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Getting Out of Rumination: Comparison of Three Brief Interventions in a Sample of Youth

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Abstract

Rumination, passively and repetitively dwelling on and questioning negative feelings in response to distress, is a risk factor for the development of psychopathology, especially depression. The ruminative process is difficult to stop once it has begun. The present studies focused on strategies that may help youth disengage from ruminative states. In Study 1, we validated a technique for inducing distress and measuring state rumination. Twenty-six participants (mean age= 12.21; 62 % girls) underwent a negative mood induction followed by either a rumination or distraction induction. In Study 2, we examined the utility of three different brief interventions for stopping the ruminative process. One hundred-two youth (mean age= 11.51; 64 % girls) underwent a negative mood induction followed by a rumination induction. Following this, participants were randomly assigned to one of three conditions designed to help them out of the ruminative state (distraction, problem-solving, or mindfulness). In Study 1, participants in the rumination condition reported significantly higher levels of state rumination compared to those in the distraction condition. In Study 2, both distraction and mindfulness helped reduced state rumination compared to problem-solving. Taken together, these data suggest that even a brief period of distraction or mindfulness is helpful in getting youth out of a ruminative state. Clinical implications might include the potential use of mobile device applications to help alleviate rumination.

Keywords

Rumination; Distraction; Mindfulness; Problem-solving; Adolescents

Introduction

Rumination involves passively dwelling on negative feelings and questioning their causes and consequences (Nolen-Hoeksema et al. 2008). Often, rumination becomes a vicious cycle, and we know very little about how to stop rumination among youth. Given that rumination is a risk factor for the development of depression and other forms of psychopathology (Nolen-Hoeksema et al. 2008), understanding how to stop the ruminative cycle, especially among youth, has important health implications.

Rumination is a response to distress that involves “repetitively and passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms”

(Nolen-Hoeksema et al. 2008, p. 400). According to the response styles theory, rumination serves as a vulnerability factor for the development of depression as well as a factor that maintains and exacerbates existing depression (Nolen-Hoeksema 1991). Observational studies have demonstrated a prospective link between self-reported rumination and depressive symptoms in studies of adults (Nolen-Hoeksema et al. 2008) and youth (Rood et al. 2009). Experimental studies have also demonstrated an effect of rumination on mood (see Nolen-Hoeksema et al. 2008 for a review). Additionally, experimental studies have demonstrated other detrimental effects of rumination among individuals with negative affect, including activation of negatively-biased memories (Lyubomirsky et al. 1998; Park et al. 2004) and poor problem-solving (Donaldson and Lam 2004; Lyubomirsky et al. 1999). Thus, rumination seems to be harmful for individuals with a propensity for negative affect.

Even among non-depressed individuals, ruminative states and negative affect are related in a reciprocal fashion. This relationship has been demonstrated over relatively shorter (Moberly and Watkins 2008) and longer (Nolen-Hoeksema et al. 2007) time frames. The more one ruminates, the worse one feels, fueling more rumination, and so on. Thus, stopping rumination seems paramount to preventing prolonged negative affect.

Healthy Responses to Distress

According to the response styles theory, two healthier responses to distress include distraction and problem-solving (Nolen-Hoeksema 1991). Distraction involves purposely directing attention to pleasant or neutral activities rather than one's negative emotions. For example, one might read a book or talk to a friend to avoid brooding. Problem-solving involves the active process of generating and enacting solutions to change one's negative mood. For example, one might brainstorm three mood-lifting activities and then pick one to engage in. Nolen-Hoeksema suggested that distraction may help in alleviating negative mood long enough to allow for problem-solving, which she views as a more adaptive response to distress in the long-run. Although the only two healthy coping strategies discussed in the original response styles theory were distraction and problem-solving, recent research has revealed another possible alternative to rumination that involves purposeful attention to the present moment along with an acceptance of mental events, i.e., mindfulness (Bishop et al. 2004). With mindfulness, an individual might note his/her negative emotion, but rather than allow the mind to wander into a ruminative state, will attempt to accept it and let it go.

Distraction has been studied extensively in the laboratory. Typical laboratory studies of rumination use distraction as a comparison condition. These studies typically involve a negative mood induction followed by getting participants into a ruminative or distractive state by reading through note cards with prompts for 8 min. Rumination prompts instruct participants to focus on their feelings along with their causes and consequences (e.g., *think about why you feel the way you do*), while distraction prompts instruct participants to imagine objects and scenes (e.g., *think about a large, black umbrella*). Distraction has been shown to improve mood (e.g., Nolen-Hoeksema and Morrow 1991) and problem-solving (e.g., Donaldson and Lam 2004) in dysphoric or depressed individuals (see Nolen-Hoeksema et al. 2008 for a review). Although most studies on distraction have been conducted with adults, it may be a helpful way out of the ruminative process for youth as well. For example, studies with youth have shown that self-reported distraction (compared to rumination) is associated with lower depressive symptoms over time (Hilt et al. 2010; Roelofs et al. 2009).

Unlike distraction, problem-solving has not been studied as a rumination alternative in the laboratory; however, problem-solving impairment has been linked to depression, and problem-solving therapy has effectively treated depression (e.g., Nezu 1986). Because

rumination interferes with problem-solving (Lyubomirsky and Nolen-Hoeksema 1995; Lyubomirsky et al. 1999), it may be a mechanism by which rumination exacerbates depression. Problem-solving has been studied in the laboratory as an outcome measure. For example, several studies using the Means-Ends Problem-Solving Task (Platt and Spivack 1975) have found that dysphoric and depressed individuals induced to ruminate, scored worse than those induced to distract (e.g., Watkins and Baracaia 2002). Rumination impedes on motivation and implementation of the problem-solving process (Lyubomirsky et al. 1999). Thus, if facilitated, problem-solving could be a way out of the ruminative process.

Studies with youth and problem-solving are lacking. However, problem-solving training is an integral component of cognitive-behavioral treatments for youth depression (e.g., Lewinsohn et al. 1990). Additionally, studies focusing on self-reported responses to depression find that adolescents who report engaging in problem-solving are less likely to experience increases in depressive symptoms (e.g., Abela et al. 2004; Hilt et al. 2010). One study found that the relationship between problem-solving and depressive symptoms was present for young adolescents (i.e., 7th graders), but not younger children (i.e., 3rd graders; Abela et al. 2004); thus, we might expect problem-solving to be particularly effective for older youth.

Mindfulness involves purposely focusing on mental events in a nonjudgmental manner. It allows individuals to acknowledge negative emotions without pushing them away or becoming overwhelmed; rather, view them as passing mental events. Mindfulness is thought to allow individuals to disengage from rumination by directing attention to the present moment (Segal et al. 2002).

Most research with mindfulness involves several weeks of training in the techniques. Some studies using intensive mindfulness training demonstrated reductions in rumination for adults (Kingston et al. 2007; Ramel et al. 2004; Shapiro et al. 2007). For example, one study found that while both mindfulness and relaxation training reduced distress among college students, mindfulness did so via reduced rumination (Jain et al. 2007). Although only in the preliminary stages, mindfulness interventions have been applied to youth as well (Burke 2010). A pilot study with 4th and 5th graders found that those in the mindfulness group had reduced rumination at the end of 12 weeks of training compared to those with no mindfulness training (Mendelson et al. 2010).

Other studies have used a mindful *state* to examine changes in negative affect. In these studies a brief mindfulness induction was compared to a distraction or rumination induction following a negative mood induction, to examine differential effects on negative affect. Among non-clinical adult samples, one study found that mindfulness resulted in less negative affect compared to rumination and distraction (Broderick 2005), while another found that distraction resulted in less negative affect compared to rumination and mindfulness (Kuehner et al. 2009). Studies of formerly depressed adults show that both mindfulness and distraction inductions result in less intense negative mood compared to a rumination induction (Huffziger and Kuehner 2009; Singer and Dobson 2007).

Thus, although few studies have been conducted with youth, accumulating evidence suggests that mindfulness techniques, including those engaged in during a brief state, are helpful in reducing negative affect, possibly by reducing rumination. Furthermore, mindfulness techniques are likely to be developmentally appropriate for children by age 7, and especially by early adolescence (Thompson and Gauntlett-Gilbert 2008).

In sum, there are at least three strategies that may be helpful in stopping the ruminative process for youth: distraction, problem-solving, and mindfulness. No studies that we are aware have specifically examined these strategies in terms of success interrupting a

ruminative state. Such an inquiry would involve first inducing rumination and then measuring how well each strategy reduced rumination. Prior research established that distraction, and possibly mindfulness, are adaptive alternatives to rumination for reducing negative affect. Although problem-solving is featured prominently in the response styles theory, it has not been evaluated as a potential alternative to rumination in laboratory studies. Finally, research has concentrated primarily on adults. Rates of depressive symptoms and diagnosis increase beginning in adolescence, particularly for girls (Hankin et al. 1998; Twenge and Nolen-Hoeksema 2002). Prior research suggests that rumination may be partially responsible for this increase (Hilt et al. 2010). Thus, understanding rumination in youth is particularly important for the prevention of depression.

The Present Studies

The central goal of this study was to see if certain cognitive techniques, administered only briefly, would reduce a ruminative state in adolescents. Because prior research suggested that mindfulness and distraction reduce negative affect (Broderick 2005; Kuehner et al. 2009), we tested whether these interventions also reduce rumination. Because problem-solving is well-known to have an inverse relationship with rumination (Lyubomirsky et al. 1999), we also included it as a third intervention.

Before testing the interventions, we first needed to validate a technique for inducing distress and measuring state rumination. In Study 1, we used an ecologically-valid social stressor to induce distress in the laboratory. We examined the validity of this negative mood induction, using both self-report and blood pressure, in a small sample of youth as well as the feasibility of the state rumination measure in response to a rumination or distraction induction. In Study 2, we directly compared distraction, problem-solving, and mindfulness in their ability to reduce rumination. Thus, we first induced distress and then rumination, followed by random assignment to one of three brief intervention conditions: distraction, problem-solving, or mindfulness. We compared state rumination before and after the interventions. We also explored differences by sex, as prior research has suggested possible gender differences in use of responses to distress (cf. Hilt et al. 2010). Finally, we include age as a covariate in analyses examining state rumination, based on prior research that rumination is more strongly associated with negative affect in adolescents compared to children (Rood et al. 2009).

Study 1

The purpose of this study was a) to test the validity of a negative mood induction, and b) to compare state rumination following a rumination versus a distraction induction. Because rumination is defined as a response to distress, we first needed to distress participants. We hypothesized that an ecologically-valid social-rejection event would induce distress in participants as indexed by increases in self-reported negative affect and blood pressure. We also expected that state rumination would increase following a rumination induction relative to a distraction induction.

Method

Participants and Procedure—Twenty-six youth, ranging in age from 9 years, 6 months to 14 years, 4 months (16 girls, 10 boys) participated (M age = 12.21, SD = 1.61). Participants were recruited from the community (via advertisements and fliers regarding research on child and adolescent emotion) and identified as 61 % Caucasian, 27 % African American, and 4 % Asian. Median family income was reported in the range of \$70,000–80,000 (lowest income bracket reported was \$15,000–20,000 and highest was \$250,000–275,000). The study was approved by the Institutional Review Board. Parents gave informed

consent and assent was obtained for all child participants, who were debriefed at the completion of the study. Participants received a small prize and \$10 for their participation.

Participants completed baseline measures (mood, blood pressure, and state rumination) before undergoing the negative mood induction. After completing post-negative mood induction measures, participants underwent either a rumination or distraction induction followed by a final assessment of state rumination. Participants were randomly assigned to condition. One participant withdrew from the study during the negative mood induction.

Negative Mood Induction—We developed a novel stressor involving a surprise speech task followed by negative peer feedback to activate distress. After completing baseline measures, participants were told they had the opportunity to audition for a new reality television show and would be recording a 3-min speech about themselves (similar to the cover story used by Heilbron et al. 2009; also see Hilt and Pollak 2012). The images of four “peers” appeared on the computer screen (2 boys, 2 girls; mixed ethnicity). Participants were told these children had already been chosen for the show and would be judging their speeches to decide if the videos should be sent to the television network. The experimenter instructed the participant to prepare for the speech while she set the peer judges up with microphones. Three minutes later the experimenter returned telling the participant to stand in front of the video camera, with the viewing screen turned so the participant could see his/her image. If the participant finished early, he/she was instructed to continue and talk about what makes him/her special or unique and why he/she should get picked for the show.

At the end of 3 min, the participant listened to feedback from the peer judges. Although the participant was led to believe that the feedback was live and specific to his/her speech, it was pre-recorded and played back over an intercom from the control room. The feedback was neutral to slightly negative (e.g., *His/Her speech was ok, He/she was average, I just don't think he/she would be good for a reality TV show*). Following the feedback, the experimenter left the room (under the guise of talking to the other children about the audition video).

Rumination and Distraction Inductions—Following the negative mood induction, participants listened to an 8-min audio recording of 23 prompts read at a rate of 1 every 20 s. This procedure was adapted from prior response style inductions that typically involve self-paced focus on 46 prompts written on note cards (Lyubomirsky and Nolen-Hoeksema 1993, 1995). Prompts in the present study included half of the prompts from the Lyubomirsky and Nolen-Hoeksema studies and were chosen to be appropriate for youth and face valid. Prompts were delivered in audio format using language at or below a fourth grade reading level to be appropriate for the age-range included in the sample. Pilot testing indicated that children in this age range understood the task instructions. For the rumination induction, prompts included items such as: *Think about why you are feeling the way you do* and *Think about the possible consequences of the way you feel*. For the distraction induction, prompts included, *Think about the shiny surface of a trumpet* and *Think about the layout of the local shopping center*.

Measures—During an instructional practice session, the experimenter made sure that participants understood the instructions and intended meanings of the words used on the scales. All ratings were completed on a computer.

Distress was measured with self-reported negative affect and blood pressure. Participants reported on negative affect using visual analog scales (VAS). Questions appeared on a computer screen asking how sad, anxious, and irritated participants were (interspersed with 3 positive items and 3 neutral items presented in a randomized order for each data collection

point). A black line appeared below the question ranging from 0 % (not at all sad/anxious/irritated) to 100 % (extremely sad/anxious/irritated). Participants clicked the mouse pointer on the line to indicate their response (range= 0 to 100). Ratings for sad, anxious and irritated were summed to form the negative affect rating (range= 0 to 300). Blood pressure ratings were obtained with an ambulatory blood pressure monitor attached to the participant's body (Spacelabs Healthcare; Issaquah, WA). Participants were prompted on the computer screen to take their blood pressure. Maximum arterial pressure during heart contraction (systolic reading), and minimum arterial pressure during heart relaxation (diastolic reading) were obtained for each data point. Because of equipment problems, blood pressure data were missing for 2 participants.

State rumination was assessed in a manner similar to that used by Moberly and Watkins (2008). Participants rated the degree to which they were currently focusing on their feelings and problems (two separate items) using the same type of VAS described above. The two items were summed to form the state rumination rating (range= 0–200). This measure has adequate construct and predictive validity via its association with a validated measure of dispositional rumination and negative affect, respectively, as well as modest test-retest reliability (Moberly and Watkins 2008).

Debriefing—At the completion of the study, participants were told about the nature of the study. We allowed adolescents to re-play back the feedback in order to demonstrate that it was pre-recorded.

Results and Discussion

Negative affect significantly increased from baseline to post-mood induction ($M=-31.28$, $SD= 55.95$), $t(24)=-2.80$, $p=0.01$, $d=0.45$, as did diastolic blood pressure ($M=-3.29$, $SD= 6.43$), $t(20)=-2.34$, $p= 0.03$, $d= 0.49$. Systolic blood pressure remained the same ($M=-2.17$, $SD= 13.75$), $t(22)=-0.76$, ns , $d= 0.15$. These data demonstrate a medium effect size for increases in negative affect and diastolic blood pressure and suggest that the speech and feedback was a sufficient task for inducing distress.

Participants assigned to the rumination vs. distraction conditions ended the negative mood induction with similar levels of state rumination ($M_s= 80.31$ and 80.67 , $SD_s= 72.92$ and 57.29 , respectively), $t(23)=-0.01$, ns , $d= 0.01$. A repeated-measures ANOVA revealed that state rumination significantly increased following the rumination induction ($M= 109.69$, $SD= 64.68$) relative to the distraction induction ($M= 70.75$, $SD= 77.86$), $F(1, 23)= 5.06$, $p= 0.03$, $\eta^2= 0.18$. There was no effect of age, $F(1,22)= 0.01$, ns . These data, reflecting a significant, large effect (Cohen 1988), show that the state rumination measure is sensitive to changes in the expected direction based on induced response style.

Study 2

Study 1 revealed that state rumination increased following a rumination induction. In Study 2, we focused on strategies to disengage from rumination. We first heightened rumination by inducing rumination following distress. Next, participants were randomly assigned to a brief intervention condition: distraction, problem-solving or mindfulness. We examined changes in state rumination.

Method

Participants and Procedure—Participants included 102 youth ranging in age from 9 years, 1 month to 14 years, 5 months ($M_{age}= 11.51$, $SD= 1.47$). We over-sampled girls (64 %) based on previous research that rumination is more common among girls (Hilt et al.

2010). Participants were recruited from the community (via advertisements and fliers regarding research on child and adolescent emotion), identifying as 68 % Caucasian, 18 % African American, 10 % Asian American, 3 % Hispanic, and 1 % Native American. Median family income was \$70,000–80,000 (ranging from less than \$5000 to \$225,000–250,000). The study was approved by the Institutional Review Board. Parents gave informed consent and assent was obtained for all participants, who were debriefed at the completion of the study. Participants were given a small prize and \$10 for their participation.

Similar to Study 1, participants practiced before completing baseline measures of negative affect, blood pressure, and state rumination. Next, they completed the speech/feedback task followed by another ratings period (described above). All participants then underwent the rumination induction described in Study 1 followed by an assessment of state rumination. Participants then underwent the distraction (33 %), problem-solving (33 %) or mindfulness (34 %) intervention, followed by a final assessment of state rumination. Data from six participants was incomplete due to computer malfunction ($n=2$) and study withdrawal ($n=4$). Additionally, blood pressure data from eight participants were missing because of equipment difficulties. Participants were debriefed as described in Study 1.

Brief Interventions—The distraction intervention is described in Study 1. The problem-solving and mindfulness interventions were designed to be similar in format (i.e., 8 min in length, audio recording of prompts to direct participants).

The problem-solving intervention was created based on the problem-solving process of identifying the problem, generating possible solutions, evaluating their consequences, choosing a solution, and verifying the process (D’Zurilla and Goldfried 1971). The 8-min time frame allowed for 3 rounds of this process. Each time, participants were instructed to identify a current problem followed by 3 sets of prompts alternating between solution generation and evaluation of consequences. Next, participants were prompted to choose a solution. We focused on self-praise during the final stage of problem-solving (e.g., *Imagine giving yourself a pat on the back for solving the problem*), as this has been used successfully with problem-solving therapies designed for youth (Kazdin et al. 1992).

The mindfulness intervention was modified from a script used in a study of college students (Broderick 2005). The original script focused on present-moment awareness, acceptance, and awareness of breath. We modified the script slightly for use with a younger sample and added a prompt about letting go of thoughts (i.e., *If you find your mind cluttered by thoughts it might help to imagine putting each thought in a bubble and imagine it floating away, just letting it go*).

Results and Discussion

Descriptive statistics for all study variables are presented in Table 1.

Manipulation Checks—To examine whether the negative mood induction successfully induced distress for this sample, we compared negative affect and blood pressure before and after the speech/feedback task. Negative affect significantly increased from baseline to post-mood induction ($M=-36.19$, $SD=57.80$), $t(98)=-6.23$, $p<0.001$, $d=0.58$, as did systolic [$M=-5.50$, $SD=12.74$; $t(89)=-4.10$, $p<0.001$, $d=0.43$] and diastolic [$M=-5.20$, $SD=5.73$; $t(86)=-6.44$, $p<0.001$, $d=0.69$] blood pressure. The significant effects and robust effect sizes suggest that the sample was successfully distressed.

In order to examine whether the rumination induction was successful, we compared baseline state rumination to state rumination after the induction. State rumination significantly

increased ($M = -22.27$, $SD = 48.39$), $t(95) = -4.51$, $p < 0.001$, $d = 0.26$. This small, but significant effect, suggests that the rumination induction was successful.

Brief Intervention Comparisons—We conducted a 3 (group: distraction, problem-solving, mindfulness) X 2 (time: pre and post-intervention) X 2 (sex: male, female) repeated-measures ANOVA with state rumination as the dependent variable and age as a covariate. Rumination significantly decreased, $F(1, 90) = 6.65$, $p = 0.01$, $\eta^2 = 0.07$. This main effect was qualified by a significant time X group interaction, $F(2, 90) = 4.01$, $p = 0.02$, $\eta^2 = 0.08$. There was no effect for age, $F(1, 89) = 1.24$, *ns*. It appears that state rumination decreased for both the distraction and mindfulness conditions relative to the problem-solving condition (see Fig. 1), with a medium effect size. Pair-wise comparisons of state rumination scores after the interventions (controlling for prior state rumination) indicate that problem-solving was significantly different from distraction ($p = 0.003$) and marginally significantly different from mindfulness ($p = 0.055$), but that distraction and mindfulness were not different from one another. Thus, it appears that distraction and mindfulness were successful in helping adolescents out of a ruminative state, but problem-solving was not.¹

General Discussion

Study 1 established the utility of an ecologically-valid negative mood induction procedure as well as a measure of state rumination for use with adolescents. The goal of Study 2 was to examine the effectiveness of three strategies in getting participants out of a ruminative state. Both distraction and mindfulness were successful in reducing rumination while problem-solving was not.

Extant work comparing rumination to distraction has established that distraction repairs negative mood (see Nolen-Hoeksema et al. 2008 for a review). The present studies further suggest that distraction reduces rumination, consistent with the response styles theory (Nolen-Hoeksema 1991). Although the specific mechanism of action was not examined in the present studies, it is likely that distraction captures one's attention, thus limiting the mind from wandering to self-relevant content.

Study 2 is one of a handful of studies that examined the effects of a mindful state in the laboratory. Prior studies used rumination as a comparison condition, and most found that mindfulness resulted in better mood (Broderick 2005; Huffziger and Kuehner 2009; Singer and Dobson 2007) though one did not (Kuehner et al. 2009). Additionally, when comparing mindfulness to distraction, two studies found they did equally well in repairing negative mood (Huffziger and Kuehner 2009; Singer and Dobson 2007), one found mindfulness to be superior (Broderick 2005), and one found distraction to be superior (Kuehner et al. 2009). We found that mindfulness and distraction were equally beneficial for reducing state rumination. This study adds to the growing literature suggesting that mindfulness need not be intensively practiced to be beneficial.

Given the similar effect that mindfulness and distraction had in this study and others (Huffziger and Kuehner 2009), one might wonder whether they are operating via similar mechanisms. Both involve control of attention: in the distraction induction, imagery is primarily used, while in the mindfulness induction, focus on breath is primarily used (along with noticing mental events and some imagery). Both strategies may be experienced as relaxing. One major difference stands out regarding the content of the interventions. While

¹Because one of the items in the state rumination measure involves a focus on problems, we wanted to be sure that this was not driving the differences between the problem-solving condition and other two conditions. Thus, the repeated measures ANOVA was also conducted with only the feelings item as the dependent variable, and the pattern of results was the same.

distraction focuses on imagining objects to avoid self-relevant thought, mindfulness focuses on acceptance of self-relevant thoughts. In future work, it will be important to probe for the mechanisms involved in these brief interventions to better understand their clinical utility.

The brief problem-solving intervention was not helpful in getting participants out of a ruminative state. There are several potential explanations for this finding. One is that it was not effective enough to mitigate the negative effects of rumination on problem-solving. Although the problem-solving intervention was guided in the same way that distraction and mindfulness were, it may have required more effort because participants were instructed to think of possible solutions to problems. Rumination has been shown to decrease motivation for problem-solving (Lyubomirsky et al. 1999), so this effort may not have been valued as worthwhile. It is also possible that the problem-solving process requires more intensive training or instruction than was possible in an 8-min guided intervention. Problem-solving therapies used with youth typically involve a great deal of modeling of effective solutions (Kendall 1993), and this was not possible in the current study. Although we attempted to operationalize the self-praise stage by asking participants to imagine giving themselves a pat on the back, this instruction may lack ecological validity. Finally, Nolen-Hoeksema (1991) suggested that problem-solving maybe more effective after first lifting mood with distraction. Future research could examine the effectiveness of problem-solving following a brief distraction intervention. Although the brief problem-solving intervention was not effective in mitigating rumination in the present study, our findings do not suggest that problem-solving is unhelpful overall in the treatment of depression; in fact, problem-solving may be quite helpful for depression, but perhaps not during active rumination.

It is also noteworthy that this study was conducted with youth spanning middle childhood and early adolescence, suggesting that both distraction and mindfulness are helpful for individuals during a developmental period of heightened risk. Emerging adolescence is a time when reasoning capacities and cognitive abilities are more developed compared to childhood, yet emotion regulation difficulties are high, in part due to incomplete prefrontal brain maturation (Dahl 2004; Steinberg 2005). Brief techniques that aid in regulating negative emotion may be especially important during this developmental period.

Conclusions from this study must be considered within their limitations. Although all participants appeared to comply with study instructions, we do not know what adolescents were doing during the interventions. Thus, we cannot rule out the alternate explanation that participants in the problem-solving condition were not following instructions. Additionally, we did not find any statistically significant effects by gender, but we were largely underpowered to do so; thus, gender differences may exist. Similarly, although we covaried age in our analyses, developmental effects may exist and could be explored further in future studies. Finally, the participants from these samples were drawn from the community, limiting generalizability to more clinical samples. It will be important for future research to examine how changes in state rumination that result from these interventions map onto clinical outcomes in order to better evaluate the clinical significance of these findings.

Strengths of the study include the use of a diverse sample of youth, an ecologically-valid negative mood induction, and a measurement of state rumination. Additionally, we focused specifically on strategies that may be helpful in getting out of a ruminative state. Accordingly, we induced both a negative mood and rumination in participants before the brief interventions, a rather conservative approach to testing our hypothesis. Findings suggest that both distraction and mindfulness may be helpful in stopping rumination, at least in the short term. Future research should examine longer-term effects of these strategies and employ them in clinical samples of adolescents.

An important implication of this research is that brief, guided audio recordings may be helpful for getting out of rumination, preventing subsequent negative affect. An exciting possibility is that use of guided interventions to interrupt the ruminative cycle may be able to prevent depression in those prone to ruminate. We do not know how lasting the effects of these brief interventions are; however, even if their effects are temporary, they may still be quite effective if used regularly. Because new technology has the potential for great impact on mental health (Kazdin and Blase 2011), one possible way to introduce a widespread prevention effort would be to develop a mobile device application to monitor state rumination. Adolescents would be prompted to report on their state rumination throughout the day, and when levels increased, they would be prompted to listen to a guided audio recording involving distraction and/or mindfulness.

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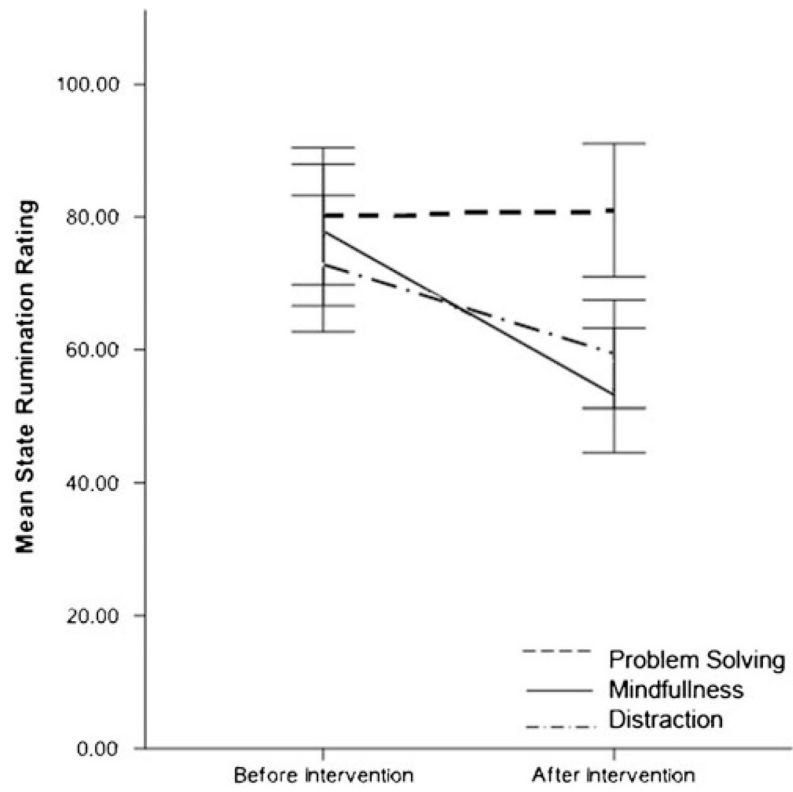


Fig. 1. Effects of condition on state rumination ratings. Error bars are +/- 1 standard error

Table 1

Means, standard deviations, and ranges for study 2 variables

Variable	<i>n</i>	Mean	Standard deviation	Range
Baseline negative mood	102	52.87	52.41	0–253
Baseline systolic blood pressure	93	118.01	11.55	97–161
Baseline diastolic blood pressure	90	72.769	6.93	57–90
Baseline rumination	102	54.29	41.55	0–169
Post-speech/feedback negative mood	99	89.31	70.24	0–300
Post-speech/feedback systolic blood pressure	90	123.10	14.39	74–159
Post-speech/feedback diastolic blood pressure	87	77.91	8.00	64–102
Post- induction rumination	96	76.85	58.47	0–200
Post-intervention rumination				
Distraction condition	32	53.91	52.60	0–197
Problem-solving condition	33	81.00	57.60	2–200
Mindfulness condition	31	59.35	45.26	0–131