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Coping and emotion regulation in response to social stress tasks among young adolescents with and without social anxiety

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ABSTRACT

Given that threat appraisal and coping are amenable to intervention, we aimed to identify threat appraisals and coping responses of anxious adolescents, relative to less anxious peers, during induced social stressors. Adolescents ($N = 76$; $M_{age} = 13.5$yrs) completed a clinical interview and five stress tasks. After each task, we measured threat appraisals (state anxiety and social evaluation), general coping ability, and eight ways of coping and regulating emotion. Adolescents with high anxiety appraised more threat and used more distraction, behavioral disengagement and rumination. As adolescents progressed through tasks, threat appraisal decreased, perceived coping ability increased, and problem-solving, distraction, behavioral disengagement and rumination decreased. Social anxiety level × task interactions were not significant. In person-centered analysis, adolescents were distinguished as active copers, suppressors, or expressives. Anxious adolescents were more likely to be active copers, whereas their less anxious peers more likely suppressed or expressed emotions to cope with the tasks.

Past research has identified multiple risk and protective factors for social anxiety, ranging from neurological to social (Wong & Rapee, 2016). Yet, not all factors are easily addressed in individual interventions designed to help young people to put in place (or avoid) strategies in the moment that could help reduce their anxiety symptoms in the short and the longer term. In this study, we focus on ways of coping and regulating emotion (e.g., reappraisal, distraction or rumination), given they can be quite amenable to intervention (Golombek et al., 2020; Masters et al., 2019). We also focus on coping and emotion regulation because it is unclear which strategies should be the focus when intervening with socially anxious youth. In fact, even after completing a systematic review of the literature, Golombek et al. (2020) concluded that coping and emotion regulation processes in socially anxious children and adolescents are not well understood. In the present study, we gathered adolescents' reports of their coping and emotion regulation, as well as their perceptions of threat and general coping ability, in response to a series of five social stress tasks. We compared responses from adolescents who were clinically-characterized as low, moderate or high in social anxiety symptoms. In addition, we used person-centered analysis to identify coping profiles more common in adolescents with high social anxiety symptoms relative to their less anxious peers.

Coping and emotion regulation

One commonly cited definitions of coping is "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). As this definition implies, coping is multidimensional, but it also develops with maturation and new experiences, shows individual differences, and is dependent on features of the stressful event. In our work on the development of coping (Skinner & Zimmer-Gembeck, 2007, 2016; Zimmer-Gembeck & Skinner, 2011, 2016), we have proposed that coping shows individual differences and developmental changes that reveal foundations in early temperamental traits, past and current social affordances and restrictions, and an

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accumulation of learning from stressful events and coping outcomes.

By adolescence, coping with stress and regulation also can become constrained by the emotional difficulties that have emerged from a history of individual and social risk factors (Baker et al., 2021; Buckholdt et al., 2014; Cole et al., 1994; Richardson et al., 2021). For example, because coping is aimed at modifying one's own emotional responses to stress or modifying the stressor that prompted emotion, high emotional reactivity to stressful events can overload coping skills or require maximum coping efforts (Aldao et al., 2010; Compas et al., 2001; Losoya et al., 1998). Theories of coping and regulation, and related research, highlight how emotional disorders, given their history in individual and social vulnerabilities, will bring with them excessive challenges for responding to stressful events (Aldao et al., 2010; Bridgett et al., 2015; Zimmer-Gembeck & Skinner, 2016). Moreover, experts in emotional disorders often point to emotion regulation as a transdiagnostic risk factor (Compas et al., 2014, 2017; Schäfer et al., 2017), suggesting that assessing ways of coping with stressful events may also be revealing of processes that maintain emotional, social or behavioral disorders. Thus, definitions and developmental views on coping and regulation forge links pointing to the importance of examining many ways of coping and regulating emotion within studies of emotional disorders.

Coping and emotion regulation responses associated with social anxiety

There are many possible ways of coping or regulating emotion when facing social or other stressors, and many survey-based correlational and longitudinal studies have shown that individual ways of responding are linked to symptoms of psychopathology, including having links to social anxiety (for reviews see Compas et al., 2017; Zeman et al., 2006; Zimmer-Gembeck & Skinner, 2016). Coping and emotion regulation responses measured in this study were identified from past reviews of research on coping and emotion regulation during childhood and adolescence (Zimmer-Gembeck & Skinner, 2011, 2016) and other previous reviews of coping, emotion regulation and emotional problems (e.g., Aldao et al., 2010; Carthy et al., 2010; Compas et al., 2017; Golombek et al., 2020; Webb et al., 2012). Integrating this past research, while also keeping in mind the constraints on adolescents when presented with what would be perceived as unavoidable social stress tasks, we considered the following eight coping and emotion regulation responses: problem solving, cognitive reappraisal, distraction, constructive emotional expression, acceptance, behavioral disengagement, rumination, and emotion suppression.

Notably, the eight coping and emotion regulation strategies measured here have been described as relevant for identifying how social anxiety may interfere with emotional, behavioral or social engagement and recovery from stressful events (Golombek et al., 2020). First, cognitive reappraisal, problem-solving and constructive emotional expression are three responses to stressors that fit within the category of active or approach-oriented strategies and each of these ways of coping has been linked to better recovery from stressful events (Compas et al., 2014, 2017; Zimmer-Gembeck & Skinner, 2016). In addition, these active and approach strategies are less likely among individuals with emotional problems, such as social anxiety; thus, use of active/approach strategies have been associated with fewer internalizing symptoms (Aldao et al., 2010; Clarke, 2006; Compas et al., 2017; Dryman & Heimberg, 2018; Fields & Prinz, 1997; Richardson et al., 2021). Yet, it should be noted that studies of children and adolescents have produced a mix of results that could be explained by features of the stressful events themselves (Clarke, 2006).

Second, some ways of coping and regulating emotion have been associated with heightened anxiety and other emotional problems. These have included behavioral disengagement (also called social withdrawal, Aldao et al., 2010; Sandstrom, 2004; Zimmer-Gembeck, 2015), emotional suppression (Aldao et al., 2010; Dryman & Heimberg, 2018), and rumination (Aldao et al., 2010; Zimmer-Gembeck & Skinner, 2016). Each of these coping and regulation responses has been associated with less recovery from stressful events. Moreover, each of these responses is more common among individuals with heightened social anxiety or other internalizing symptoms, although there have been few studies of emotional suppression as a correlate of social anxiety (Golombek et al., 2020).

Finally, we also measured some accommodative coping strategies, namely acceptance and distraction. Accommodating to the stressful event can be beneficial in some stressful situations, especially when events are perceived to be uncontrollable, such as what might occur in a laboratory setting when adolescents are presented with stressful tasks to complete (Fear et al., 2009). In this study, young people were asked to complete the tasks by adult researchers and accepting the task or findings opportunities for distraction might be

positive accommodative responses for task completion and emotion management. Thus, these responses were expected to align with other adaptive coping responses (such as cognitive reappraisal).

Overall, our choice of coping responses to consider in the present study addresses a notable gap in understanding, especially given that most studies have examined only a couple or a few responses (such as distraction, reappraisal or emotion suppression) or collapsed responses into broader composite categories after asking for retrospective reports of how youth or adults coped with past stressful events (e.g., Dryman & Heimberg, 2018; Farmer & Kashdan, 2012; Golombek et al., 2020; Ziv et al., 2013; see Carthy et al., 2010 for an exception). In their systematic review of the research on emotion regulation among children and adolescents with social anxiety, Golombek et al. (2020) located, for example, five studies of social avoidance, four studies of cognitive reappraisal and four studies of acceptance. They located only two studies of emotional expression and one study of emotion suppression. Our aim here was to better isolate how socially anxious children and adolescents cope and regulate their emotions as they complete stressful tasks, comparing their responses to their less socially anxious peers.

Patterns of coping and emotion regulation across social stress tasks

We could not locate a previous study of within-person patterns in young adolescents' coping and emotion regulation responses across a series of social stress tasks, but we drew inspiration for the present study from a previous study of anxiety risk in toddlers and their patterns of responses across tasks (Buss, 2011). In Buss's study of 111 toddlers, regulation of the intensity of fearful behavior was assessed and compared across a variety of different contexts, which varied in the level of threat (e.g., low, moderate and high). The findings showed that a more dysregulated fear profile, as characterized by high intensity fear in *both* low and high threat contexts, and rigid stability of high behavioral reactivity across contexts, were predictive of elevated anxious behaviors in subsequent years. Based on these results, Buss argued that examining the role of eliciting context on fearful behavior may help to identify those individuals that are most at risk for developing chronic internalizing symptoms. Although this study was focused on toddlers, there are two key points relevant to the present study of young adolescents. First, studying responses in lower and higher threat conditions can provide a useful frame of reference from which an individual's characteristic style of regulating (or pattern of dysregulation) can be determined. Second, high rigid stability in regulating emotion across contexts may constitute one form of dysregulation in which an individual is demonstrating an inability to accurately match and/or flexibly adapt their coping responses to the contextual demands of different situations. This may be particularly relevant for socially anxious adolescents, who have demonstrated elevated appraisal of threat and other heightened negative or maladaptive responses to social both situations and tasks (Gross, 2013).

The present study

In summary, the primary aim of the present study was to examine associations of adolescents' social anxiety severity with their perceptions of threat (measured as state anxiety and perceived level of social evaluation) and general coping ability, as well as their use of eight specific ways of coping and regulating emotion, across multiple induced social stress tasks. Social stress tasks were presented under controlled conditions and were selected from a list of stressors that had been judged in a previous study of adolescents (Masters, 2020) to be low, moderate or high in social-evaluative threat.

We tested two sets of hypotheses. First, relative to their less anxious peers, adolescents characterized by high clinician-rated social anxiety were expected to appraise more task threat, to perceive they had less coping ability, and to report more use of coping responses that have been associated with internalizing symptoms in past research (i.e., behavioral disengagement, rumination, and emotional suppression) across all tasks. Five coping responses that have been described as more constructive were also compared between adolescents defined by clinical-rated social anxiety, but past research has been mixed so we did not have a specific hypothesis.

Second, we expected anxiety-based differences in the pattern of coping across the five social stressors. We expected that adolescents low or moderate in anxiety would report a pattern of coping that would align more closely with the task demands, relative to adolescents high in social anxiety. In other words, we expected adolescents low or moderate in anxiety to report fewer coping responses in lower stress tasks and more in higher stress tasks, whereas adolescents high in anxiety were expected to engage in a high

level of coping, especially disengagement, rumination and suppression, across all tasks.

Finally, applying a person-centered approach, we conducted some exploratory analyses to identify and compare adolescents who were distinguished by their person-level profiles of coping and emotion regulation. Although exploratory, this approach was guided by the evidence that many coping and emotion regulation strategies can co-occur; even those strategies found to be maladaptive and those considered adaptive for managing stress show positive correlations with each other (Skinner & Zimmer-Gembeck, 2016). Also, there is evidence from previous research using cluster analysis that person-level profiles of coping/emotion regulation can be identified (e.g., Boxer et al., 2012; Doron et al., 2015; Gaudreau & Blondin, 2004; Tandon et al., 2013; Tolan et al., 2003). Drawing from this previous research, we expected to find a cluster of adolescents who reported elevated use of multiple specific strategies to cope and regulate emotions, especially those more associated with continued distress (e.g., distraction, behavioral disengagement, and rumination). This group was expected to include the greatest proportion of adolescents high in clinician-rated social anxiety and to be distinguished by the highest level of negative perceptions of the in-vivo stress tasks (i.e., high state anxiety, high perception of social evaluation, and low perceived *overall* coping efficacy/ability). We could locate no study that has applied a person-centered approach with data collected during an in-vivo stress task with adolescents varying in social anxiety level, so it was not clear what other coping/emotion regulation profiles would be found. It was possible that a profile low in all coping and emotion regulation responses would be found (as a "low" cluster is often found when using cluster analysis), but all participants in this study participated in a series of tasks that were designed to be stressful. So, we instead expected to find clusters of adolescents with different sets of specific responses, rather than finding a cluster low in all coping/emotion regulation responses.

Method

Participants

Participants were 76 preadolescents and adolescents aged 10 – 15 years (M_{age} = 13.5, SD = 1.5; 55% female) enrolled in grades 5 to 11 in an urban area within Australia. Most participants endorsed white (89.5%), Asian (7.9%), Australian First Peoples, Torres Strait Islander, or Pacific Islander (1.3%), or other ethnic/racial backgrounds (1.3%). About one-half of participants (48.7%) had participated in an in-school study and were recontacted and invited to participate. The remaining 51.3% of participants were recruited through advertisements that were distributed through the university "special projects" broadcast email (13.2%), local psychology clinics (27.6%), and social media (10.5%) platforms. In terms of family context, the majority of participants' parents (73.3%) endorsed being currently married or within a committed relationship (4%). The remaining 22.7% of parents reported their relationship status as single (4%), widowed (2.7%), divorced (9.3%) separated (5.3%), or did not specify (1.4%). A post-hoc power analyses of a 3 (i.e., social anxiety severity) × 5 (i.e., stressor task) mixed factorial ANOVA showed that we had 85% power to detect an effect size of .15 at a critical alpha of .05. Thus, we had good power to detect small effects.

Measures

Social anxiety

Adolescents completed the Anxiety Disorders Interview Schedule for DSM-IV–Child Version (ADIS-IV-C; Silverman & Albano, 1997). The ADIA-IV-C is a clinician-administered, structured interview. Clinical Severity Ratings (CSRs) are made, which range from 0 (*not at all interfering*) to 7 (*very much interfering*). CSRs ≥4 indicate clinical significance (Brown et al., 2001), whereas CSRs of 2-3 are typically considered to be indicative of subclinical symptoms, and a CSR of 0 (no symptoms) or 1 (minimal and non- debilitating) indicates no or few symptoms present. Using the social anxiety CSR, three groups were formed; adolescents in the high symptoms group had CSR ≥ 4 (n = 15), moderate a CSR of 2 or 3 (n = 29), and low a CSR of 0 or 1 (n = 32). The ADIS-IV-C CSR was retained as the primary measure of social anxiety for this study following preliminary analyses that revealed the ADIS-IV-C CSR was highly correlated with adolescents' self-reported social anxiety symptoms using the Social Anxiety Scale for Adolescents (SAS-A; r = .67, p < .001; La Greca & Lopez, 1998) and social anxiety subscale of the Spence Children's Anxiety Scale (SCAS; r = .67, p < .001; Spence, 1998). The SAS-A and SCAS were also highly correlated, r = .78, p < .001. Further, bivariate associations of each measure of social anxiety symptoms had similar associations with all other measures.

Perceived state anxiety, social evaluation, and coping ability

Following each task in the Social Situation Stressor Protocol (SSSP), participants rated their anxiety ("how nervous, afraid or worried did you feel during the last task?"), perception of social evaluation ("how much do you feel that you were evaluated or judged by others during the last task?"), and perceived general coping ("how well do you feel that you coped during the last task?"). Response options ranged from 0 (*not at all/very little*) to 4 (*the most*). Appraisals of threat and coping ability from each stress task were used when testing hypotheses. However, for some analyses, composite threat and coping ability scores were formed by averaging responses across tasks. Cronbach's αs for responses to the five stressors were .75 for state anxiety, .89 for social evaluation, and .71 for perceived coping ability.

Coping and emotion regulation

After each task, 11 items were completed to measure eight ways of coping and regulating emotions (see appendix A): problem-solving (1 item), cognitive reappraisal (1 item), distraction (2 items; α ranging from .81 to .89), constructive emotional expression (1 item), acceptance (1 item), behavioral disengagement (2 items; α ranging from .72 to .79), rumination (2 items; α ranging from .74 to .90), and emotional suppression (1 item). Participants answered each item with reference to how often they relied on each strategy during each task. Response options ranged from 0 (*not at all*) to 3 (*a lot*). Items were drawn from existing measures including the Responses to Stress Questionnaire (Connor-Smith et al., 2000), the Cognitive Emotion Regulation Questionnaire – Short Version (Garnefski & Kraaij, 2006), the Emotion Regulation Questionnaire (Gross & John, 2003), and the COPE Inventory (Carver et al., 1989). Items to assess coping and emotion regulation responses were selected based on the results of a pilot study of adolescents (Masters, 2020). In this pilot, existing measures of each of the eight coping/emotion regulation responses were tested with 298 adolescents (aged 12 to 14 years). Factor analyses were used to identify items with the highest loadings for use in this study. For coping/emotion regulation responses assessed with more than one item, subscale scores were formed by averaging the items. Reports of each strategy in response to each SSSP task were used when testing hypotheses regarding patterns across the tasks. For correlations and for person-centered analyses, each coping/emotion regulation response was averaged across the five tasks to produce a composite score across the entire SSSP. Cronbach's αs for coping responses to the five stressors were .81 for constructive emotional expression, .83 for emotional suppression, .85 for cognitive reappraisal, and .88 for problem solving, acceptance, distraction, behavioral distraction, and rumination.

Tasks in the social situation stressor protocol (SSSP)

The pilot study of 298 adolescents (age 12 to 14 years) was used to identify stressful social situations for the SSSP (Masters, 2020). Students ranked 18 social situations from least to most stress-provoking ("distressing"). Rankings were compiled to select relatively low, moderate and high stress situations that could be reproduced in the laboratory. Low stress tasks were two structured conversations (Simulated Social Interaction Test, SSIT; see Reyes et al., 2013) with an older (about age 19 years) confederate – one with a same-sex confederate and another with a cross-sex confederate. Moderate stress tasks were unstructured conversations with same- and cross-sex confederates (UCT; see Reyes et al., 2013). The high stress task was the read aloud task (RAT; Drummond et al., 2003) in front of an audience.

We selected to order the tasks to represent a curvilinear pattern (e.g., inverted-U shape) of stress level. Thus, the SSSP began with two tasks rated as moderately stressful by adolescents, which was followed by the two least stressful tasks. The final (5^{th}) task of the SSSP had been rated as the most stressful. We did this to give us more confidence that any pattern in perceptions of threat and coping ability or pattern of coping responses would be as result of the stress level of the tasks rather than due to habituation to the stressful tasks (and the laboratory) or due to increasing distress from an accumulation of tasks. Given that we were also including adolescents high in anxiety, we did not want to begin the SSSP with the high stress task to avoid overload and high distress. For these same reasons, we also chose not to randomize the ordering.

More precisely, the SSSP began with the two UCTs (moderate stress), the first involving interaction with a same-sex confederate (e.g., "you just moved into a new house and see your neighbor in the back yard"), and the second involving interaction with a cross-sex confederate (e.g., "pretend you are at a dinner party and get to know the person next to you"). Each interaction was 3 minutes long. Because these involved a general scenario, there were no specific confederate prompts. Confederates responded to the participant in a natural and neutral manner but were asked not to assume the burden of the conversation. Confederates

Table 1. Means (M) and standard deviations (SD) of all measures, and Pearson's correlations between all measures *(N = 76)*.

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Social anxiety CSR	2.16	1.76	—								
2. Threat: state anxiety	1.42	0.78	.48**	—							
3 Threat: social evaluation	1.24	1.00	.34**	.52**	—						
4. General coping ability	2.19	0.67	-.12	-.25*	.06	—					
Coping/emotion regulation responses											
5. Problem solving	1.13	0.74	.32**	.33**	.38**	.16	—				
6. Cognitive reappraisal	0.44	0.55	.28*	.24*	.16	.25*	.50**	—			
7. Acceptance	1.24	0.76	.05	.10	.20	.04	.23*	.03	—		
8. Distraction	0.64	0.65	.47**	.47**	.33**	-.11	.31**	.24*	.09	—	
9. Constructive emot expression	0.67	0.61	-.12	-.29*	-.14	.34**	-.16	.06	.04	-.10	—
10. Behavioral disengagement	0.57	0.62	.41**	.63**	.43**	-.22	.23*	.13	.08	.64**	-.14
11. Rumination	0.88	0.70	.46**	.50**	.51**	-.01	.54**	.36**	.17	.62**	-.21
12. Emotional suppression	1.48	0.74	.09	.28*	.29*	-.04	.12	-.11	.17	.30**	-.41**
13. Age	13.46	1.54	.15	.11	.17	.13	.40**	.23*	.20	.00	.16
14. Gender	–	–	-.12	.01	-.13	-.08	-.17	.03	-.11	-.15	-.18

	10	11	12	13	14
1. Social anxiety CSR					
2. Threat: state anxiety					
3 Threat: social evaluation					
4. General coping ability					
Coping/emotion regulation responses					
5. Problem solving					
6. Cognitive reappraisal					
7. Acceptance					
8. Distraction					
9. Constructive emot expression					
10. Behavioral disengagement	—				
11. Rumination	.52**	—			
12. Emotional suppression	.32**	.28*	—		
13. Age	.00	.14	-.10	—	
14. Gender	-.16	-.11	.06	-.12	—

*$p < .05$. **$p < .01$.

Note. CSR – Clinician severity rating. Threats, general coping, and all coping/emotion regulation responses are averaged across the five stress tasks. CSR had a possible range from 0 – 7, threats and general coping could range from 0 to 4, coping/emotion regulation responses could range from 0 to 3.

were not able to suggest conversation topics, to guide the conversation, or to ask questions. Next, the two low stress SSITs were completed, whereby adolescents interacted with a confederate in four scenarios (potential loss of a friendship, receiving a compliment from a friend, conflict/rejection from a close relative, interpersonal consolation); the first two were with a same-sex confederate and the last two were with a cross-sex confederate. Each interaction was about 3 minutes. For each, a researcher read the scenario, the confederate delivered a prompt, the participant responded, the confederate delivered a second prompt, and the participant responded. Finally, the high stress RAT was completed by reading an extract from *Horton Hears a Who* while a same-sex confederate recorded the reading, and a cross-sex confederate made notes.

Procedure

Study approval was obtained from the Griffith University Human Research Ethics Committee (protocol #2016/838). Following parental consent and adolescent assent to participate, an initial appointment for a 1-hour semi-structured phone interview was scheduled to complete the ADIS-IV- C with a trained researcher/psychologist and an appointment was made for the SSSP. Upon arrival for the SSSP, the adolescent and a parent each completed a demographic survey. Next, the adolescent was directed to the research room. The researcher or research assistant (and parent, if desired) then entered the adjacent observation room, and provided the participant with an overview of the SSSP tasks. Following each task, adolescents reported their state anxiety, feelings of social evaluation, their perceived general coping ability, and their use of coping and emotion regulation responses. After all tasks were completed, adolescents were debriefed and provided with a $20 gift card. Parents were provided with referral options and any questions were answered.

Results

Descriptive statistics and correlations

Means (*M*s) and standard deviations (*SD*s) of all measures, and correlations between all measures are shown

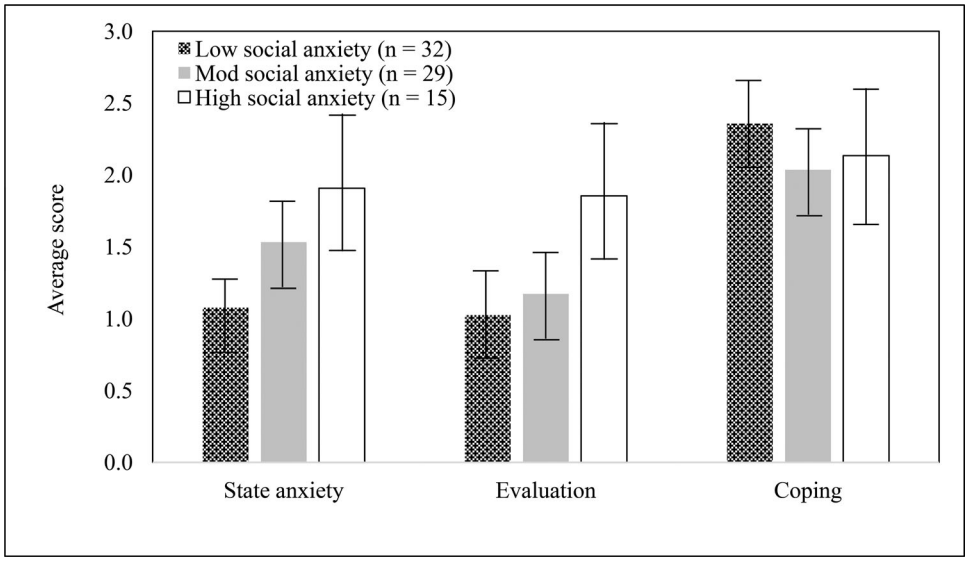

Figure 1. Average experienced threat (state anxiety and perceived social evaluation) and general coping by social anxiety severity ($N = 76$).
Note. Mod = moderate. State anxiety, perceived social evaluation, and general coping were averaged across five social stress tasks. Error bars represent 95% confidence intervals. State anxiety, evaluation, and general coping could range from 0 to 4.

in Table 1. Somewhat surprisingly, the average levels of state anxiety and perceived social evaluation were low (<1.5 on a scale from 1-4), and perceived coping ability was moderate. Regarding specific ways of coping and regulating emotion, all were infrequently used; only three (emotional suppression, problem-solving and acceptance) had a mean above 1 on a scale from 0-3.

As can be seen in Table 1, social anxiety clinician severity rating was positively and significantly associated with perceived social threat (both state anxiety and social evaluation), problem solving, cognitive reappraisal, distraction, behavioral disengagement; the exceptions were perceived general coping ability, acceptance, constructive emotional expression, and emotional suppression. The strongest associations were of social anxiety clinician severity rating with state anxiety, behavioral disengagement, rumination, and distraction. Correlations of all measures with age and gender are also shown in Table 1. Age was positively associated with problem-solving and cognitive reappraisal. Gender was not significantly associated with any measure.

Comparisons of responses between social anxiety severity groups and across tasks

State anxiety, social evaluation and general coping

Social anxiety severity level and stress task differences in participants' reported state anxiety, social evaluation and general coping ability were tested using three 3 (i.e., social anxiety severity) × 5 (i.e., stressor task) mixed factorial ANOVAs. Pairwise comparisons were completed using Bonferroni corrections. In contrast to what was hypothesized, there were no significant 2-way (social anxiety level × stress task) interactions in these three models. However, as hypothesized, there was a significant main effect of social anxiety severity status in the models of state anxiety and perceived social evaluation (see Figure 1 and Table 2). Pairwise comparisons revealed that adolescents with high social anxiety experienced more social threat (i.e., reported more state anxiety and perceived more social evaluation) than adolescents with low anxiety, p's $< .05$.

Also as hypothesized, there were a significant main effect of task in each these three models (see Figure 2 and Table 2). Perceived threat (i.e., state anxiety and social evaluation) declined and general coping ability increased as tasks progressed; pairwise comparisons (Bonferroni corrections) revealed that state anxiety was significantly higher, and perceived general coping ability was lower, in the first task relative to all other tasks (p's $< .01$) (with the exception of the 2nd task for coping). Also, anxiety was higher in the second as opposed to the third task; more evaluation was perceived in the first, relative to the fourth task; and general coping was lower in the second task, relative to the third ($p < .01$) and last ($p < .05$) tasks.

These analyses were repeated introducing age as a covariate. The results were not substantively changed for state anxiety and general coping. However, when age was entered as a covariate, the main effect of social anxiety symptom level on perceived social

Table 2. Results of mixed factor ANOVAs comparing adolescents' responses to stress tasks between social anxiety severity groups and across task (N = 76).

	BS: Social anxiety severity (SA)			WS: Task			SA × Task		
Repeated measure	*F*(2,72)	*p*	Effect size, ηp2	*F*(4,70)	*p*	Effect size, ηp2	*F*(8,142)	*p*	Effect size, ηp2
Threat: state anxiety	7.32	.001	.17	14.58	<.001	.17	1.55	.156	.04
Threat: social evaluation	3.89	.025	.10	3.93	.007	.05	1.14	.341	.03
General coping ability	1.87	.162	.05	12.63	<.001	.15	0.96	.462	.02
Coping/emotion regulation responses									
Problem-solving	1.64	.201	.04	7.69	<.001	.10	0.62	.741	.02
Cognitive reappraisal	0.92	.405	.02	0.90	.456	.01	0.75	.630	.02
Acceptance	0.01	.995	.00	1.05	.366	.01	0..89	.494	.02
Distraction	9.54	<.001	.21	4.37	.003	.06	0.81	.584	.02
Constructive emot exp	1.82	.170	.05	1.83	.130	.02	1.20	.304	.03
Behavioral disengage	8.27	.001	.19	15.83	<.001	.18	1.72	.104	.05
Rumination	6.57	.002	.15	4.28	.003	.06	2.61	.011	.07
Emotional suppression	1.29	.281	.04	2.40	.055	.03	1.44	.187	.04

Note. BS = Between subject effect. WS = with subject effect. η_p^2 = partial eta squared. emot exp = emotional expression. disengage = disengagement.

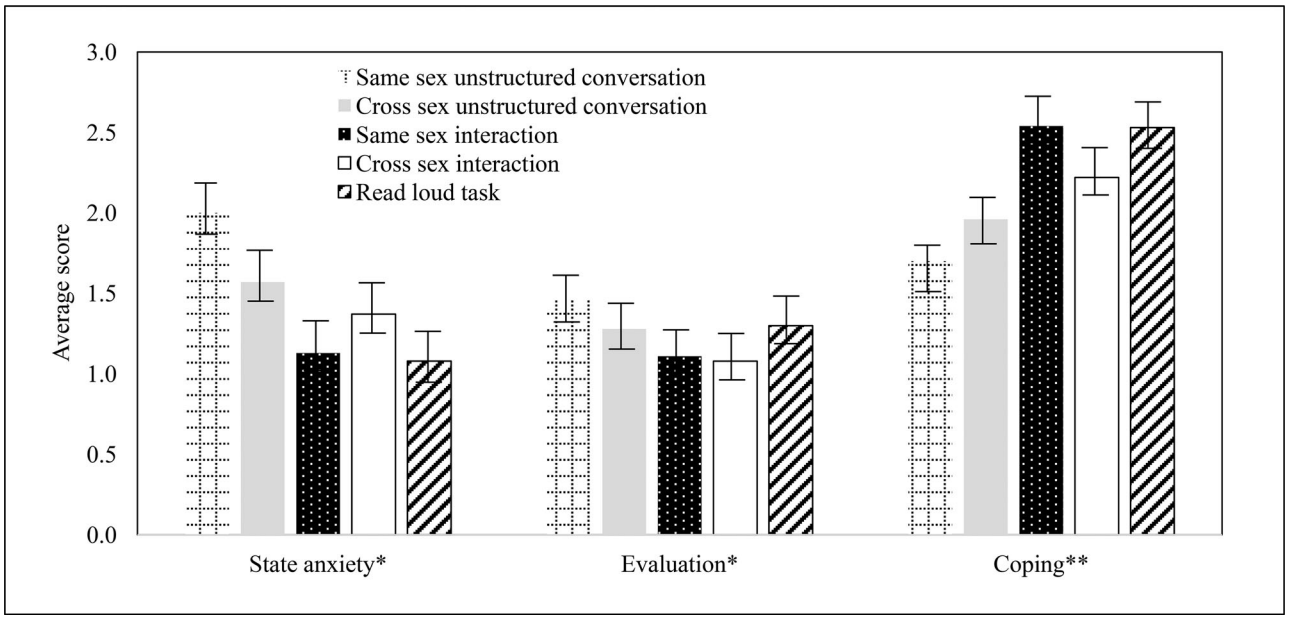

Figure 2. Average experienced threat (state anxiety and social evaluation) and general coping across the five stress tasks (*N* = 76). *Note.* Stress tasks are presented in the order that they were completed by adolescents. *significant decline across tasks. **significant increase across tasks. Error bars represent 95% confidence intervals. State anxiety, evaluation, and general coping could range from 0 to 4.

evaluation no longer reached significance, $F(2, 72) = 3.45$, $p = .088$, $np^2 = .09$. However, age was not a significant covariate in any model, with *p* values ranging from .168 to .519.

Ways of coping and regulating emotion

To compare adolescents' coping and emotion regulation responses between social anxiety severity groups and across tasks, 3 (social anxiety severity) x 5 (stressor task) mixed factorial ANOVAs were used (adjusting the critical *p*-value to .006 because of multiple tests). In these eight models, no 2-way interaction was significant, but there were significant main effects of social anxiety on distraction, behavioral disengagement, and rumination (see Table 2; data not shown in a Figure). Tukey's test showed that the high anxiety group reported more distraction, disengagement, and rumination than the moderate (*p*'s < .05) and low (*p*'s < .01) anxiety groups. There were also main effects of stressor task on problem-solving, distraction, behavioral disengagement, and rumination, whereby these responses showed a significant linear decrease across tasks (see Table 2 and Figure 3).

The above analyses were repeated introducing age as a covariate. In these eight ANCOVAs, the results did not change substantially. As above, no 2-way interaction was significant, but we found significant main effects of social anxiety on distraction, behavioral disengagement, and rumination. Tukey's test showed that the high anxiety group reported more

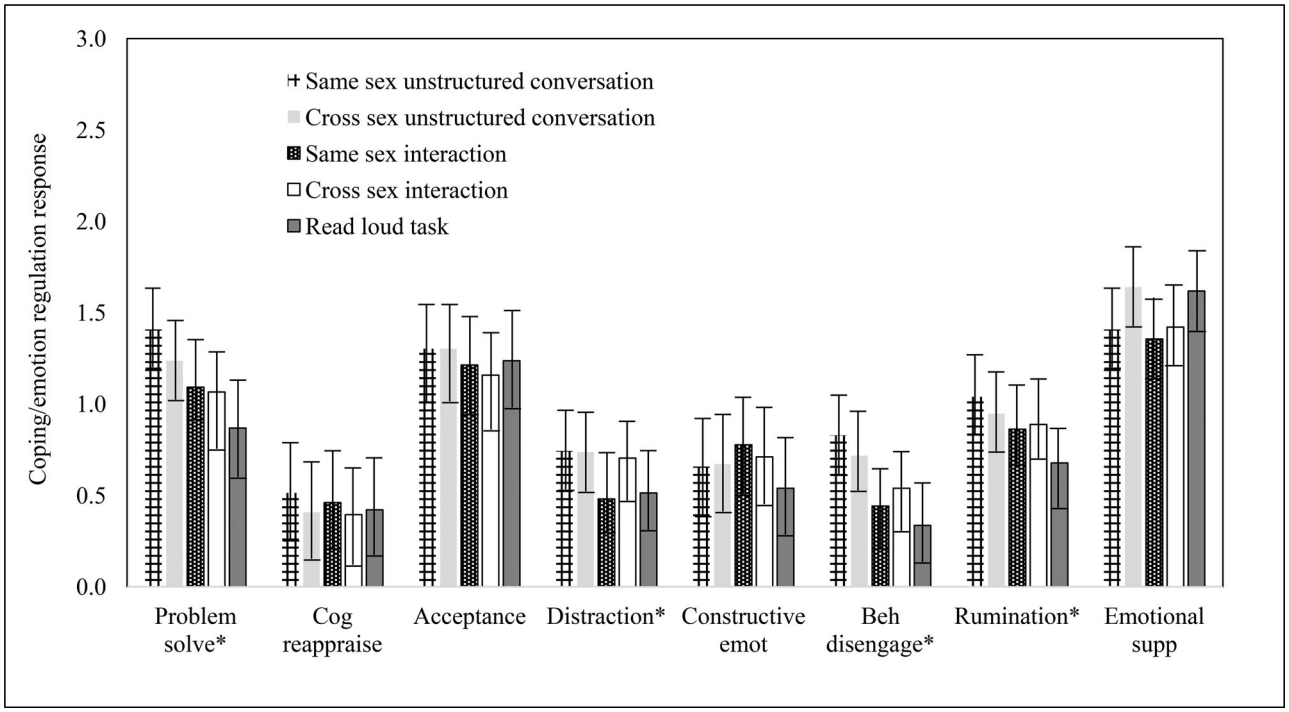

Figure 3. Coping/emotion regulation responses across the five stress tasks ($N = 76$).
Note. Stress tasks are presented in the order that they were completed by adolescents. Cog = cognitive. Emot – emotional expression.
Beh = behavioral. Supp = suppression. *significant decline across tasks. Error bars represent 95% confidence intervals. Coping/emotion regulation responses could range from 0 to 3.

distraction, disengagement, and rumination than the moderate (p's $< .05$) and low (p's $< .01$) anxiety groups. There were also main effects of task on problem-solving, distraction, behavioral disengagement, and rumination, whereby responses had a significant linear decline across tasks. Age only emerged as a significant covariate in the model of problem-solving ($p < .001$).

Coping/emotion regulation strategy clusters

For the person-centered analyses, an average score was obtained for each of the eight coping and emotion regulation responses by averaging across the five situations (see Method). These composite coping scores were standardized and entered into a clustering procedure to identify adolescents with different profiles of responses to the SSSP. To identify the number of clusters, the initial approach was a hierarchical cluster analysis using Ward's method of squared Euclidian distances. This analysis suggested that two or three clusters were feasible (i.e., they had a similar BIC). We first considered the three clusters of adolescents; this solution revealed 1) *active copers* ($n = 21$) who relied on all ways of coping and regulating emotion except emotional suppression, acceptance and constructive emotional expression relative to other clusters; 2) *suppressors* who reported more emotional suppression and acceptance relative to other clusters ($n = 23$), and 3) *expressives* who were below average for all strategies except highest in constructive emotional expression relative to other clusters ($n = 32$, see Figure 4). Confirming the cluster differences, all ways of coping and regulating emotion differed between clusters, $F(2,75)$ ranged from 7.60 ($p = .001$) for acceptance to 28.39 ($p < .001$) for rumination. Age did not differ between the three clusters, $F(2,73) = 2.72$, $p = .072$, nor did gender, $\chi^2(2) = 0.27$, $p = .875$. In comparison, the 2-cluster solution identified 25 adolescents (42% high in social anxiety) who reported higher use of all responses *except* lower use of constructive emotional expression compared to the other 51 adolescents (10% high in social anxiety), with the proportion of adolescents high in social anxiety significantly greater in the former compared to the latter cluster, $\chi^2(2) = 12.32$, $p = .002$. Thus, given the theoretical meaningfulness and explanatory power in relation to coping/emotion regulation differences and social anxiety (Milligan & Cooper, 1985), the 3-cluster solution was accepted for further analyses.

Four one-way ANOVAs were used to compare social anxiety CSR, and perceived threat (state anxiety

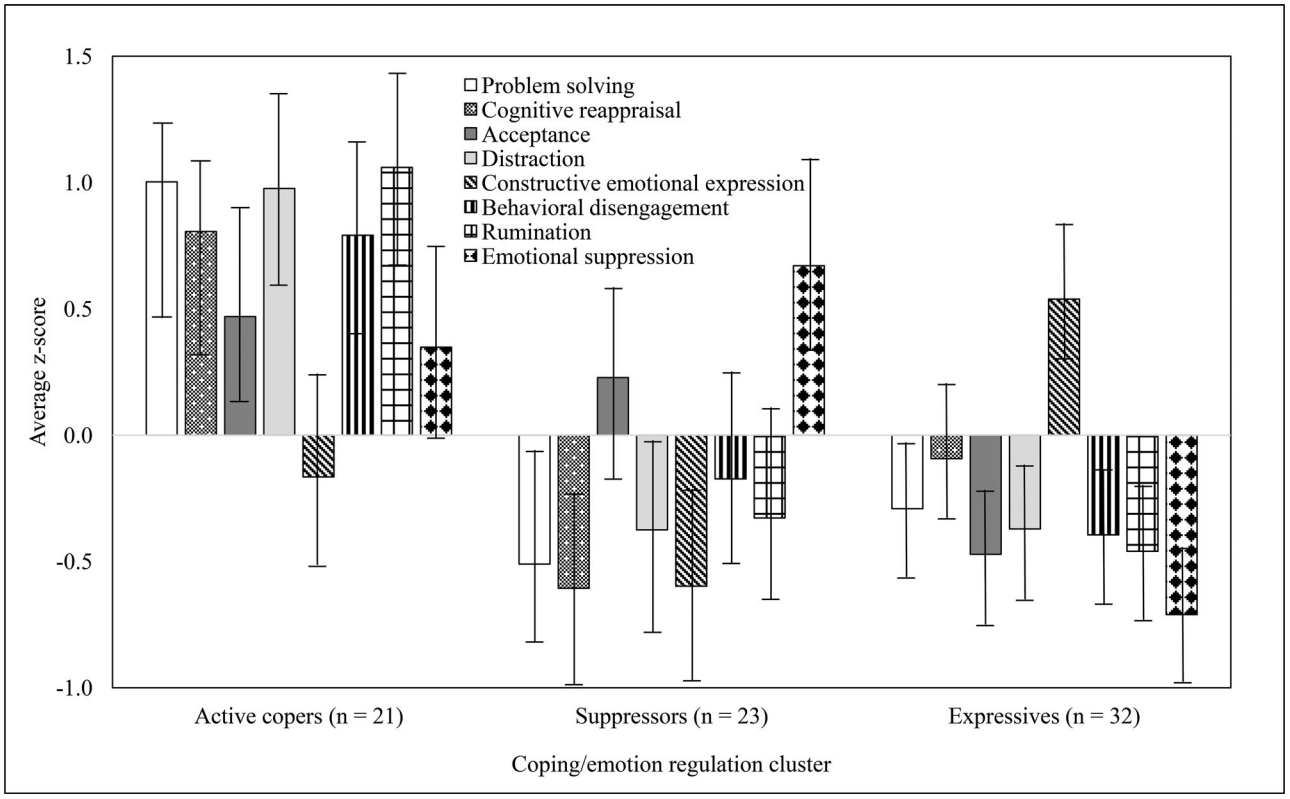

Figure 4. Illustration of the three coping/emotion regulation profiles ($N = 76$). Error bars represent 95% confidence intervals. Coping/emotion regulation responses could range from 0 to 3.

Table 3. Comparison of social anxiety clinician severity rating (CSR), and perceived state anxiety, social evaluation, and general coping ability by cluster of adolescents with different coping/emotion regulation patterns (N = 76).

Measure	Active copers (A) ($n = 21$), *M* (*SD*)	Suppressors (S) ($n = 23$) *M* (*SD*)	Expressives (E) ($n = 32$) *M* (*SD*)	*F*(2,73)	*p*	Effect size, ηp2	A vs. S *p*	A vs. E *p*	S vs. E *p*
Social anxiety CSR	3.52^{a} (2.06)	1.65^{b} (1.27)	1.63^{b} (1.36)	11.11	<.001	.23	<.001	<.001	1.000
Threat: state anxiety	2.05^{a} (0.58)	1.32^{b} (0.61)	1.42^{b} (0.78)	12.58	<.001	.26	.002	<.001	.439
Threat: social evaluation	1.93^{a} (0.97)	1.23^{b} (0.93)	0.81^{b} (0.83)	9.94	<.001	.21	.030	<.001	.210
General coping ability	2.17 (0.56)	2.03 (0.72)	2.32 (0.69)	1.30	.279	.03	.751	.712	.250

Note. Experienced threat (state anxiety and perceived social evaluation) and general coping were averaged across five social stress tasks. Means with different superscripts differed significantly from each other. CSR had a possible range from 0 – 7, threats and general coping could range from 0 to 4. η_p^2 = partial eta squared.

and social evaluation) and general coping ability (averaged across tasks) between clusters (see Table 3). Adjusting the critical *p*-value to .01 (.05/4), the main effect of cluster membership was significant for social anxiety CSR, state anxiety and perceived social evaluation. Tukey's test showed that the active copers had a higher CSR and reported more state anxiety and more social evaluation than suppressors and expressives. There were no significant differences between suppressors and expressives. General coping did not significantly differ between clusters. Entering age as a covariate in these models did not substantively change the results and age was not significant in any model, *p* values ranged from .194 (general coping) to .967 (state anxiety).

Discussion

We examined associations of adolescents' social anxiety symptoms with perceived social threat (state anxiety and perceived social evaluation) and general coping ability, as well as eight ways of coping and regulating emotion, across five induced social stress tasks. The five induced tasks were ordered to present moderate stress tasks first, followed by lowest and ending with a high stress task. Our primary hypothesis was that adolescents high in social anxiety would be distinguished by stable high threat appraisals, low reported general coping ability, and more use of behavioral disengagement, rumination, and emotional suppression across tasks, whereas other adolescents would vary depending on the pre-determined stress

level of each task. Consistent with this notion, we found that adolescents who were high in social anxiety reported more threat during the tasks and reported more use of behavioral disengagement and rumination. However, adolescents high in social anxiety also reported more distraction and did not report lower perceived coping ability or more use of emotional suppression.

In contrast to our expectations, no social anxiety group differences in task-related patterns were evident, with the pattern of responses across the tasks not different between low, moderate and high anxious adolescents. For all adolescents, many threat appraisals and coping/emotion regulation responses decreased as the tasks progressed, whereas perceived general coping ability increased. To examine patterns of response more fully, we conducted person-centered analyses, which revealed distinct groups differing on multiple coping and emotion regulation responses, which were also related to social anxiety severity. Three principal findings from this study are discussed in more detail below.

Three principal findings

The first principal finding was that social anxiety severity did identify differences in adolescents' social stress appraisals. As expected, adolescents high in social anxiety perceived more threat than adolescents low in social anxiety. In contrast, social anxiety level was not related to adolescents' perceived general coping ability. Moreover, it was not the case that adolescents with high social anxiety differed in their pattern of appraised threat and perceived coping ability across the tasks relative to other their less anxious peers. Instead, perceived threat decreased and general perceived coping ability increased as tasks progressed for all adolescents. Although our hypotheses were only partially supported, these findings are consistent with previous research (e.g., Melfsen & Florin, 2002; Reijntjes et al., 2007; Ryan et al., 2019; Waters et al., 2019), which suggests that socially anxious children and adolescents are more likely to display information processing biases, specifically an interpretation bias for social threat. He findings also suggest, however, that all adolescents, regardless of social anxiety level, can gain feelings of coping ability through practice with stressful tasks.

Somewhat surprisingly, however, socially anxious adolescents did not perceive they had less coping ability than other adolescents. One possible explanation for this finding is that the item used to assess perceived coping ability across the stress tasks may not have sufficiently captured the complexity of perceived general coping ability. However, it may also be that adolescents (irrespective of their social anxiety symptoms) are not very aware of, or effective at identifying, what it means to have good coping ability. Consistent with this, although inconsistent with past research on emotion regulation and coping (Zimmer-Gembeck & Skinner, 2011), adolescents' perception of their general coping with the stress tasks was not very strongly associated with their reported use of specific ways of coping and regulating emotions. In fact, the only strong association here was for constructive emotional expression, which suggests that the use of this strategy may have been most aligned with the general perception of "good" coping in these adolescents. Overall, these findings suggest that adolescents may not be entirely aware of their general ability to cope with stress when it occurs. In addition, the findings suggest that scaffolding and training in appropriate and constructive venting of emotion (see Compas et al., 2017) may foster greater feelings of ability and efficacy when adolescents are facing stress.

The second principal finding concerns the use of varied coping and emotion regulation responses among socially anxious youth. Correlations showed that adolescents with more severe social anxiety symptoms (as rated by clinicians) reported more use of some ways of coping and regulating emotions. High socially anxious adolescents reported more behavioral disengagement, distraction, and rumination during the tasks, when compared to adolescents who received clinician ratings that were moderate or low. This finding is consistent with evidence that more anxious adolescents respond to stress with more withdrawal and rumination (Aldao et al., 2010; Carthy et al., 2010; Clarke, 2006; Golombek et al., 2020; Schäfer et al., 2017; Zimmer-Gembeck, 2015). This also seems to align with evidence that anxious adolescents seek help from others more frequently than other youth (Carthy et al., 2010), because it is possible they relied on distraction and disengagement here because seeking support was not an option. However, this finding extends on existing evidence to suggest that, when adolescents high in social anxiety are within emotion provoking, threatening or challenging situations where social support is not an option, they may fall back on using behavioral disengagement and attempts at distraction. Adding to this, our person-centered analyses identified youth high in social anxiety as overrepresented in a cluster that reported the highest level of use of most of the measured coping/emotion regulation responses,

suggesting that they rely on a range of different strategies.

The finding that high socially anxious adolescents expend more regulatory effort on distraction could be considered further in future research and treatment. While being disengaged is sometimes described as a maladaptive strategy when facing threat and challenge (Aldao et al., 2010; Zimmer-Gembeck & Skinner, 2016), research examining the function of distraction is less clear, and the effectiveness or ineffectiveness of distraction as a coping/emotion regulation strategy is often dependent on context. For instance, the use of distraction has been associated with immediate benefits for reducing negative affect in both anxious and non-anxious individuals (Connor-Smith et al., 2000; Tan et al., 2012). Also, Stone et al. (2019) found that anxious boys' use of distraction and co-distraction (e.g., with a peer or parent) were the most effective responses for short-term social regulation. Thus, distraction might be an effective coping or emotion regulation strategy in the short term, such as when facing short, stressful tasks, as it may help reduce negative emotion. However, it is also possible that socially anxious adolescents' habitual use or reliance on distraction may not alleviate their anxiety in the longer term. It is also possible that overreliance on distraction may not permanently reduce their worries down to the level of their moderate or low socially anxious peers. Because of significant positive correlations between distraction and state anxiety, as well as between distraction and ways of coping and regulating emotions commonly associated with internalizing symptoms (i.e., behavioral disengagement, rumination, and emotion suppression), it is possible that socially anxious adolescents use of distraction may serve as another form of avoidance, which, in turn, may exacerbate and maintain their symptoms into the future.

It was curious that the use of cognitive reappraisal, which is often taught in coping programs and interventions for anxiety as an important way to cope with stress (especially uncontrollable stress), was not associated with anxiety, and was one of the least endorsed responses. Thus, it would be useful for future research to continue to explore this issue and determine whether revisions to current prevention and intervention programs for social anxiety disorder are required in order to target the most relevant coping and emotion regulation responses for enhancement to reduce distress and anxiety symptoms. Nevertheless, findings do suggest that adolescents are not very effective at, and may require more assistance to, flexibly adapt their use of coping and emotion regulation strategies when experiencing negative affect and worry about social events.

The third principal finding relates to our identification of adolescents distinguished into three clusters based on their profile of coping and emotion regulation responses. Identifying three profiles added value for understanding specific feelings of distress and threat when confronting stressful events. The three clusters were differentiated into adolescents who were *active copers*, adolescents high in suppression of emotion (*suppressors*), and adolescents high in constructive emotional expression (*expressives*). Active copers were highest in social anxiety and appeared most threatened by the stress tasks, whereas suppressors and expressors were lower in anxiety and perceived threat. Thus, what is notable here is the possibility that adolescents high in social anxiety might need practice in how to supress, but especially to express, emotion when they are facing anxiety provoking social situations that are hard to avoid.

Study limitations

Despite the strengths of a study with a clinical assessment of social anxiety and a series of induced stress tasks built on pilot research, this study also had some limitations. First, study power may have been limited by the modest sample size and unequal group sizes across social anxiety severity levels. However, a post-hoc power analysis revealed adequate power for finding small effects. Another sample size limitation relates to the person-centered analysis. It is possible a larger sample may identify more or different clusters.

Second, participant age ranged from 10 to 15 years. Age was included as a covariate across the analyses, and it had minimal significant effects. Nevertheless, these analyses did not rule out the potential moderating effect of age on the study findings and, because we had an unequal distribution of younger and older adolescents, we did not test moderation. Age moderation should be tested in future research with a larger sample and a more uniform age distribution. Moreover, we examined the linear effect of age only. Considering the possibility of nonlinear age effects would be a notable extension to the current study, given that multiple emotion regulation and coping skills mature throughout the course of adolescence, but some of these improvements are not linear across age periods (Zimmer-Gembeck & Skinner, 2011).

Third, given the use of five stress tasks and the need for adolescents to complete surveys following

each task in a short period of time, many constructs were assessed with one or two items. However, all items were selected after they were tested with similar age adolescents in a previous study and were drawn from existing measures that have been used extensively in past research.

Fourth, we formed composites scores for perceived social threat (i.e., state anxiety and social evaluation) and coping ability by averaging responses across the five tasks of the SSSP. We then compared composite threat and coping ability scores between adolescents distinguished by their coping profiles, with these profiles also founded on composite coping scores. Our reasoning for taking this approach was to move to the level of responding across the whole of the SSSP to provide an overarching snapshot of how adolescents' coping profile, compiled across multiple stressors in succession, related to their overall perception of threat and perceived coping ability across these same stressors. It should be noted that interitem correlations across the stressor tasks were good for all measures, but it is also important to keep in mind that these person-centered analyses and comparisons do not directly address responses to any single stressor or patterns across the five stressors.

Finally, although this study was designed using situations that adolescents reported to be socially stressful in a pilot study (Masters, 2020), and situations were ordered (e.g., moderate, low, high stress) to mitigate any habituation effect and to avoid high stress in the first task, it remains unclear whether declines across the tasks could be attributed to habituation or other factors, such as boredom or fatigue. Thus, it would be useful for future studies to debrief participants and obtain qualitative information about these factors, as well as to better understand how youth interpreted the items used to assess ways of coping and regulating emotions.

Application of the findings and future research

The findings of this study have implications for social anxiety treatment. First, the limited associations between adolescents' reported coping ability and their specific ways of coping and regulating emotion suggest that adolescents, irrespective of their level of social anxiety symptoms, would benefit from assistance in developing a better understanding of coping, how to cope, and how this relates to their actual coping ability (see Modecki et al., 2017). It would also be worthwhile to conduct qualitative research to explore how adolescents, who vary in internalizing symptoms, describe and interpret the meaning of coping with stress. Second, for adolescents with social anxiety disorder, the findings support the efficacy of clinical interventions that incorporate exposure to social stressors, given that perceived threat and coping ability did improve over the course of the tasks. Yet, these existing therapies, found to be effective for treating anxiety for some youth, might simultaneously add on creative ways to assist adolescents to manage their negative emotions without the use of behavioral disengagement and distraction, perhaps by learning to use appropriate forms of constructive communication about emotions and self-talk techniques (e.g., see Waters et al., 2014, 2019). Overall, future research in this area could focus on more precisely identifying how ways of coping and regulating emotions unfold throughout emotion-provoking situations, and how these processes might help to account for the emergence and maintenance of social anxiety and other emotional adjustment problems.

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Declaration of interest

The authors have no conflict of interest to declare.

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Data availability

The data are available upon reasonable request by contacting the second author.

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