

Cognitive Risk and Protective Factors for Suicidal Ideation: A Two Year Longitudinal Study in Adolescence

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Abstract Adolescence is a developmental period associated with heightened risk for both the onset and escalation of suicidal ideation (SI). Given that SI is a potent predictor of suicidal behavior, it is important to develop models of vulnerability for and protection against SI, particularly among young adolescents. This study examined the relative impact of several cognitive vulnerabilities, as well as protective factors, for SI among young adolescents over a 2-year interval encompassing their transition to mid-adolescence. At baseline, 324 adolescents (M=12.39 years; SD=0.63; 52.5 % female) completed measures of depressive symptoms, self-referent information processing biases, negative inferential style, and responses to negative affect. Further, the adolescents and their mothers were administered a diagnostic interview to

assess current and past depressive disorders and SI. Over follow-up, adolescents and their mothers were administered the diagnostic interview every 12 months and adolescents completed a self-report measure inquiring about SI every 6 months to assess interviewer-rated and self-reported SI. Logistic regressions indicated that preferential endorsement of negative adjectives as self-referent (only among girls), rumination in response to negative affect, and a negative inferential style prospectively predicted SI. Additionally, young adolescents' tendency to respond to negative affect with distraction and problem-solving buffered against their risk for exhibiting SI. When these factors were entered simultaneously, preferential endorsement of negative adjectives as self-referent and the use of distraction and problem-solving skills remained the only significant prospective predictors of SI. No previous studies have examined these variables as predictors of SI, thereby highlighting their potential utility in improving the predictive validity of extant models of suicide risk and resilience.

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Adolescence is a developmental period associated with a heightened risk for both the onset and the escalation of suicidal thoughts and behaviors (Nock et al. 2008). In fact, the lifetime prevalence of suicidal ideation (SI) among adolescents is documented at 12.1 %, with 4 % who have made suicide plans, and 4.1 to 8.5 % who have attempted suicide (Grunbaum et al. 2004; Nock 2012; Nock et al. 2013). Given that SI is a potent predictor of suicide attempts and completed suicide, it is important to develop models of vulnerability for and protection against SI among young adolescents in order to

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implement early prevention and intervention programs (Lewinsohn et al. 1994).

The suicide literature consistently has implicated a wide range of cognitive predictors of the initiation and maintenance of SI and suicidal behavior (O'Connor 2011; Weishaar 1996; O'Connor 2011). Cognitive factors have been broadly defined as the style in which individuals habitually “search for, acquire, interpret, categorize, remember, and retrieve information in making decisions and in problem solving” (Sheehy and O'Connor 2014, p. 69). The current study examined a range of cognitive risk and protective factors previously found to provide vulnerability for and protection against suicide-related outcomes and/or depression and their relationship to SI among young adolescents (ages 12 to 13) over a two-year interval encompassing their transition to mid-adolescence (Hankin et al. 1998; Kessler et al. 2001). Risk factors are defined as “a measurable characterization of each subject in a specified population that precedes the outcome of interest and which can be used to divide the population into 2 groups (the high risk and the low risk groups that comprise the total population)” (Kraemer et al. 1997, p. 377). Further, protective factors are defined as “antecedent conditions associated with a decrease in the likelihood of undesirable outcomes or with an increase in the likelihood of positive outcomes” (Kazdin et al. 1997, p. 377).”

Although the transition from early adolescence to mid-adolescence is associated with increased suicidal thoughts and behaviors as well as increased rates of major depressive disorder, few studies have examined the predictive capacity of cognitive *risk factors* for suicide-related outcomes over this time period. Even fewer studies have examined the predictive capacity of cognitive *protective factors* for suicide-related outcomes, not only across this sensitive time period, but also across all age groups (Johnson et al. 2011). Research on protective factors for SI among youth is sorely needed, as suicide prevention efforts have been hampered by focusing solely on mitigating risk factors, as opposed to incorporating resiliency findings (Brent 2011). In fact, the 2012 National Strategy for Suicide Prevention called for a better understanding of protective factors against suicide to bolster prevention efforts (United States Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention 2012). Furthermore, very few studies have concurrently examined cognitive risk and protective factors to ascertain their relative significance in conferring risk for and/or protection against SI. This study aimed to fill these research gaps by examining the relative impact of negative inferential style, response styles, and self-referent information processing on rates of SI to determine which risk and protective factors may be the most robust predictors of SI.

Cognitive Model of Suicide

Wenzel and Beck (2008) put forth a model of suicide based on Beck's cognitive theory of psychopathology. Their cognitive model of suicide suggests that three classes of factors influence the initiation of suicidal thoughts and behaviors: dispositional factors, maladaptive cognitive processes associated with psychopathology, and cognitive processes more specifically related to suicidal thoughts and acts. Dispositional factors are those that are more distal in nature, and may put individuals at risk for experiencing psychopathology in general (i.e., impulsivity, deficits in problem solving). According to Wenzel and Beck (2008), cognitive processes associated with psychopathology include the content of cognitions, as well as information processing biases, reflecting the manner in which cognitions are formed. The theory purports that the more an individual tends to exhibit negative cognitive content and maladaptive information processing biases, the more likely it is that suicide relevant cognitive processes will be triggered in response to stressful life events, thus spurring the development of suicidal thoughts (Wenzel and Beck 2008). According to this cognitive model of suicide, suicidal acts occur when an individual reaches his or her threshold for tolerating the pain associated with a suicidal crisis (Wenzel and Beck 2008). The current study aims to examine the predictive capacity of specific maladaptive cognitive processes identified by the cognitive model of suicidal behavior among young adolescents, as well as test additional cognitive factors that have not yet been examined in relation to this model, to potentially build on the model. Of note, the cognitive model of suicidal behavior includes little emphasis on protective factors, and thus, the current study also aims to fill that gap by examining one potential cognitive protective factor.

Negative Self-Referent Information Processing

Beck's (1976, 1987) cognitive model of depression theorizes that individuals who are vulnerable to depression possess negative self-schemas (e.g., believing that they are characterized by failure, worthlessness) that can influence their perception, interpretation, attention, and memory for self-referent information. Individuals with a negative self-schema are hypothesized to exhibit information processing biases, such that cognitive resources are disproportionately allotted to attending to and processing negative information, therefore leaving depleted resources to attend to and process positive information (Disner et al. 2011; Ingram 1984). According to Wenzel and Beck's (2008) cognitive model of suicidal behavior, suicidal crises are more likely to occur as the frequency, intensity, and duration of information processing biases increase, as these biases escalate psychological disturbance, a context in

which it is more likely for a stressful life event to engender suicidal thoughts.

The Self-Referent Encoding Task (SRET; Alloy et al. 1997; Derry and Kuiper 1981; Hammen and Zupan 1984) measures information processing biases that may be influenced by negative self-schemas, by instructing participants to rapidly judge whether a series of negative and positive adjectives are self-referent and then complete a free recall component in which participants list as many words as they can remember from the task. Self-referent information processing biases as measured by the SRET have been found to concurrently and prospectively predict depressive symptomatology among both clinical and non-clinical samples of adults and adolescents (Connolly et al. 2015; Jacobs et al. 2008). Among adolescents, several studies examining currently and remitted depressed youth have found that depression is associated with significantly greater endorsement and recall of negative adjectives, with some studies reporting decreased endorsement and recall of positive adjectives as well (Alloy et al. 2012; Gençöz et al. 2001; Hammen and Zupan 1984; Timbremont and Braet 2004). Furthermore, among community samples of adolescents, recall of fewer positive adjectives predicted increases in depressive symptoms over a 9-month follow-up period (Connolly et al. 2015), and recall of more negative adjectives interacted with rumination to predict increases in depression longitudinally (Black and Pössel 2013).

No studies to our knowledge have examined the association between the SRET and SI directly, although low reported levels of self-esteem, a related explicit measure of self-concept, has been linked to increased SI in adolescents (Overholser et al. 1995). Given that depression is highly associated with SI, and that information processing biases serve as a vulnerability factor for depression and suicide (Alloy et al. 1997; Black and Pössel 2013; Connolly et al. 2015; Wenzel and Beck 2008), we propose that SRET information processing may also serve as a risk factor for SI.

Negative Inferential Style

Negative inferential style is defined as the tendency to attribute negative life events to stable and global causes, as well as to infer negative implications for the self and negative future consequences from their occurrence. As outlined in Wenzel and Beck's (2008) cognitive theory of suicidal behavior, the stronger one's tendency to process information about negative life events in this manner, the greater the likelihood one may develop suicidal thoughts in response to their occurrence.

Although literature examining the relationship between negative inferential style and SI is more consistent and robust among adults, aspects of negative inferential style have been examined among adolescents and have demonstrated some varied results in predicting SI. For example, several

longitudinal studies have found that mid-to-late adolescents with a more negative inferential style were significantly more likely to experience prospective SI over follow-up than those with a less negative inferential style (Schwartz et al. 2000; Smith et al. 2006). Furthermore, in a large longitudinal study of late adolescents, Lewinsohn et al. (1996) demonstrated that a combined measure of negative depressotypic cognitions, inferential style, self-esteem, and coping skills mediated the relationships between psychopathology, physical illness, negative events, interpersonal events and a combined measure of SI and suicidal behavior (SB). However, a recent study by Labelle et al. (2013) indicates that a dysfunctional inferential style did not predict SI among a community sample of adolescents ages 14 to 18. Given the mixed results regarding the impact of negative inferential style on SI among mid-to-late adolescents, and the relative dearth of information regarding this relationship among young adolescents, more research is needed to clarify the role of this negative information processing style.

Response Style: Rumination and Distraction/Problem-Solving

A ruminative response style is a cognitive style characterized by a chronic, repetitive focus on one's dysphoric emotions as well as their causes and consequences (Nolen-Hoeksema 1991). Several theories have proposed that rumination serves as a risk factor for SI. Research indicates that rumination is perseverative and may inhibit one's ability to problem-solve by depleting concentration and contributing to inflexible thinking (Davis and Nolen-Hoeksema 2000; Miranda and Nolen-Hoeksema 2007). In turn, exhibiting deficits in problem-solving is itself a risk factor for SI and SB (Lyubomirsky and Nolen-Hoeksema 1995). Furthermore, according to the response styles theory, the passive style in which individuals focus on their symptoms is thought to heighten and prolong the presence of affective symptoms (Nolen-Hoeksema 1991).

Therefore, this type of thinking also may interfere with one's ability to adaptively regulate one's mood, with deficits in mood regulation also strongly linked to SI and SB (Miranda and Nolen-Hoeksema 2007; Williams et al. 2005). Furthermore, O'Connor's (2011) theory of suicide suggests that suicide risk comes about from the experience of defeat and entrapment, which rumination might foster.

Given these suggestions, it is not surprising that there is a consistent link between rumination and suicide risk in the literature (for a review, see Morrison and O'Connor 2008). For example, in a 2.5 year longitudinal study, rumination predicted hopelessness and both the severity and duration of SI among a sample of non-depressed university students (Smith et al. 2006). Among a community adult sample, rumination

predicted SI at 1 year follow-up, controlling for baseline SI, with depressive symptoms mediating the relationship (Miranda and Nolen-Hoeksema 2007). Longitudinal and cross-sectional research also has found that rumination mediates the relationships between self-criticism, cognitive flexibility, depressive symptoms, negative life events, suicide attempts, and SI (Chan et al. 2009; O'Connor and Noyce 2008; Krajniak et al. 2013; Miranda et al. 2013). Although the link between rumination and SI appears to be consistent among college students and adults, no studies to our knowledge have examined this link among young adolescents. However, existing literature documenting the significant role rumination plays in predicting prospective depressive symptoms among adolescents provides compelling reason to believe that this response style may also be a vulnerability for suicidal thoughts among adolescents and, if so, may serve to extend Wenzel and Beck's (2008) cognitive model of suicide to incorporate maladaptive cognitive processes in response to negative affect (Abela et al. 2007, 2009; Stange et al. 2014).

More recently, factor analyses of common measures of response styles among adolescents have suggested that there are two aspects of responses to negative affect: rumination, the tendency to repetitively think about one's low mood as well as its negative consequences, and distraction/problem-solving, the tendency to distract oneself and/or problem-solve as a response to low mood (Abela et al. 2007). According to the response styles theory (Nolen-Hoeksema 1991), responding to negative affect by distracting oneself inhibits inward thinking, which, in turn, may serve as a protective factor, preventing negative affect from resulting in greater dysfunctional cognitions. This technique subsequently allows individuals to more efficiently problem-solve without intrusion from the biased depressogenic thinking that negative affect often produces (Nolen-Hoeksema et al. 1993). Therefore, it has been hypothesized that initially distracting oneself from depressive symptoms, followed by engaging in active problem-solving once negative affect has improved, may be the optimal method of decreasing depressed mood (Nolen-Hoeksema 1991).

Given this hypothesis, distraction and problem-solving may be considered protective factors against depression. Indeed, a collection of evidence among adult and child samples supports this claim. Importantly, a longitudinal study of 6 to 14 year-olds found that engaging in both distraction and problem-solving techniques buffered against the development of depressive symptoms over time (Abela et al. 2007). Among dysphoric adult samples, undergoing a distraction induction has consistently been shown to decrease depressed mood, indicating its beneficial effects (see Wisco and Nolen-Hoeksema 2008). Furthermore, engaging in distraction also has been shown to increase effective problem-solving, providing support for the purported relationship between distraction, subsequently improved

problem-solving, and decreases in depressive symptoms (see Nolen-Hoeksema et al. 2008).

However, contradictory findings also have been reported in which distraction and problem-solving were not found to buffer against depressive symptoms within samples of children (Abela et al. 2002) as well as adults (see Nolen-Hoeksema et al. 2008). Issues in the measurement of distraction and problem-solving are thought to be responsible in part for these observed null findings. Indeed, Abela and colleagues (2002) did not find significant protective effects of distraction and problem-solving in their study in which they assessed these domains using separate subscales. Upon utilizing factor analytic techniques, Abela and colleagues (2007) proposed that distraction and problem-solving were best represented as a unified factor; when examined as such, this combined response style was found to prospectively protect against depressive symptoms in a young adult sample.

In contrast to rumination, no study to our knowledge has examined the link between distraction and problem-solving in response to negative affect and SI among any age group. Despite these mixed findings in relation to depression, we propose that employing distraction and problem-solving will buffer against the activation of suicide-relevant cognitive processes, and therefore, protect against the development of suicidal cognitions among young adolescents. Specifically, we posit that these more adaptive response styles may lessen the likelihood that one's negative affect may produce state-dependent dysfunctional cognitions, and may hamper generation of escapist suicidal behaviors as solutions when problem-solving. The current study aims to fill the identified gaps in the literature by investigating the respective risk associated with rumination and protection associated with distraction/problem-solving in the development of SI among young adolescents, and therefore, possibly extend Wenzel and Beck's (2008) cognitive model of suicide.

Sex Differences in the Pathway Between Cognitive Factors and Suicidal Ideation

Although SI increases among both boys and girls during the adolescent years (Nock 2012), research has consistently documented that adolescent girls are at greater risk for SI and attempted suicide (Lewinsohn et al. 1996). In addition to increased rates of SI among adolescent girls, research has consistently demonstrated that adolescent girls also have greater negative inferential styles (Hankin and Abramson 2002) and are more likely to develop ruminative tendencies during the adolescent years (e.g., Hamilton et al. 2015). Although few studies have evaluated sex as a potential moderator of the relationship between cognitive factors and SI, numerous studies have demonstrated that cognitive vulnerabilities predict depression more strongly among adolescent girls than boys

(e.g., Jose and Brown 2008; Mezulis et al. 2010). Further, one study found that girls with greater hopelessness were more likely to experience SI, which suggests that girls with cognitive vulnerabilities may be particularly at risk for SI compared to boys. Given the documented sex differences in SI, it is important to determine factors that may exacerbate the risk of SI, particularly among girls.

The Current Study

The present study assessed several cognitive factors that have received varying degrees of research support in conferring risk for or protection against the development of SI. This study aimed to elucidate which of these cognitive factors are most potent in predicting SI in the transition from early to mid-adolescence, a developmental period that has received relatively scant attention in longitudinal suicide research. Investigating this developmental period is of particular importance, as it provides the opportunity to identify key risk and protective factors that may be present and identifiable *before* the adolescent surge in depression and suicidal thoughts and behaviors occurs, particularly among girls (Hankin et al. 1998; Abela and Hankin 2008). Consistent with Wenzel and Beck's (2008) cognitive model of suicide, it was hypothesized that greater endorsement of negative adjectives as self-referent and greater recall of endorsed negative adjectives on the SRET would serve as prospective risk factors for SI. Correspondingly, it was expected that less endorsement of positive adjectives as self-referent and less recall of endorsed positive adjectives on the SRET would also serve as risk factors for SI over the transition from early to mid-adolescence. Furthermore, in line with the cognitive model of suicidal behavior, it was hypothesized that negative inferential style would independently pose risk for SI over time. Although ruminative response to negative affect has not yet been examined in relation to SI among young adolescents nor incorporated in the cognitive model of suicidal behavior (Wenzel and Beck 2008), the tendency to respond to negative affect by engaging in rumination was expected to serve as a risk factor for future SI and the tendency to respond to negative affect by engaging in self-distraction and/or problem-solving was expected to serve as a protective factor against future SI. Given mixed results and scant literature aimed at determining the relative impact of each of these cognitive factors in the prediction of SI, we did not generate specific hypotheses regarding which cognitive factors may be the most potent predictors of SI. Rather, we explored which cognitive variables emerged as the strongest predictors of SI when examined simultaneously. Further, given research demonstrating that girls are at greater risk for cognitive vulnerabilities (e.g., Mezulis et al. 2010) and SI (Lewinsohn et al. 1996), we expected that the cognitive

vulnerabilities tested would predict SI more strongly among adolescent girls than boys.

Method

Participants and Procedure

Sample Recruitment

Participants included in these analyses completed at least the baseline assessment and one additional follow-up session of the Temple University Adolescent Cognition and Emotion (ACE) Project, a longitudinal study examining risk factors for the development of depressive disorders in adolescence (see Alloy et al. 2012 for a detailed description of the sample). This study recruited early adolescents (12 to 13 years old) and their primary female caregivers (93 % were the adolescents' biological mothers; hereafter referred to as "mothers") from Philadelphia area public and private middle schools. Inclusion criteria required participants to be age 12 or 13 at the time of the baseline assessment, to identify as white, black, or biracial, and to be able to attend assessments with their mothers. Participants were excluded if either the mother or adolescent was unable to speak or read English, or if they demonstrated a history of psychosis, severe cognitive impairment or any medical problems that would not allow study participation. Dyads who met inclusion and exclusion criteria were invited to complete a baseline assessment that was separated into two sessions, referred to as Time 1 Session 1 and Time 1 Session 2.

Procedures

Adolescents and their mothers attended both Time 1 sessions and all prospective assessments in person. The Time 1 sessions each lasted approximately 2 to 3 h and included questionnaires, behavioral tasks, and diagnostic interviews. Adolescents and mothers were each compensated \$30 per session. At Time 1, adolescents completed self-report measures of suicidal ideation, depressive symptoms, negative inferential style, and response styles. Adolescents also completed the SRET behavioral task measuring self-referent information processing. Adolescents and mothers completed diagnostic interviews assessing the adolescents' lifetime history of psychiatric disorders and suicidal ideation with a trained doctoral student in clinical psychology, post-baccalaureate research assistant, or a Ph.D. level clinical psychologist. Participants who completed Time 1 of the study were invited to participate in longitudinal assessments every 6 months, during which they were again administered the self-report questionnaires and behavioral tasks listed above. Diagnostic interviews were conducted every 12 months to assess for change in

diagnoses and SI over time. Adolescents were followed for an average of 503.68 days ($SD=222.59$ days). Mothers provided written consent and adolescents provided written assent to participate in this prospective study.

Study Sample

The present study sample consisted of 324 adolescents who completed baseline measures and at least 1 of 4, 6-month follow-up sessions over approximately 24 months. The sample was 12.39 years old ($SD=0.63$) at Time 1, 53.5 % female, 47.50 % White, and 52.5 % African-American; 48.42 % of the sample qualified for free or reduced lunch at school, a measure of socioeconomic status that accounts for the number of dependents being supported by a family income. (See Table 1 for sample demographics).

Measures

Current and Past Depressive Disorders

The Kiddie – Schedule for Affective Disorders and Schizophrenia – Epidemiological Version (K-SADS-E; Orvaschel 1995), a semistructured diagnostic interview, was administered to both adolescents and mothers at baseline and at each 12-month follow-up session for the primary purpose of diagnosing psychiatric disorders within the sample. The K-SADS-E assesses current and past *Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV-TR; American Psychiatric Association 2000)* Axis I psychopathology in youth. The K-SADS-E interview was revised to additionally allow for the assessment of Research Diagnostic Criteria (RDC; Spitzer et al. 1978) diagnoses. Trained interviewers administered the K-SADS-E first to mothers and then to adolescents, subsequently generating a summary rating of symptoms and diagnoses. The interviewers were charged with summarizing the ratings of the mothers and adolescents based upon “best-estimate” clinical judgment, in line with the K-SADS-E procedures. Previous research on the K-SADS-E has demonstrated good inter-rater and test-retest reliability (e.g., Major Depression [$\kappa=.73$]; Dysthymia [$\kappa=.72$]) (Orvaschel 1995). For the purposes of this study, adolescents were considered to have exhibited a current or past episode of a depressive disorder if he/she met criteria for *DSM-IV-TR* Definite Major Depressive Disorder (MDD), Depressive Disorder Not Otherwise Specified (NOS) or Dysthymia or if he/she met criteria for RDC MDD, Minor Depressive Disorder (MDD), or Intermittent Depressive Disorder (IDD). All interviewers were subject to reliability checks. Disagreement in diagnosis was handled by bringing the case to a case meeting to discuss with the Principal Investigator and other licensed clinicians and expert diagnosticians to determine the diagnosis. Interrater reliability based on 120 pairs

Table 1 Demographic and cognitive factors as a function of SI status

	T2 No SI ($N=261$)	T2 SI ($N=63$)	t/x^2
T1 Age	12.43 (0.61)	12.25 (0.67)	-1.95
Sex	47.51 % female	71.43 % female	11.64**
Race	51.73 % AA 48.28 % White	55.56 % AA 44.44 % White	0.30
SES (Lunch)	51.43 %	48.57 %	4.13
Days In Study	496.15 (229.72)	534.05 (189.94)	1.16
# F/U Sessions	2.78 (1.30)	2.83 (1.37)	0.28
T1 SI	6.13 %	30.16 %	30.41***
T1 Current Dep	3.16 %	1.59 %	0.41
T1 Past Dep	11.88 %	11.11 %	0.03
SRET Neg Me	1.67 (1.56)	2.95 (2.69)	5.00***
SRET Neg Rec	.12 (0.15)	.19 (0.19)	2.70**
SRET Pos Me	9.85 (1.32)	9.35 (1.92)	-2.44*
SRET Pos Rec	.58 (0.25)	.56 (0.22)	-0.55
ACSQ	113.72 (36.98)	129.92 (45.35)	2.98**
HSC	2.90 (1.90)	3.43 (2.68)	1.82
CRSQ-R	23.53 (6.72)	27.62 (8.21)	4.14***
CRSQ-DPS	19.58 (4.45)	17.51 (3.83)	3.40**

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Standard deviations are in parentheses. T1=Time 1 (baseline); T2=Time 2 (follow-up); SI=Suicidal Ideation; SES (Lunch)=measure of socioeconomic status that accounts for the number of dependents being supported by a family income; # F/U Sessions=Number of follow-up sessions completed; SRET Neg Me/SRET Pos Me=Total number of negative/positive words endorsed as “Me”; SRET Neg Rec/SRET Pos Rec=[# positive/negative words endorsed and recalled/total #words endorsed and recalled across all conditions]; ACSQ-M=The Adolescent Cognitive Style Questionnaire-Modified; HSC=Hopelessness Scale for Children; CRSQ=Children’s Response Style Questionnaire; CRSQ-R=Rumination; CRSQ-DPS=Distraction/Problem Solving

of ratings (10 interviews, randomly selected, 5 raters for each of 24 diagnoses) was $\kappa=.85$ (BLINDED FOR REVIEW).

Suicidal Ideation

Suicidal ideation was assessed by adolescents’ response on the suicidal ideation item of the self-report Children’s Depression Inventory (CDI; Kovacs 1992) and by interviewer-rated responses to the suicide item in the K-SADS-E (based on both mother and adolescent report), described previously. The CDI was administered at baseline and approximately every 6 months. The CDI is a 27-item self-report measure used to evaluate depressive symptomatology among children and adolescents ages 7 to 17. The scale measures depression symptoms experienced by youth over the previous 2 weeks. Items are scored on a scale from 0 to 2, with higher scores indicating greater severity of symptomatology. For the purposes of this study, we used only the suicide item (Item 9), with zero indicating “I do not think about killing myself,” one indicating “I think about killing myself but I

would not do it,” and two indicating “I want to kill myself.” Adolescents indicating a score of one or two were considered to exhibit SI. Previous studies have demonstrated the validity of measuring SI using single suicide items derived from self-reported depression scales (e.g., Desseilles et al. 2012). The CDI has shown good reliability and validity (Klein et al. 2005) and had a .85 internal consistency in this sample.

At Time 1, in the K-SADS-E, all adolescents and mothers were asked if the adolescent had made any suicide plans (“*Did you ever have a specific plan to kill yourself, that you didn’t follow or carry out or try?*”) in their lifetime. At 12-month and 24-month follow-ups, adolescents and mothers were asked if the adolescent had made any suicide plans since their previous interview. Furthermore, at Time 1, 12, and 24 months, any adolescent or mother who endorsed that the adolescent experienced any symptoms of current or past depression and screened into those sections of the K-SADS-E were asked if the adolescent exhibited suicidal ideation (“*Do (did) you think about hurting or killing yourself?*”), or made any suicide plans (“*What do (did) you think of doing?*”). Only adolescents whose summary scores indicated suicidal ideation and/or suicide plans on the K-SADS-E were considered as exhibiting suicidal ideation.

A combination dichotomous score was calculated such that adolescents were considered to exhibit suicidal ideation at baseline if they endorsed suicide items on either the CDI or the K-SADS-E (0=Suicidal Ideation Not Present; 1=Suicidal Ideation Present), thereby incorporating both self-report and interview-based assessment information.

A combination dichotomous follow-up score also was calculated such that adolescents were considered to exhibit SI over follow-up if they endorsed suicide items on either the CDI at 6, 12, 18, or 24 month follow-up or on the K-SADS-E (0=Suicidal Ideation Not Present; 1=Suicidal Ideation Present) at 12 or 24 month follow-up, thereby incorporating both self-report and interview-based assessment information.

Self-Referent Information Processing

The Self-Referent Encoding Task (SRET; Derry and Kuiper 1981; Hammen and Zupan 1984) measures participants’ judgments of negative and positive emotionally-valenced words as self-descriptive, as well as their free recall of these words. The SRET was adapted for the computer using E-Prime software for the purposes of this study (Alloy et al. 2012; Connolly et al. 2015). Adolescents completed a total of 44 trials in which either a positive or a negative adjective appeared on the computer above a question instructing them to either make a self-referent judgment (“*Like Me?*”), rapidly judging whether the adjective describes them, or to make a structural judgment (“*Has an ‘E’?*”), rapidly judging whether the adjective contains the letter “E”. Structural trials served

as control trials, in order to assess for differences in the recall of self-referent negative/positive adjectives compared to the recall of negative/positive adjectives that were not encoded self-referentially. Adolescents were prompted to respond by pressing either a “Yes” or a “No” button labeled on the keyboard. Once adolescents responded they were advanced to the next trial immediately. The 44 total trials were divided into 22 structural judgment trials and 22 self-referent judgment trials, each with 11 positively (e.g., happy, attractive) and 11 negatively (e.g., ugly, loser) valenced adjectives. Positive adjectives and negative adjectives were matched on word length and frequency in the lexicon, and the order in which they were presented to participants was randomly determined. Immediately after completion of the computerized trials, a trained research assistant prompted participants to freely recall all words they remembered from the computer task. Participants were given up to 5 min to provide answers. The task’s rapid assessment format may help limit response bias as participants rate their self-concept, and its surprise recall component is intended to measure the depth with which this negative self-referent information has been encoded.

In this study, the SRET variables analyzed were: 1) Number of negative adjectives endorsed as self-referent, 2) Number of positive adjectives endorsed as self-referent, 3) Number of correctly recalled negative adjectives endorsed as self-referent (judged “like me”) divided by the total number of positive and negative words endorsed and recalled across both the self-referent and structural conditions, and 4) Number of correctly recalled positive adjectives endorsed as self-referent (judged “like me”) divided by the total number of positive and negative words endorsed and recalled across both the self-referent and structural conditions.

Negative Inferential Style

The Adolescent Cognitive Style Questionnaire-Modified (ACSQ-M; Alloy et al. 2012) is a revised version of the original scale (ACSQ; Hankin and Abramson 2002), which measures adolescents’ tendency to make negative inferences about the causes, consequences and self-implications of negative life events. In addition to assessing adolescent inferential style for negative achievement and interpersonal-related events, the modified version of the ACSQ also assesses appearance-related events. Therefore, the ACSQ-M presents four hypothetical events per domain (achievement, interpersonal, and appearance-related) and subsequently prompts adolescents to endorse inferences about the causes of the events (i.e., internal/ external, stable/ unstable, global/ specific), consequences of the events, and self-worth implications of the events. Each dimension is rated on a one to seven scale, with higher scores indicating a more negative inferential style. In the present study, we examined participants’ overall negative

score, which is a composite of ratings of event stability, globality, consequences, and self-implications in the achievement and interpersonal domains, in line with scoring of the original ACSQ (Alloy et al. 2006). Previous literature has shown that the ACSQ exhibits good internal consistency and test-retest reliability (Hankin and Abramson 2002). Furthermore, a study examining the scale's factor structure in measuring cognitive vulnerability to depression among adolescents demonstrated validity (Hankin and Abramson 2002). The internal consistency of the ACSQ-M in this sample was $\alpha=.94$ for the overall negative composite.

Response Styles

The Children's Response Styles Questionnaire (CRSQ; Abela et al. 2004) is a self-report questionnaire designed for youth that assesses response to dysphoric mood. The scale has a total of 25 items that prompt participants to indicate how often they respond to feeling depressed in a particular way. The 25 items represent two different response styles: rumination and distraction/problem-solving (DPS). The rumination subscale consists of items measuring self-focused responses to depressed mood (e.g., "Think about how alone you feel"). The DPS subscale measures the tendency to attempt to direct one's attention away from one's mood (e.g., "When I am sad, I do something fun with a friend") and the tendency to attempt to problem-solve and overcome a depressed mood ("When I am sad, I think of a way to make my problem better"). Each item is measured on a 4-point scale (*never, sometimes, often, almost always*) and higher scores on each subscale reflect a stronger tendency to engage in rumination, distraction, or active problem-solving when experiencing depressed mood. The CRSQ has demonstrated good validity and internal consistency (Abela et al. 2007). The rumination and DPS subscales exhibited good internal consistency in the present sample ($\alpha=.84$ and $.67$, respectively).

Statistical Analysis

Before conducting a series of logistic regressions to test the main study hypotheses, we ran independent samples *t*-tests to determine if any demographic variables (age at baseline, sex, race, SES) were associated with concurrent or prospectively measured SI. Further, given the participants' varying length of time in the study, we also ran an independent samples *t*-test to determine if number of days in the study and if number of follow-up assessments were associated with prospectively measured SI. Only sex was significantly associated with SI prospectively, in that females were more likely to exhibit increased SI over time. Thus sex was controlled for in all subsequent prospective analyses when sex was not examined as a moderator (in which it was entered as a main effect). An

additional set of preliminary analyses examined bivariate correlations between the main study variables (see Table 2).

To evaluate study hypotheses and examine each cognitive factor as an independent prospective predictor of SI, we conducted a series of logistic regression analyses, controlling for sex, Time 1 SI, Time 1 current depressive diagnoses, and Time 1 past depressive diagnoses. In order to determine the relative predictive value of each cognitive factor, we ran separate hierarchical logistic regressions to determine which cognitive factors predicted prospective SI. Next, to examine the relative strength and predictive ability of each cognitive factor, we entered each significant cognitive factor simultaneously in Step 2 of a combined logistic regression, controlling for the previously mentioned covariates in Step 1. We centered the cognitive variables when they were entered simultaneously into the multiple logistic regression analysis so as to combat the potential for multicollinearity.

To examine our hypothesis that the relationship between each cognitive risk and protective factor and SI may be particularly strong among adolescent girls compared to boys, we conducted a series of moderation analyses using the PROCESS macro in SPSS (Hayes 2013). Thus, we controlled for Time 1 SI, Time 1 current depressive diagnoses, and Time 1 past depressive diagnoses during all analyses predicting to prospective SI. To test each cognitive factor separately, the main effect of sex and the cognitive factor of interest were entered into the model in addition to the interaction term of sex and each cognitive factor. For all significant interactions, we probed the simple slopes for boys and girls.

Results

Preliminary Analyses

At baseline, 10.8 % of the sample reported SI on either the CDI or via diagnostic interview on the K-SADS-E. Over the 2-year follow-up period ($M=503.68$ days; $SD=222.59$), 19.4 % of the sample endorsed SI. At baseline, a dichotomous indicator of SI utilizing CDI Item 9 and a dichotomous indicator of SI measured by the K-SADS-E were significantly correlated ($r=.34$, $p<0.001$). Follow-up SI results utilizing the CDI #9 and the K-SADS-E were also significantly correlated ($r=.34$, $p<0.001$). There were no significant differences in SI status at baseline or follow-up based on age, race or SES. At baseline, sex was not significantly related to SI status (males=10.32 %; females=11.24 %, $\chi^2(1, N=324)=0.70$, $p>0.05$). However, at follow-up, there was a significant difference in SI for males (11.61 %) and females (26.70 %), $\chi^2(1, N=324)=11.64$, $p=0.001$, such that females demonstrated higher rates of SI.

We found significant differences in length of time in study and number of follow-up sessions based on race ($r=-.18$,

Table 2 Bivariate correlations between study variables

	1	2	3	4	5	6	7	8	9
T1 SI	–								
T2 SI	0.31***	–							
SRET Neg Me	0.29***	0.27***	–						
SRET Neg Rec	0.11	0.18**	0.45***	–					
SRET Pos Me	–0.31***	–0.14*	–0.33***	–0.28***	–				
SRET Pos Rec	–0.12*	–0.03	–0.29***	–0.40***	0.23***	–			
ACSQ-M	0.21***	0.16**	0.23***	0.03	–0.16**	–0.01	–		
CRSQ-R	0.34***	0.23***	0.35***	0.09	–0.23***	–0.01	0.34***	–	
CRSQ-DPS	–0.10	–0.19**	–0.16**	–0.12	0.17**	0.10	–0.05	–0.08	–

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

T1=Time 1 (baseline); T2=Time 2 (follow-up); SI=Suicidal Ideation; SRET Neg=Me/SRET Pos=Me=Total number of negative/positive words endorsed as “Me”; SRET Neg Rec/SRET Pos Rec=[# positive/negative words endorsed and recalled/total #words endorsed and recalled across all conditions]; ACSQ-M=The Adolescent Cognitive Style Questionnaire-Modified; CRSQ=Children’s Response Style Questionnaire; CRSQ-R=Rumination; CRSQ-DPS=Distraction/Problem Solving

$p < 0.01$; $r = -.13$, $p < 0.05$, respectively) and baseline age ($r = .24$, $p < 0.001$; $r = -.50$, $p < 0.001$, respectively). However, number of follow-ups, length of time in study, race, and age were all not significantly associated with the presence of SI over the follow-up period. Furthermore, sensitivity analyses indicated that all study results remained consistent when also controlling for race and age. Given the consistent results, the following analyses presented were run without controlling for these demographic variables. Tables 1 and 2 provide an overview of descriptive statistics and correlations between study variables, respectively.

Correlational Relationships Between Cognitive Factors and SI at Baseline and Follow-Up

Relationship Between Negative Self-Referent Information Processing and Suicidal Ideation

The number of negative adjectives adolescents endorsed as self-referent was significantly positively correlated with both baseline ($r = .29$, $p < 0.001$) and follow-up SI ($r = .27$, $p < 0.001$). Furthermore, the proportion of self-referent negative adjectives correctly recalled relative to all words endorsed and recalled was positively correlated with follow-up SI ($r = .18$, $p < 0.01$), but not with baseline SI ($r = .11$, $p > 0.05$). The number of positive adjectives adolescents endorsed as self-referent was significantly negatively correlated with both baseline ($r = -.31$, $p < 0.001$) and follow-up SI ($r = -.14$, $p < 0.01$). Additionally, the proportion of positive words endorsed as self-referent that were subsequently correctly recalled relative to all words endorsed and recalled was significantly associated with baseline SI ($r = -.12$, $p < 0.05$), but not with follow-up SI ($r = -0.03$, $p > 0.05$).

Relationship Between Negative Inferential Style and Suicidal Ideation

We hypothesized that negative inferential style would be associated with SI at both baseline and over the 2 year follow-up period. In line with these hypotheses, negative inferential style was significantly associated with baseline SI ($r = .21$, $p < 0.001$) and follow-up SI ($r = .26$, $p < 0.01$).

Relationship Between Response Styles of Rumination and Distraction/Problem-Solving and Suicidal Ideation

We hypothesized that greater levels of rumination would be correlated with baseline and follow-up SI. Rumination was, in fact, significantly correlated with both baseline ($r = .34$, $p < 0.001$) and follow-up SI ($r = .23$, $p < 0.001$). Although responding to negative emotion by engaging in distraction/problem-solving was not significantly correlated with baseline SI ($r = -.10$, $p > 0.05$), it was significantly negatively correlated with prospective SI ($r = -.19$, $p < 0.01$).

Cognitive Factors as Prospective Predictors of SI over Two-Year Follow-Up

All SRET variables, negative inferential style, rumination, and distraction/problem-solving were examined separately as predictors of follow-up SI, controlling for baseline SI, current and past depressive diagnoses, and sex. Other demographic variables and time in study were not covaried, as they were not correlated with prospective SI.

After adjusting for these covariates, the number of negative words endorsed as “Me” on the SRET significantly predicted SI over follow-up ($OR = 1.31$; 95 % CI [1.12, 1.54], $p < 0.01$). Furthermore, the ratio of negative self-referent adjectives

Table 3 Relationship between individual cognitive variables and prospective SI status controlling for Time 1 SI, Time 1 current and past depressive disorders, and sex

Predictor	β	Wald	OR	95 % CI	<i>p</i>	ΔR^2
SRET Neg=Me	0.52	11.24	1.68	1.24–2.26	0.001	0.05
SRET Neg Rec	2.12	3.74	8.40	0.97–71.80	0.053	0.00
SRET Pos=Me	−0.10	0.92	0.90	0.74–1.11	.337	0.00
SRET Pos Rec	−0.13	0.04	0.88	0.24–3.16	.842	0.00
ACSQ-M	0.37	5.60	1.45	1.07–1.97	0.018	0.03
CRSQ-R	0.40	6.22	1.49	1.09–2.03	0.013	0.03
CRSQ-DPS	−0.48	8.92	0.62	0.45–0.85	0.003	0.04

T1=Time 1 (baseline); T2=Time 2 (follow-up); SI=Suicidal Ideation; SRET Neg=Me/SRET Pos=Me=Total number of negative/positive words endorsed as “Me”; SRET Neg Rec/SRET Pos Rec=[# positive/negative words endorsed and recalled/total #words endorsed and recalled across all conditions]; ACSQ-M=The Adolescent Cognitive Style Questionnaire-Modified; CRSQ=Children’s Response Style Questionnaire; CRSQ-R=Rumination; CRSQ-DPS=Distraction/Problem Solving; ΔR^2 =Change in *R*² beyond step 1 covariates

correctly recalled to the total number of adjectives endorsed and recalled was trending toward significance in predicting SI at follow-up (*OR*=1.31; 95 % CI [1.12, 1.54], *p*=0.053). Neither the number of positive words endorsed as self-referent on the SRET nor the recall of these words was predictive of SI at follow-up, after controlling for study covariates (*OR*=.90; 95 % CI [0.74, 1.11], *p*>0.05; *OR*=.88; 95 % CI [0.24, 3.16], *p*>0.05).

Consistent with hypotheses, negative inferential style (*OR*=1.01; 95 % CI [1.00, 1.02], *p*<0.05), and the response styles of rumination (*OR*=1.06; 95 % CI [1.01, 1.10], *p*<0.01) and distraction/problem-solving (*OR*=.90; 95 % CI [0.83, 0.96], *p*<0.01) each significantly predicted adolescent SI over follow-up in the expected directions after adjusting for covariates (see Table 3).

The most potent predictor of SI over the 2-year follow-up period was baseline SI, conferring five times higher odds of reporting SI at future timepoints. Sex served as the second strongest predictor of prospective SI, with females being three times more likely to report SI over the 2 year follow-up period (see Table 4). Of

note, being diagnosed with a current depressive disorder at Time 1 was minimally predictive of prospective SI (*OR*=0.04; 95 % CI [0.00, 0.71], *p*<0.05), with a past depressive episode not significantly predicting prospective SI (*OR*=0.51; 95 % CI [0.16, 1.61], *p*>0.05).

Strongest Cognitive Predictors of Suicidal Ideation among Early Adolescents

In a combined regression model including all significant cognitive predictors, the number of negative adjectives endorsed as self-referent on the SRET remained significant as a risk factor for prospective SI (*OR*=0.01; 95 % CI [1.04, 1.45], *p*<0.05) and distraction/problem-solving remained a significant protective factor for SI (*OR*=.91; 95 % CI [0.85, 0.98], *p*<0.05). The degree to which adolescents engaged in rumination and exhibited a negative inferential style were no longer predictive of SI when entered with all cognitive factors simultaneously.

Table 4 Logistic regression evaluating significant cognitive predictors of SI simultaneously

Step	Predictor	β	Wald	OR	<i>p</i>	95 % CI	ΔR^2
1	Sex	1.16	11.13	3.19	0.001	1.61–6.30	.19
	T1 SI	1.72	12.98	5.58	0.000	2.19–12.24	
	T1 Curr Dep	−3.14	4.85	0.04	0.028	0.00–0.71	
	T1 Past Dep	−0.68	1.32	0.51	.250	0.16–1.61	
2	SRET Neg=Me	0.39	6.02	1.48	0.014	1.08–2.02	0.09
	ACSQ-M	0.23	1.78	1.26	.182	0.90–1.76	
	CRSQ-R	0.20	1.27	1.22	.259	0.86–1.73	
	CRSQ-DPS	−0.41	6.03	0.66	0.014	0.48–0.92	

T1=Time 1 (baseline); T2=Time 2 (follow-up); SI=Suicidal Ideation; Curr=Current; Dep=Depression; SRET Neg=Me Total number of negative words endorsed as “Me”; ACSQ-M=The Adolescent Cognitive Style Questionnaire-Modified; CRSQ=Children’s Response Style Questionnaire; CRSQ-R=Rumination; CRSQ-DPS=Distraction/Problem Solving; ΔR^2 =Change in *R*² beyond step 1 covariates

Sex Differences in the Prospective Relationship Between Cognitive Factors and SI

We examined potential sex differences in the relationship between cognitive factors and prospective SI, controlling for baseline SI and current and past depressive diagnoses. Consistent with hypotheses, there was a significant interaction between sex and the number of negative words endorsed as “Me” on the SRET ($B=.41$, $SE=.19$, $Z=2.11$, $p=0.04$). Specifically, the number of negative words endorsed predicted prospective levels of SI over follow-up among adolescent girls ($B=.38$, $SE=.10$, $Z=3.73$, $p<0.001$), but not among boys ($B=-0.03$, $SE=.17$, $Z=-.20$, $p=.84$; Fig. 1). Contrary to hypotheses, there was no significant interaction between sex and any other SRET variables, negative inferential style, rumination, or distraction/problem-solving in predicting prospective SI. In sum, it appears that although there is a significant main effect of sex on prospective SI, the number of negative adjectives endorsed as self-referent more strongly predicted SI among girls than boys.

Discussion

A multitude of cognitive factors have been implicated as predictors of SI and have been incorporated into a cognitive model of suicidal behavior (Wenzel and Beck 2008). However, very few studies have prospectively examined multiple cognitive predictors of SI in non-clinical samples of young adolescents over their transition to mid-adolescence, despite the fact that this period of time coincides with a significant surge in psychopathology and suicidality (Hankin et al. 1998; Kessler et al. 2001; Nock et al. 2008). Furthermore, very few studies have simultaneously examined suicide-relevant cognitive factors in order to determine their relative importance in conferring risk for and/or protection against SI. In line with Wenzel and Beck’s (2008) model of

suicidal behavior, the current study demonstrates that both cognitive content and cognitive processes pose significant risk for the development of SI. Specifically, the results indicate that the preferential endorsement of negative adjectives as self-referent and a negative inferential style are significant indicators of risk for the development of SI over a 2-year follow-up period among early adolescents. Adding to the postulates of Wenzel and Beck’s (2008) cognitive model of suicidal behavior, findings suggest that young adolescents’ tendency to ruminate in response to negative affect also increases risk for experiencing suicidal thoughts. Further building on this model, the current study found that the cognitive tendency to respond to negative affect by engaging in distraction and problem-solving reduces the risk of exhibiting SI over the transition from early- to mid-adolescence. It is important to note that these relationships remained significant even after adjusting for consistently robust prospective predictors of SI including sex, baseline SI and depressive disorders, and past depressive disorders (Nock et al. 2008).

When examining these cognitive factors simultaneously, negative self-schema (measured by the number of negative adjectives an adolescent endorsed as self-referent during a computerized self-referent encoding task) and the tendency to engage in distraction and problem-solving when faced with low mood, remained the only significant predictors of SI over follow-up. Although we did not offer specific hypotheses regarding which cognitive factors would serve as the strongest predictors of SI given the dearth of literature available to support such conjectures, these findings are surprising, as this is the first study to our knowledge to examine either of these factors as prospective predictors of SI. Our finding that these variables predicted SI even when accounting for baseline SI, depression diagnoses, sex, and the well-established cognitive factors of negative inferential style and rumination, highlights their potential utility in improving the predictive validity of extant models of risk pathways to suicide.

Although rates of SI did not vary by sex at baseline, girls displayed greater SI at follow-up, in line with previous research (Lewinsohn et al. 1996). Furthermore, a significant interaction was found between the number of negative self-referent adjectives endorsed on the SRET and sex in the prediction of SI, such that negative word endorsement was only a significant predictor of SI among girls. This finding suggests that the presence of a negative self-schema may be a particularly important risk factor for the development of SI in females. No other interactions between sex and cognitive vulnerabilities emerged in the current sample. The finding that the preferential endorsement of negative adjectives as self-referent is a significant predictor of prospective SI is in line with Wenzel and Beck’s (2008) cognitive model of suicide. Specifically, in this model of suicide, as the frequency, intensity, and duration of information processing biases increase, one is at greater risk of experiencing suicidal cognitions. The

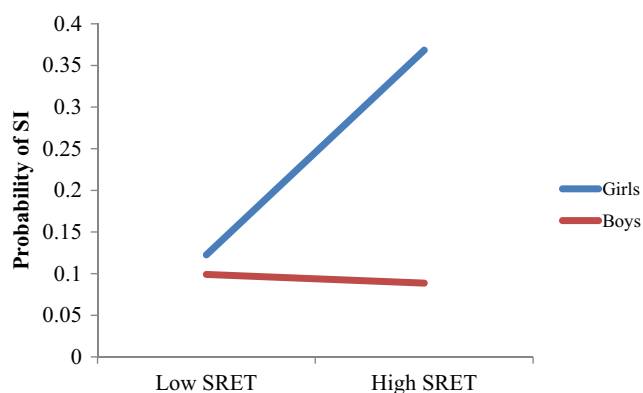


Fig. 1 Gender moderates the relationship between SRET Neg words and SI

greater number of negative words attributed to oneself might signify a higher likelihood that one possesses a negative self-schema, which causes biases in the interpretation and encoding of environmental stimuli. Given that the SRET required adolescents to quickly decide whether or not a negative adjective was self-referent, it is possible that this task may tap into automatic self-associations to a greater degree than to explicit self-beliefs. Whereas explicit self-beliefs are theorized to signify one's carefully weighted assessment of the truth of alternative ideas, automatic self-associations are theorized to more truthfully reflect how closely two constructs (such as the self and negative characteristics) are linked in one's memory (Gawronski and Bodenhausen 2006). Automatic self-associations may be more reflective of deep-seated self-schemas, as they are hypothesized to be less affected by social desirability biases and introspection deficits (Greenwald and Farnham 2000). Beck's theory indicates that the deeper-seated the negative self-schemas, the more likely they are to have a dysfunctional effect on information processing biases, and therefore, the greater likelihood that they may lead to suicidal cognitions (Beck 1976, 1987).

It is intriguing that negative adjective endorsement on the SRET emerged as the only cognitive variable to significantly interact with sex in predicting SI, as sex differences have not typically been reported in previous SRET research within the depression literature. However, to our knowledge, the current study is the first to examine SRET performance as a predictor of SI, finding that the possession of a negative self-schema is a particular risk factor for SI in girls but not boys. It is possible that negative self-concept predicts SI more strongly among girls due to a stronger internalization of negative views; indeed, it has been shown that women engage in a greater degree of self-focus compared to men (Ingram et al. 1988). In keeping with this idea, if girls attend to and identify more strongly with this negative self-schema than boys, they may be more likely to adopt a hopeless or defeatist attitude and in turn, engage in SI. A previous study of the relationship between self-esteem and SI in adolescence somewhat supported this concept, demonstrating that girls displayed both higher rates of SI and lower self-esteem; however, no significant interaction was reported (Overholser et al. 1995). Future research should aim to further examine this relationship between negative self-concept and SI, and potential differences that may exist between sexes.

Beck's theory of depression (1987) hypothesized that negative self-schemas cause individuals to encode negative information more deeply than positive information. Therefore, consistent with Wenzel and Beck's (2008) cognitive model of suicide, individuals at risk for SI may be better able to retrieve negative information than positive information. However, contrary to hypotheses, the current study did not find strong support for this hypothesis. Although increased negative self-referent recall on the SRET trended toward significance as a predictor of SI, the relationship between decreased positive

self-referent recall and SI was nonsignificant. It is possible that the use of a clinical sample with higher rates of depression and SI would be necessary in order for these relationships to reach significance, and thus, further research is warranted.

A significant body of research supports the role of rumination as a robust prospective predictor of SI in late adolescent and adult samples (Morrison and O'Connor 2008). Although rumination served as a significant independent predictor of SI over follow-up in our sample, it is somewhat surprising that it was not predictive beyond the effect of the other cognitive factors in our study. It is possible that high levels of shared variance between the constructs of rumination and negative inferential style led to their loss of significance when entered into a model simultaneously along with the remaining risk and protective factors of interest. Rather, our results suggest that a response style characterized by the tendency to distract oneself and engage in problem-solving when faced with negative affect is a more potent predictor of prospective SI. Our findings complement Abela et al.'s (2007) report that a response style characterized by distraction and problem-solving predicted decreases in depressive symptoms over time among adolescents, therefore operating as a protective factor. The response styles theory (Nolen-Hoeksema 1991) suggests that responding to negative mood by first engaging in distraction to lower arousal and subsequently engaging in problem-solving to resolve the issue that induced the low mood may be an effective way to reduce negative affect. In an extension of this theory, our current results suggest that utilizing distraction and problem-solving techniques also may lessen the likelihood that adolescents consider suicide as a means of responding to or regulating depressed mood. Given that this measure of distraction/problem-solving has not been examined in relation to SI in prior studies, this finding highlights this response style as a potentially important protective factor against the onset of SI, and future research will be needed to replicate and extend these findings.

Clinical Implications

Future research should probe whether quantifying information processing biases using the SRET might be a feasible way to assess non-clinical adolescent samples for suicide risk, while avoiding the inherent biases associated with self-report measures of sensitive information. The present findings additionally suggest that targeting maladaptive self-schemas in therapy (e.g., with cognitive therapy; Wenzel et al. 2009) may be worthwhile among young adolescents, and particularly among girls, as self-concept is still developing and may be relatively more malleable at this stage of development than in later adolescence (Abela and Hankin 2008; Kroger et al. 2010). Furthermore, our results suggest that assessing the use of adaptive response styles to negative affect (problem-solving

and distraction) also may be important in quantifying suicide risk, and may represent a point of intervention clinically. For those who already employ distraction and problem-solving in response to depressive affect, building upon these skills may enhance resiliency. For those who do not utilize these skills at all, teaching problem-solving strategies and the distress tolerance skill of distraction may be very helpful in preventing future SI. These strategies have been successfully implemented within treatments such as dialectical behavioral therapy for adolescents (DBT-A; Miller et al. 2006). Numerous treatments also have been developed to reduce the use of rumination, including mindfulness-based cognitive therapy (Segal et al. 2012), rumination-focused cognitive behavioral therapy (Watkins et al. 2011), emotion regulation therapy (Mennin and Fresco 2014), and cognitive control training (Siegle et al. 2007). These treatments originally were developed for adults, but ideally could be extended to adolescents to help prevent the onset or recurrence of SI.

Study Strengths and Limitations

Although we arguably examined not only empirically established cognitive predictors (i.e., negative inferential style and rumination), but also cognitive predictors that have received less empirical attention in the field (i.e., self-referent information processing and distraction/problem-solving in response to negative affect), we did not exhaustively cover all potentially important cognitive variables that may predict SI. For example, examining cognitive variables such as autobiographical memory (e.g., Arie et al. 2008; Williams and Broadbent 1986) and cognitive flexibility (e.g., Miranda et al. 2012, 2013) might further enhance predictive models of SI among young adolescents and should be investigated in tandem with the cognitive variables examined in the current study. Wenzel and Beck's (2008) model of suicidal behavior purports that maladaptive cognitive processes serve to increase the chance of activating a suicide schema, such as hopelessness, which may trigger cognitive processes associated with suicidal acts (i.e., selective attention to suicide-relevant environmental cues and attentional fixation). Future research should explore how both the maladaptive and adaptive cognitive processes supported in the current study influence the activation of suicide schemas and cognitive processes associated with suicidal acts to build empirical evidence for this model.

Although our study covered approximately 2 years of follow-up, future studies may consider extending the follow-up period to examine how these cognitive factors may differentially impact SI among early, middle, and late adolescents. Future work that includes more follow-up assessments, particularly among high-risk samples in which base rates of SI are higher, could use other statistical approaches to model and

predict trajectories of SI over time. Specifically, multi-wave data collection could allow researchers to perform mediation analyses to identify potential mechanisms that underlie the relationships between our study's cognitive factors and risk for or protection against SI. In addition, given the low base rate of SI in our community sample of early adolescents, our study only examined a combined measure of suicidal ideation with and without plans, which limited our ability to differentiate whether certain cognitive factors more strongly predict those at greater risk with suicidal plans versus those without plans. Therefore, future research would benefit from separate examination of adolescents with and without suicidal plans. In addition, given the low base rate of MDD in our sample, the present study was unable to longitudinally examine the relationship between MDD and SI across the study period, which would be important to demonstrate the unique prediction of cognitive factors to MDD versus SI over time. Additionally, in the current study, eight adolescents reported a suicide attempt over the 2-year follow-up. Given this low rate, we were unable to conduct analyses examining predictors of suicidal behavior due to minimal power. Future studies should examine this study's cognitive factors as predictors of suicidal behaviors among community sampled young adolescents. Nevertheless, given that SI is a strong predictor of future suicide attempts (e.g., Beck et al. 1999; Brown et al. 2000; Lewinsohn et al. 1994; Myers et al. 1991), understanding factors that precede the onset of SI may be important in attenuating suicide risk.

The current study's prospective design and 2 year follow-up period beginning at early adolescence (ages 12 to 13) allowed us to uniquely predict SI in early adolescence, a sensitive period prior to the sharp emergence of psychopathology (Hankin et al. 1998; Kessler et al. 2001). Prospective studies of SI among community samples of young adolescents are relatively rare, with those that exist being primarily reliant on self-report measures of SI. Therefore, an important strength of this study was its use of a combined indicator of SI incorporating both interviewer-administered and self-report measures and both mother and adolescent report. Nevertheless, as with most methods of measuring SI, the measures used in the present study likely are imperfect. For example, only SI occurring in the prior 2 weeks is captured by responses on the CDI. Although the K-SADS covers a longer period of follow-up, due to demand characteristics, adolescents may be more reluctant to disclose the occurrence of SI to interviewers on the K-SADS than they are on self-report measures. Future studies might use multiple modes (e.g., interview, self-report) that cover the same period of follow-up, as well as implicit measures of SI, to assess SI more completely. However, this is the first study that we know of that examines a computerized self-referent encoding task and the distraction and problem-solving subscale of the Children's Response Style Questionnaire (Abela et al. 2007) as predictors of SI. Early

detection of risk for SI is crucial in order to prevent suicide. This study identified multiple prospective predictors of adolescent SI that will aid in further strengthening the cognitive model of suicidal behavior (Wenzel and Beck 2008), thus informing suicide prevention efforts among a non-clinical sample of diverse early adolescents.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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