.73***	1		
4. Past ASAD symptoms	.22**	.31***	.31***	1	
5. Past suicide attempts	.29***	.30***	.23**	.64***	1
M	9.60	10.54	9.57	50.68	.30
SD	4.87	4.33	4.05	104.98	.77
Range	6–29	5–20	5–20	0–400	0–4
Skewness	1.72	.56	.66	1.87	2.86
Kurtosis	2.82	− .77	− .59	2.08	7.69

ASCC anxiety sensitivity cognitive concerns, *ASAD* acute suicidal affective disturbance

**$p < .01$, ***$p < .001$

95% CI [.09, 1.38]); ASAD and lifetime suicide attempts were also significantly associated with each other ($B = .55$, $SE = .08$, $p < .001$, 95% CI [.41, .70]). Indirect effects analyses indicated that ASAD significantly accounted for the association between ASCC and lifetime number of suicide attempts ($B = .72$, $SE = .26$, $p = .005$, 95% CI [.22, 1.22]). See Fig. 1 for an illustration of this model.

Brooding, ASAD, and Suicide Attempts

Brooding was significantly related to ASAD symptoms ($B = .16$, $SE = .04$, $p < .001$, 95% CI [.09, .23]), but not lifetime suicide attempts ($B = .07$, $SE = .04$, $p = .068$, 95% CI [− .01, .14]) after ASAD symptoms were included in the model ($B = .55$, $SE = .08$, $p < .001$, 95% CI [.40, .70]); see Fig. 1. The direct effect of brooding on lifetime suicide attempts, however, was significant ($B = .19$, $SE = .05$, $p = .001$, 95% CI [.08, .29]) prior to the inclusion of ASAD symptoms. The indirect effect of brooding on lifetime suicide attempts through ASAD was significant ($B = .09$, $SE = .02$, $p < .001$, 95% CI [.04, .13]), suggesting that ASAD explained the association between brooding and lifetime number of suicide attempts.

Reflection, ASAD, and Suicide Attempts

Reflection was positively associated with ASAD symptoms ($B = .17$, $SE = .04$, $p < .001$, 95% CI [.09, .25]) but was unrelated to lifetime number of suicide attempts ($B = .02$, $SE = .04$, $p = .584$, 95% CI [− .06, .10]) after the inclusion of ASAD symptoms ($B = .58$, $SE = .08$, $p < .001$, 95% CI [.43, .73]) in the model (Fig. 1). The direct effect of reflection on lifetime number of suicide attempts was significant prior

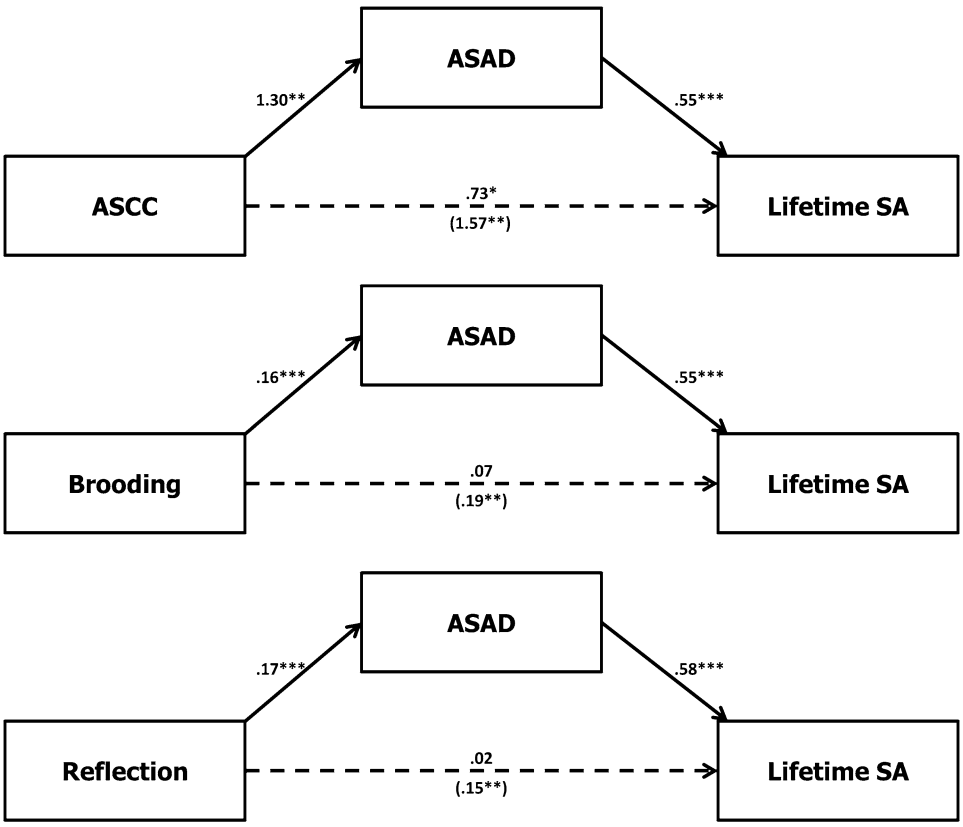

Fig. 1 Individual indirect effects models for ASCC, brooding, and reflection on lifetime number of suicide attempts through ASAD symptoms. *$p < .05$, **$p < .01$, ***$p < .001$. *ASCC* anxiety sensitivity cognitive concerns, *ASAD* acute suicidal affective disturbance, *SA* suicide attempts. Direct effects of each negative cognitive style on lifetime suicide attempts *prior* to the inclusion of ASAD symptoms are below the dashed lines. Direct effects of each negative cognitive style on lifetime suicide attempts *after* the inclusion of ASAD symptoms are above the dashed lines

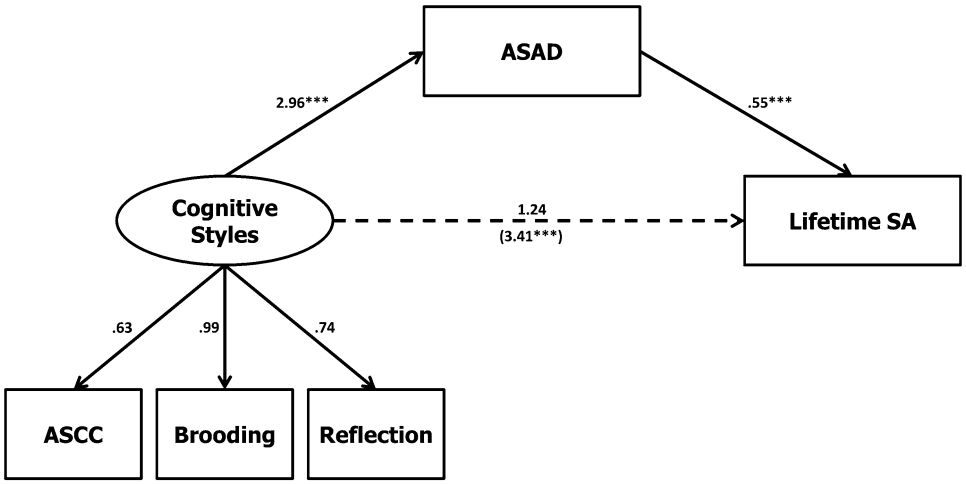

Fig. 2 Joint indirect effects model for negative cognitive styles on lifetime number of suicide attempts through ASAD symptoms. *$p < .05$, **$p < .01$, ***$p < .001$. *ASCC* anxiety sensitivity cognitive concerns, *ASAD* acute suicidal affective disturbance, *SA* suicide attempts. The direct effect of negative cognitive styles on lifetime suicide attempts *prior* to the inclusion of ASAD symptoms is below the dashed line. The direct effect of negative cognitive styles on lifetime suicide attempts *after* the inclusion of ASAD symptoms is above the dashed line

to the inclusion of ASAD in the model ($B = .15$, $SE = .06$, $p = .008$, 95% CI [.04, .26]). The indirect effect of reflection on lifetime number of suicide attempts through ASAD was significant ($B = .10$, $SE = .03$, $p < .001$, 95% CI [.09, .25]), indicating that ASAD accounted for the association between reflection and lifetime suicide attempts.

Joint Prediction Models

In a model with ASCC, brooding, and reflection entered as parallel, correlated predictors, neither ASCC ($B = .32$, $SE = .53$, $p = .541$, 95% CI [−.71, 1.36]), brooding ($B = .08$, $SE = .06$, $p = .221$, 95% CI [−.05, .20]), nor reflection ($B = .10$, $SE = .06$, $p = .084$, 95% CI [−.01, .21]) were significantly associated with ASAD symptoms. Similarly, whereas ASAD symptoms were positively related to lifetime number of suicide attempts ($B = .55$, $SE = .08$, $p < .001$, 95% CI [.40, .70]), ASCC ($B = .61$, $SE = .44$, $p = .165$, 95% CI [−.25, 1.47]), brooding ($B = .04$, $SE = .05$, $p = .379$, 95% CI [−.05, .14]), and reflection ($B = -.03$, $SE = .04$, $p = .476$, 95% CI [−.12, .05]) were not. All indirect effects were non-significant in this model (ASCC: $B = .18$, $SE = .29$, $p = .543$, 95% CI [−.39, .75]; brooding: $B = .04$, $SE = .03$, $p = .227$, 95% CI [−.03, .11]; reflection: $B = .05$, $SE = .03$, $p = .094$, 95% CI [−.01, .12]), indicating that no specific negative cognitive style uniquely was related to ASAD or lifetime suicide attempts.

Thus, to test whether an overarching negative cognitive style was associated with ASAD and lifetime number of suicide attempts, a final model was examined (see Fig. 2), with ASCC, brooding, and reflection loading onto a latent factor of negative cognitive styles. The measurement model exhibited excellent model fit ($\chi^2 = .38$, $df = 1$, $p = .536$, CFI = 1.00, TLI = 1.01, RMSEA = .00, SRMR = .01), indicating the appropriateness of the latent factor of negative cognitive styles. All variables loaded onto the factor (ASCC = .63, brooding = .99, reflection = .74). This negative cognitive style factor was significantly related to ASAD symptoms ($B = 2.96$, $SE = .74$, $p < .001$, 95% CI [1.52, 4.41]), but not lifetime number of suicide attempts ($B = 1.24$, $SE = .69$, $p = .071$, 95% CI [−.11, 2.59]) following the inclusion of ASAD symptoms ($B = .55$, $SE = .08$, $p < .001$, 95% CI [.40, .70]) in the model. The direct effect, prior to the inclusion of ASAD symptoms, was significant ($B = 3.41$, $SE = .91$, $p < .001$, 95% CI [1.62, 5.20]). Indirect effects analyses indicated that ASAD symptoms significantly accounted for the association between the negative cognitive styles and lifetime number of suicide attempts ($B = 1.62$, $SE = .46$, $p < .001$, 95% CI [.72, 2.53]).

Alternative Models

We conducted several alternative models to test the specificity of our effects. First, all of the aforementioned findings were equivalent when lifetime number of suicide attempts was treated as a dichotomous variable (i.e., the presence/absence of a lifetime suicide attempt), rather than as a count variable. Second, when the independent and indirect effects variables were reversed to test for specificity, indirect effects across all models were non-significant (ASCC: $B = .03$, $SE = .02$, $p = .079$, 95% CI [−.003, .06]; brooding: $B = .04$, $SE = .02$, $p = .083$, 95% CI [−.01, .09]; reflection: $B = .01$,

$SE = .02$, $p = .587$, 95% CI [−.03, .06]; latent negative cognitive styles: $B = .04$, $SE = .03$, $p = .099$, 95% CI [−.01, .09]). Finally, when lifetime suicide attempts (dichotomous) was treated as the independent variable, ASAD as the indirect effects variable, and negative cognitive styles as the outcome variables, ASAD did not account for the association between lifetime suicide attempts and negative cognitive styles (ASCC: $B = .01$, $SE = .08$, $p = .902$, 95% CI [−.15, .17]; brooding: $B = 1.43$, $SE = .90$, $p = .112$, 95% CI [−.34, 3.20]; reflection: $B = 1.45$, $SE = .85$, $p = .087$, 95% CI [−.21, 3.11]; latent negative cognitive styles: $B = .08$, $SE = .05$, $p = .117$, 95% CI [−.02, .18]). Together, these findings provide some evidence for the specificity of our models.

Discussion

The present study sought to examine ASAD, a recently proposed clinical syndrome, as a potential mechanism of the association between negative cognitive styles (i.e., ASCC, brooding, reflection) and lifetime number of suicide attempts. Given past evidence that ASCC and ruminative thinking styles may be related to interpersonal dysfunction (Hudiburgh et al. 2017; Ruijten et al. 2011; Wesselmann et al. 2013), hopelessness (Krajniak et al. 2013; Smith et al. 2006), and overarousal (Rogers et al. 2017, 2016), we expected that these negative cognitive styles would relate to suicidal behavior indirectly through ASAD symptoms. Our results were largely in line with this main hypothesis, as ASAD accounted for the association between each individual cognitive style and lifetime number of suicide attempts; moreover, as demonstrated in past research (Arditte et al. 2016), it may be due to the overarching influence of negative cognitive styles, rather than of any individual cognitive style by itself. Overall, these findings have several notable implications.

First, our study provides an explanation for how negative cognitive styles might ultimately confer risk for engagement in suicidal behavior, given that ASCC and brooding/reflective rumination have previously been associated with suicide-related outcomes in a number of studies (Rogers and Joiner 2017; Stanley et al. in press). It is possible that negative cognitive styles, like ASCC, brooding, and reflection, contribute to the onset of key features of ASAD, like suicidal intent, social alienation (Ruijten et al. 2011; Wesselmann et al. 2013), hopelessness (Miranda et al. 2013), and/or overarousal (Rogers et al. 2016, 2017; Thibodeau et al. 2012), which in turn contributes to the likelihood of engaging in suicidal behavior (Rogers et al. 2017; Stanley et al. 2016; Tucker et al. 2016). Another possibility is that the inability to disengage from repetitive negative thinking patterns might feed into feelings of hopelessness or increase suicidal intent through the perception of death as a way to escape these thoughts (Baumeister 1990). Further, because persistent negative thoughts can develop quickly in the context of other relevant symptoms, this may also coincide with the rapid onset of ASAD symptoms.

Second, our findings are consistent with the proposition that negative cognitive styles are a precipitating factor that may confer risk for an ASAD episode, an important consideration in the validation of ASAD as a clinical construct (Rogers et al. under review). Because ASAD is being proposed as a potential diagnosis to fill a gap in the nomenclature with a suicide-specific syndrome, it is important to consider all aspects of the clinical picture, including etiological pathways. Although far from probative, particularly given the cross-sectional nature of the study design, these findings suggest that negative cognitive styles may be a vulnerability factor for ASAD episodes. Moreover, although suicide risk detection may be improving through the use of machine learning techniques (Walsh et al. 2017), having a theoretical framework to better target intervention efforts are needed to reduce suicide risk. Specifically, this study indicated that ASCC and rumination, as well as negative cognitive styles more generally, relate to ASAD symptoms, which in turn relate to suicidal behaviors.

Third, this finding is consistent with a recent study conducted by Rogers and Joiner (2018), who found that lifetime ASAD symptoms accounted for the link between suicide-specific rumination and lifetime suicide attempts. Notably, the present study suggests that negative cognitive styles more generally, in addition to repetitive negative thinking about suicide specifically, may confer risk for ASAD and suicidal behavior. However, the association between suicide-specific rumination and ASAD was much stronger ($r = .61$) than that of the non-suicide-specific negative cognitive styles examined in this study ($rs = .22$–$.31$). Together, these findings indicate whereas negative cognitive styles are likely a distal vulnerability factor to ASAD and thereby suicidal behavior, repetitive thinking about more specific cognitions—particularly those pertaining to suicide—may represent a more pernicious risk factor.

Encouragingly, negative cognitive styles, like ASCC and rumination, are malleable, pointing to several potential targets for clinical intervention that may reduce the likelihood of ASAD symptoms and/or suicidal behavior. For instance, several efficacious single-session treatments for ASCC have been developed, including in-person (Keough and Schmidt 2012), computer-delivered psychoeducation (Schmidt et al. 2014), computer-delivered interpretation bias modification (Capron and Schmidt 2016), and combined computer-delivered psychoeducation and interpretation bias modification (Capron et al. 2017). Likewise, rumination-focused cognitive-behavioral therapies have demonstrated efficacy in reducing ruminative thought patterns (Watkins 2016). Similarly, among individuals who have negative cognitive

styles, crisis management strategies, such as safety planning (Stanley and Brown 2012) and lethal means counseling (Barber and Miller 2014), may be worthwhile to further mitigate suicide risk. Overall, focusing on these malleable risk factors may thereby reduce suicidality, including ASAD episodes and suicide attempts, in individuals with negative cognitive styles.

Moreover, it is notable that, in this sample, a sizable portion (25%) of those who reported drastic increases in suicidal intent did not report a lifetime suicide attempt, demonstrating that ASAD does not necessarily lead to suicidal behavior in all cases. It is possible that individuals with ASAD episodes who do not engage in suicidal behavior have certain protective factors that inhibit suicidal actions. For instance, one possibility is that individuals who do not possess a sufficient capability for suicide (Van Orden et al. 2010) are unable to overcome the fear of death and pain, as well as one's biological instincts for survival, even in the context of heightened intent for suicide, intractable alienation, and arousal. Another possibility is that these individuals are utilizing preventative techniques, including safety plans (Stanley and Brown 2012) and/or means safety protocols (Barber and Miller 2014), that enable a person to remain safe until the crisis abates. Nonetheless, a worthwhile avenue of future research will be the investigation of factors that impede suicide attempts in those with ASAD symptoms, as this may point to potential targets of intervention among those at highest risk.

Limitations and Future Directions

As with any study, however, there are numerous limitations that should be taken into consideration. Most importantly, this study relied on a cross-sectional design with the exclusive use of self-report measures. Prospective designs are needed in order to determine the temporality of these effects, particularly since the present study compared current negative cognitive styles to worst-point ASAD symptoms (which are transient and time-limited by nature) across the lifespan and lifetime number of suicide attempts. Although our alternative models provided some evidence of specificity, and atemporal associations provide an important basis for future research, they are not suggestive of temporal relationships (Winer et al. 2016). Accordingly, these findings should be treated as preliminary and contingent upon replication and extension in future research that addresses this major limitation. Similarly, as data regarding the timing and frequency of ASAD episodes, and timing of suicide attempts, were unavailable, we were unable to examine whether ASAD episodes related directly to engagement in suicidal behavior in sequence; however, these questions, as well as how the frequency of ASAD episodes might relate to suicidal behavior, should be addressed in future research. Moreover, future investigations may be enhanced by experimental and behavioral measures of rumination and related symptoms to better understand the causal mechanisms of these relationships. On that note, limitations regarding the use of single-item assessments of suicide attempts has been addressed in recent studies (Hom et al. 2016; Millner et al. 2015); an interview-based assessment may result in more accurate classification of suicide attempts. Finally, our sample was a fairly homogeneous set of (primarily) female, White/European American college students with low suicide risk; thus, findings may not be generalizable to other sociodemographic groups or clinical populations with higher suicide risk. Additional research is needed to replicate these findings across a number of settings and populations.

Despite these limitations, the results of this study are consistent with the theoretical conception of negative cognitive styles as a precipitating factor for ASAD symptoms, and that ASAD symptoms may account for the relationship between negative cognitive styles and suicidal behavior. We look forward to future research that replicates and extends these findings through prospective designs and multi-method approaches to better understand the complex nature of these relationships.

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Compliance with Ethical Standards

Conflict of Interest Megan Rogers, Raymond Tucker, Keyne Law, Brian Bauer, Caitlin Smith, Daniel Capron, Michael Anestis, and Thomas Joiner declares that they have no conflict of interest.

Ethical Approval 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.

Animal Rights No animal studies were carried out by the authors for this article.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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