Associations Among
Anxiety, Disengaged Coping, and Physiological Arousal
in Early Adolescents.

by

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Abstract

This study examined associations among physiological responses to peer stress (heart rate reactivity, HRR, and skin conductance level reactivity, SCLR), coping responses to peer stress (engaged and disengaged), and anxiety during preadolescence (N = 123). Physiological and real-time coping responses were assessed during lab simulations of peer stress situations (peer evaluation and peer rebuff) before the transition to middle school (Time 1; T1). Preadolescents also completed questionnaires about coping strategies at T1. Preadolescents and parents completed questionnaires about preadolescents' anxiety after the transition to middle school (Time 2; T2). Regression analyses revealed higher HRR was concurrently associated with higher levels of engaged coping responses to peer stress. SCLR was generally not associated with coping strategies. Path analyses indicated HRR was associated with higher real-time, engaged coping responses to peer stress experiences which, in turn, predicted lower levels of preadolescent- and parent-reported anxiety across the transition to middle school.

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I. Introduction

Coping with peer stress is an important developmental task for preadolescents, as peer relationships are prominent social relationships during preadolescence. Peers provide companionship and encouragement; however, they may also be the source of distress and anxiety. Thus, preadolescents become increasingly interested in obtaining their peers' acceptance while avoiding their rejection (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006). Rates of social anxiety peak around the transition to adolescence (Beidel & Turner, 2007). Around this time, preadolescents report being left out and teased by their peers as their most frequent and intense worries (Westenberg, Drewes, Goesdhart, Siebelink, & Treggers, 2004), and up to 50% report at least occasional experiences of peer victimization (Williams & Guerra, 2007). Coping strategies may shape preadolescents' adjustment in the context of peer stress experiences; however, little research has examined how children cope specifically with social stress until recently (Reijntjes, Stegge, Meerum Terwogt, Kamphuis, & Telch, 2006*a*).

Voluntary coping refers to intentional or volitional attempts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances. Coping strategies are generally conceptualized as either engagement (i.e., strategies directed toward a stressor and goal) or disengagement (i.e., attempts to avoid the stressor and/or associated emotions) strategies (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman 2000; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). In social stress situations, some children cope by disengaging from the stressful situation (e.g., avoiding peer interactions); the avoidant response may be reinforced by a reduction in the child's anxiety

(Ollendick, Vasey, & King, 2001). Overtime, the child may continually select relief from social anxiety through avoidance, which may lead to reduced perceptions of control in the peer context and impaired, or non-normative, social skills (Rapee & Heimberg, 1997; Ollendick, Vasey, & King, 2001; Rubin, 1993; Rubin & Burgess, 2001). The child may become increasingly uncomfortable with social interactions, and the child's anxiety among peers may escalate due to peer maltreatment, perpetuating the cycles of anxiety and avoidance (Rubin &Burgess, 2001). Children suffering from anxiety are at an increased risk for the development of later psychological disorders, especially depression (Chavira, Stein, Bailey, & Stein, 2004; Pine, Cohen, Gurley, Brook, & Ma, 1998), and children experiencing anxiety often refuse to attend school, perform poorly in their academics, and have an increased disposition to alcohol and drug use (Beidel & Turner, 2007; Turner et al., 1991; Morris, 2001).

Previous research has linked disengaged coping with peer problems and anxiety; thus, it is imperative to understand why children cope in the way they do, and why they use maladaptive coping strategies in stressful peer situations. Physiological arousal (i.e., increased heart rate and/or sweating) is one potential determinant of coping responses during preadolescence. According to cognitive interference (Vasey & Daleiden, 1996; Rapee & Heimberg, 1997) and functional emotion (Cole et al., 2004) theories, emotional and physiological arousal function to attach meaning to situations (e.g., appraisals of threat) and motivate responses to maintain preferable conditions or reduce uncomfortable conditions (e.g., avoidance of threat). However, these generally adaptive functions of physiological arousal may become maladaptive when they divert problem-focused attention or trigger disengaged-avoidant coping responses in controllable and developmentally important situations (e.g., social interactions). Indeed, physical symptoms originating from the autonomic nervous system (e.g., sweating, racing heart, and rapid breathing)

may be interpreted as cues of threat (Rapee and Heimberg, 1997). Children rely to some degree on their internal physical sensations (i.e., heart rate) when evaluating the threat of an event (Muris, Mayer, & Bervoets, 2010); thus, children may associate physical symptoms (i.e., accelerated heart rate) with internal cues of anxiety. Researchers have linked interference by internal cues of threat (i.e. thoughts or feelings perceived as threats of negative social evaluation) with preadolescents' coping (Vasey and Daleiden, 1996; Rapee and Heimberg, 1997). Interference occurs when attention and processing resources are directed away from the stressor or task, thus the opportunity for effective problem-focused coping is diminished (Eysenck & Calvo, 1992; Sarason, 1988; Vasey & Daleiden, 1996). In addition to distraction from problem-focused attention, physiological threat cues may prompt avoidant coping responses.

No prior studies have examined real-time physiological and coping responses to peer stress experiences in preadolescence. The present study will begin to address this gap in the literature by examining skin conductance level (SCL) and heart rate (HR) before and during lab simulations of salient and ecologically-valid peer stress situations (peer evaluation and peer rebuff). Engaged and disengaged coping with peer evaluation and peer rebuff was also assessed in real-time during the peer stress protocol (real-time, context-specific coping). These context-specific coping measures were supplemented with a context-general measure of engaged and disengaged coping with a variety of peer stress experiences (context-general coping; Connor-Smith et al., 2000) and a measure of engaged and disengaged coping with peer victimization (Kochenderfer-Ladd, 2004). Preadolescent- and parent-reported anxiety was measured concurrently with physiological and coping measures, as well as approximately 10 months later following the transition to middle school.

The present study examined (1) associations linking baseline and stress levels of physiological arousal (SCL, HR) with real-time context-specific, context-general, and victimization measures of coping with peer stress (i.e., engaged, disengaged), (2) associations linking real-time context-specific, context-general, and victimization measures of coping (i.e., engaged, disengaged) with self and parent reports of child anxiety concurrently and prospectively, (3) direct and indirect (via coping) pathways linking physiological arousal with child anxiety, and (4) potential sex differences in associations among physiological arousal, coping, and anxiety.

The following literature review addresses: (1) child anxiety, (2) conceptualizations of coping, (3) associations between coping and anxiety in children, (4) coping with peer stress, (5) and the physiological underpinnings of coping.

II. LITERATURE REVIEW

Child Anxiety

Anxiety is a normal but aversive response to perceived threat (Beck & Emery, 1985; Barlow, 1991). To some degree, childhood anxiety is a normative and transient experience; however, 11% - 17% of children develop anxiety disorders (Vasey & Dadds, 2001; Weiss & Last, 2001). Anxiety disorders interfere with children's normative and healthy functioning (Vasey & Dadds, 2001; Ollendick, Vasey, & King, 2001) and often precede other psychological disorders, particularly depression (Chavira, Stein, Bailey, & Stein, 2004; Pine, Cohen, Gurley, Brook, & Ma, 1998). Levels of anxiety exist on a continuum, and subclinical levels can be distressing and may escalate into clinical levels over time (Gazelle, Workman, & Allan, 2010).

Social anxiety is a form of anxiety characterized by persistent fears of social interactions or situations where there is potential for evaluation by others or exposure to unfamiliar people (American Psychiatric Association, 1994). The peak onset of social anxiety disorder, or social phobia, is early to mid adolescence (Beidel, Turner, & Morris, 1999). Children with social anxiety disorder often refuse to attend school due to fears of social interactions and peer maltreatment (Beidel & Turner, 2007). 91% of participants in a treatment-seeking sample reported their social fears resulted in academic impairment (i.e. lower grades) (Turner et al., 1991). About 10% of children and adolescents with social anxiety also have comorbid depression (Beidel et al., 1999; Strauss & Last, 1993). Twenty percent of children and adolescents with social anxiety have co-occurring externalizing disorders (i.e. conduct disorder, oppositional

defiant disorder, or attention-deficit/hyperactivity disorder) (Last et al., 1987). Furthermore, social anxiety disorder is associated with increased use of alcohol and drugs, often in an attempt to reduce anxiety (Turner et al., 1991; Morris, 2001).

Subclinical levels of social anxiety are especially common around the transition to adolescence. Peer interaction is a common source of discomfort among socially anxious children and adolescents (Rao, Beidel, Turner, Ammerman, Crosby, & Sallee, 2007). Forty-six percent (46%) of 12-year-olds reported fears associated with social situations, and 67% reported concerns about "what others think of me" (Kashani & Orvaschel, 1990). Levels of social anxiety in the normative range are linked with peer maladjustment, including loneliness, peer rejection, and peer victimization (Kingery, Erdley, Marshall, Whitaker, & Reuter, 2010; Siegel, La Greca, and Harrison, 2009; Storch, Brassard, & Masia-Warner, 2003; Rubin & Burgess, 2001; Verduin & Kendall, 2008).

Conceptualizations of Coping

Maladaptive coping is a well-documented correlate and potential cause of childhood anxiety. The present study examined coping as a mediator of the link between physiological responses to social stress and anxiety. Coping refers to intentional or volitional attempts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances (Compas et al., 2001; Skinner & Zimmer-Gembeck, 2007). Traditional conceptualizations of coping distinguished between problem-focused strategies that deal directly with the stressor itself (e.g., information seeking, generating potential solutions, and attempting to manage or change the situation) and emotion-focused strategies that deal with negative emotions evoked by the stressor (e.g., relaxation, support seeking, expressing feelings or emotions, and attempting to avoid the stressor) (Lazarus & Folkman, 1984).

More recently, Compas and colleagues developed a multidimensional, hierarchically organized model of coping (Compas et al., 2001; Connor-Smith et al., 2000). Voluntary coping strategies are conceptualized as either engagement strategies, which are directed toward a stressor and goal, or disengagement strategies, which involve attempts to avoid the stressor or emotions associated with it (Connor-Smith et al., 2000, Compas et al., 2001). Engagement coping is divided into primary and secondary control strategies. Primary control coping involves active efforts to achieve some level of personal control over emotions or the environmental stressor itself (e.g., problem solving, emotional expression, and emotional modulation). Secondary control coping involves efforts to adapt to the stressful situation, such as acceptance or reframing through positive activities and thoughts. In general, primary and secondary control coping are negatively correlated with both internalizing and externalizing symptoms and behaviors (see Compas et al., 2001 for a review). Disengagement coping strategies aim to direct attention away from the stressor or one's feelings and thoughts about the stressor. Disengagement coping involves primary control disengagement coping (e.g., avoidance) and secondary control disengagement coping (e.g., wishful thinking, distraction; Connor-Smith et al., 2001).

Other researchers have developed taxonomies for coping with peer stress specifically. For example, Sandstrom (2004) distinguished four forms of coping with peer stress: denial-based responses, which attempt to protect the self through minimizing the painful impact of the experience; ruminative responses, such as reflecting on negative events and experiencing them over and over again; aggressive responses, including various retaliatory actions where the peer problem is externalized; and active responses, involving deliberate and prosocial strategies for handling the conflict (Sandstrom, 2004). Kochenderfer-Ladd and Skinner (2002) also classified

strategies for coping with peer victimization. They distinguished five forms of coping with peer stress: problem solving (i.e., trying to do something different), seeking social support (i.e., get help from a friend), distancing (i.e., refuse to think about it), externalizing (i.e., get mad and throw or hit something), and internalizing (i.e., worry about it).

Linking Coping with Anxiety

Theoretical models. Disengaged coping may be linked with anxiety through negative reinforcement of disengagement and through the negative social experiences associated with disengagement. Negative reinforcement occurs when a response (e.g., behavior) leads to the removal or reduction of negative conditions (e.g., anxiety), increasing the probability that the response will be used again under negative conditions (Ollendick, Vasey, & King, 2001). For example, in social stress situations (e.g., peer interaction), children may cope by disengaging (i.e. avoidance, walking away), thus reducing the anxious feelings evoked by the social stress situation and increasing the likelihood of disengagement in the future. Researchers argue that children may learn to cope with their discomfort through avoidance of the stressors (i.e. withdrawing from peer interactions) and this avoidant response may be reinforced by the reduction in anxiety (Ollendick, Vasey, & King, 2001). Over time, preadolescents may continually select relief through avoidance. As a result, they may fail to develop perceptions of control in social situations and appropriate social skills to deal with the peer stress, leading to negative social experiences and greater feelings of anxiety (Rapee & Heimberg, 1997; Ollendick, Vasey, & King, 2001; Rubin & Burgess, 2001).

For example, the development of social anxiety may begin with a socially fearful and insecure child who chooses to withdraw from peer interactions and experiences negative reinforcement for social withdrawal. Due to relatively limited social experiences, the child may

fail to develop normative social skills (e.g., communication, compromise, negotiation) and perceived control of social situations. The child may fail to develop a normative set of social skills and the disengaging behaviors may look non-normative to other children; thus, the child may be mistreated, which may lead to more feelings of anxiety (Rubin, 1993; Rubin & Burgess, 2001). That is, peers may notice this non-normative behavior and react with exclusion, rejection, or victimization of the withdrawn child. In turn, the child may become increasingly uncomfortable with social interactions, and the child's anxiety among peers may escalate, perpetuating the cycles of anxiety and avoidance (Rubin &Burgess, 2001).

Whereas disengaged coping may result in increased anxiety, disengaged coping also may be a symptom of pre-existing anxiety. Although the exact pathway is not clear, it seems there is a biological basis to the development of social anxiety (Morris, 2001). Temperament has been described as a person's characteristic response to stressful stimuli and is considered to have physiological or genetic basis (Buss & Plomin, 1984; Thomas, Chess, & Birch, 1968). "Behavioral inhibition" is a temperamental style which refers to an individual with a fairly shy demeanor and leaning towards restraint, distress, and avoidance in new situations (Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, & Snidman, 1988); researchers have found behaviorally inhibited children tend to have increased rates of anxiety disorders and social phobia in later childhood and adolescence (Morris, 2001; Rubin & Burgess, 2001). Thus, disengaged coping may precede anxiety, and anxiety may precede disengaged coping.

Empirical evidence. Theoretical models are supported by empirical research linking disengaged coping with internalizing problems. Prior research has suggested coping strategies may mediate the relationship between stress and adjustment (Sontag et al., 2008). Disengagement coping has been reported to be associated with more internalizing symptoms

(i.e., loneliness, anxiety, and depression) in numerous studies (Compas et. al., 2001, Wadsworth & Compas, 2002; Kochenderfer-Ladd, 2004; Wadsworth et al., 2005; Seiffge-Krenke, 2011). Studies have found links between coping strategies and social competence with a similar pattern: engagement coping strategies are linked with increased social competence and disengagement coping strategies are more linked with poorer or decreased social competence (i.e., low in prosocial skills, high in social anxiety and peer victimization; Compas et al., 2001). Disengagement coping is consistently linked with internalizing and externalizing symptoms and lower social competence (Compas et al., 2001).

On the other hand, dozens of studies, both cross-sectional and longitudinal, have found associations between engagement coping and lower internalizing symptoms (Skinner & Zimmer-Gembeck, 2007). Specifically, individuals implementing coping strategies aimed to directly address the stressor through attempting to change the situation or gain more information have associations with fewer internalizing symptoms (i.e., loneliness, anxiety, and depression; Kochenderfer-Ladd, 2004; Seiffge-Krenke, 2011).

Context-Specific Coping. Although a large number of studies find associations between disengaged coping and internalizing behaviors, there are some inconsistencies regarding the relationship between disengaged coping and internalizing symptoms. In a review of the literature, Compas et al. (2001) found 28 studies reporting an association between disengaged coping and internalizing symptoms, two studies reporting an association between disengaged coping and fewer problems; however, 83 significant effects were reported for disengagement coping and internalizing symptoms while 101 non-significant effects were reported. Moreover, existing research suggests that the mean effects of coping on psychosocial functioning are modest at best (range=. 02-.12; Clark, 2006). It is likely these small effects and inconsistent

findings are due to the use of more generalized coping measures. That is, general or global coping strategies may not be equally employed or effective across stressful situations (Compas et al., 2001), and thus general measures of coping may underestimate or misrepresent the association between coping with specific stressors and adjustment outcomes, such as anxiety.

Compas et al. (2001) and Skinner & Zimmer-Gembeck (2007) emphasized that the potential context-dependence of coping strategies is a key direction for future research. For example, whereas engaged, problem-focused coping strategies are commonly linked with positive adjustment, some engaged coping strategies might be maladaptive responses to problems over which children have little control (e.g., intervening in parental marital conflict; Shelton & Gordon, 2008). Likewise, a recent study reports that preadolescents who engage in active coping to a controllable stressor have fewer externalizing symptoms and higher social competence when compared to preadolescents who use active coping strategies in an uncontrollable situation (Clarke, 2006). However, relatively little is known about the context-dependence of effective coping because few studies have examined coping with specific types of stress (Fields & Prinz, 1997; Rudolph et al., 1995; Compas et al., 2001). The present study focuses on preadolescents' physiological and coping responses to relatively controllable peer evaluation and rebuff situations; we believe the more focused and specific approach will lead to more robust and reliable associations between disengagement coping with social evaluative stressors in preadolescents and the development of anxiety.

Coping with peer stress. Peer relationships are perhaps the most salient social context in preadolescence. Peers can provide support and companionship, yet peer relationships during preadolescence may also become sources of distress and turmoil. In particular, rates of social anxiety reach their peak around the transition to adolescence (Beidel & Turner, 2007), as

preadolescents become increasingly concerned with gaining acceptance and avoiding rejection from their peers (Parker et al., 2006). Concerns about peer evaluation and social comparison are related to advances in abstract thinking and perspective taking capacities during preadolescence. Social worries are also driven by elevated peer victimization experiences, which peak around the transition to middle school (Williams & Guerra, 2007). Around 50% of 6th graders report being bullied in the current semester: 26% reported once or twice", 11% reported "sometimes", and 13% reported victimization "weekly" (Nansel et al., 2001). Not surprisingly, preadolescents report peer exclusion and teasing as their most intense and frequent worries (Westenberg et al., 2004).

Almost all preadolescents report experiencing social stress; however, little research has been done to understand how children cope specifically with social stress until recently (Reijntjes et al., 2006*a*). Coping with ongoing peer stress situations may require different coping strategies than more general stressors (Sandstrom, 2004). For example, contrary to some research on coping with general stressors (e.g., uncontrollable stressors), in a nonclinical sample of 84 middle school students researchers found that self-directed coping strategies during a conversational interaction (e.g., relaxation, distraction, self talk) were associated with poorer social skills (i.e., conversation skills) and higher incidents of self reported and peer reported peer victimization (i.e., teasing, being picked on by others, rumors; Erath, Flanagan, & Bierman, 2007). Self-directed coping cognitions may absorb attention and other coping strategies, like distraction, may further direct the limited attention resources away from the social interaction. Problem-directed engagement coping strategies, like generating talking points or appraising the situation positively, may direct attention toward the social interaction resulting in the promotion of competent social interaction (Erath et al., 2007). Therefore, certain types of coping (i.e., self-

versus problem focused) may be differentially successful for real-time coping with ongoing social stress when compared to coping with general stressors in the past or future.

Several other studies have examined the association between coping with peer stress and psychological adjustment in children and adolescents. In a sample of 111 adolescent girls (*M*= 11.84 years old), Sontag et al., (2008) found that disengaged coping strategies (assessed by the RSQ; Connor-Smith et al., 2000) were associated with greater levels of internalizing symptoms and distress (as assessed by the stressful events checklist, including broadly defined negative peer events, in the RSQ; Connor-Smith et al, 2000 and the anxiety/depression subscale of the Youth Self Report; Achenbach, 1991). It seems how adolescents cope with social stress may account for the association between stressful experience and internalizing problems during preadolescence (Sontag et al., 2008).

Kochenderfer-Ladd and Skinner (2002) explored the associations between strategies for coping with peer problems and adjustment in a sample of 356 fourth-grade students (9-10 years old). In a socially and ethnically diverse sample, coping strategies were measured by a modified versions Causey and Dubow's (1992) Self-Report Coping Scale (e.g., When I have a problem with another kid at school, I…,") to assess coping with broadly defined peer problems and the student's teacher reported on anxious-depressed behaviors and social problems on the Teacher Report Form (Achenbach, 1991). An association between engagement coping strategies and lower levels of loneliness and fewer social problems emerged. Distancing coping (e.g., denial, avoidance) was positively associated with loneliness and internalizing symptoms in boys and positively associated with social problems in girls (Kochenderfer-Ladd & Skinner, 2002).

In a longitudinal study, Kochenderfer-Ladd (2004) obtained information on peer victimization (School Experiences Questionnaire; SEQ was created specifically for this study),

psychological adjustment (anxious/depressed subscale of the CBCL; Achenbach, 1991, and Child Behavior Scale; Ladd and Profilet, 1996), and coping (When Bad Things Happen in School; designed to asses children's coping with peer victimization and adapted from SRCS; Causey and Dubow, 1992) with a sample of 145 (66 females and 79 males) elementary-aged children (5-11 year olds). The ethnically diverse sample participated in two self-report data collections during one school year. Three distinct coping strategies emerged through the newly developed WBTH; distancing, revenge seeking, and conflict resolution/advice seeking (Kochenderfer-Ladd, 2004). A gender difference in coping strategies emerged; girls were significantly more likely to endorse conflict resolution (e.g., engaged coping) than boys. Importantly, this study found children facing peer stress (i.e., peer victimization) experienced stronger negative emotional reactions (i.e., angry) to victimization, and their emotional response was associated with the choice of adaptive (i.e., engaged coping) or maladaptive (i.e., disengaged coping) strategies. Coping strategies were unique predictors of later victimization and internalized symptoms (Kochenderfer-Ladd, 2004). For example, they found selecting cognitive distancing (i.e., avoidance, disengaged coping) emerged as a predictor of increasing peer victimization and later internalizing problems. Evidence emerged that fear serves as a predictor of advice seeking, which predicts conflict resolution and fewer internalizing problems, while anger and embarrassment predicted revenge seeking which was associated with the increase of victimization (Kochenderfer-Ladd, 2004).

Jaser et al. (2007) studied a sample of 73 New English adolescents between the ages of 10 and 16 (M=12.74 years). Volitional coping responses to stressors normative to adolescence (i.e., peer stress and familial stress) were assessed by the RSQ (e.g., "Being left out, rejected, or not included"; RSQ; Connor-Smith et al., 2000). Adolescents' internalizing and externalizing

behaviors were assed by parental reports on The Child Behavior Checklist (Achenbach, 1991) and The Youth Self-Report (Achenbach, 1991). Moreover, the youth's self-report of internalizing symptoms (e.g., anxiety and depression) were negatively correlated with secondary control coping in the context of family stress while primary control and secondary control coping were negatively associated internalizing symptoms in the context of general peer stress. Interestingly, there were no associations between disengagement coping with either stressor or adolescent self-reports of internalizing symptoms in this cross-sectional study (Jaser et al., 2007).

Reijntjes et al. (2006*a*) cross-sectionally studied 234 children's (*M*age= 11.6) self-reported coping responses (e.g., behavioral engagement, behavioral disengagement, behavioral avoidance, cognitive engagement, cognitive disengagement, and catastrophizing) to emotion-eliciting peer-rejection vignettes. Reijntjes also assessed for children's internalizing symptoms using the Child Depression Inventory (CDI; Kovacs, 1981). Behavioral distraction (disengagement coping) emerged as the most prevalent coping strategy used by 70.9% of the participants; girls reported higher use of mental distraction (disengagement coping; *M*=3.86 for girls *M*=3.44 for boys; Reijntjes et al., 2006*a).* Higher levels of preadolescent's self reported depression was negatively associated with behavioral distraction and positive reappraisal, even after perceived social competence was controlled; higher perceived competence scores were negatively associated with behavioral distraction suggesting children with high levels of internalizing symptoms may be at an increased risk for future rejection (as a function of decreased social competence; Reijntjes et al., 2006*a*).

The first study to examine the associations between appraisal of an *in vivo* peer rejection experience, dispositional variables, and coping strategy use was conducted by Reijntjes and colleagues (2006*b*). A sample of 186 Dutch children (*M*age=11.5) were matched on age, gender,

perceived social competence (Harter, 1982), and scores on the CDI (Kovacs, 1981), and randomly assigned to a peer rejection condition (*n*=113) or a no rejection control condition (*n*=73; Reijntjes et al., 2006*b*). The participants were told their class would be taking part in a new Internet computer-game called 'SURVIVOR' where five other same-sex participants from neighboring schools would see their photo and information regarding their responses to questions about personal interests, school performance, and peer relationships. The participants were told the other players would compete against one another and vote off a player each round (the participant did not know the other players were fictional). Prior to 'competing', participants rated their pre-game state mood using the Self-Assessment Manikin (SAM; Lang, Bradley, & Cuthbert, 1999). The participant viewed mock information from the renegade participants and selected one player to vote off the game. Once the participant submitted his/her vote, a 10 second waiting period followed, and then the name of the player voted off the game (in the experimental condition the participant's name appeared) flashed on the computer screen; five seconds after the feedback participants were re-administered the SAM and then the 5-minute delay where participants could participate in alternate activities designed to assess behavioral coping (e.g., behavioral distraction, behavioral approach, and passive response; Reijntjes et al., 2006*b*). The participants receiving the rejection feedback reported a significant worsening of their mood; children higher in depression were more likely to respond to rejection feedback more passively than their peers (i.e., greater reluctance to be informed of the reasons given by mock players for voting the participant off the game) which is consistent with disengaged coping (Reijntjes et al., 2006*b*). It seems these children displaying higher levels of internalizing symptoms are more likely to cope with peer rejection in ways that maintain or worsen their negative mood (Reijntjes et al., 2006*b*).

In recent years, several studies exploring coping with general peer stress during childhood and adolescence emerged. However, most studies (5 of the 6 summarized above) utilized a cross-sectional design. The one study with a longitudinal design collected data at two time points within eight months; they were able to control for earlier adjustment. It is important to note, three of the six studies used data on adjustment and coping collected from the same informant (i.e., the child). The other three studies use data collected from separate informants (i.e., parents and/or teachers) for adjustment and coping. All six of the studies obtained self-report data from the child, two included reports on the child's psychological adjustment provided by the parent (Jaser et al., 2007; Kochenderfer-Ladd, 2004), and one included psychological adjustment information from the child's teacher and sociometric peer preferences from the participants' classmates (Kochenderfer-Ladd & Skinner, 2002). Several of the study designs are limited as they examine general peer stress (i.e., conflict with friends, peer rebuff, seeking romantic relationships, and gaining acceptance) without context specificity as well as retrospective reports in hypothetical situations (with the exception of Reijntnes et al., 2006b). In general, small effects emerged linking engagement coping and positive peer outcomes, and disengaged coping with negative adjustment (i.e., internalizing behavior) and poor peer experiences (i.e., peer victimization; Kochenderfer-Ladd & Skinner, 2002; Kochenderfer-Ladd, 2004; Sontag et al., 2008). However, Jaser et al. (2007) did not find an association between disengaged coping in the context of peer stress and self-reported internalized symptoms.

Physiological Underpinnings of Coping

Theoretical models. Given that disengaged coping has been linked with peer problems and anxiety, it is important to understand why children use these maladaptive coping strategies in peer stress situations. Physiological arousal is one potential determinant of coping responses.

Cognitive interference (Vasey and Daleiden, 1996; Rapee and Heimberg, 1997) and functional emotion (Cole et al., 2004) theories contend that emotional and physiological arousal serve the functions of attaching meaning to situations (e.g., appraisals of threat) and motivating responses that sustain favorable conditions or reduce unfavorable conditions (e.g., avoidance of threat). The generally adaptive functions of emotional or physiological arousal can become maladaptive, however, when they divert problem-focused attention or trigger disengaged-avoidant responses in situations that are controllable and developmentally important (e.g., social interactions). Physiological arousal may drive disengaged coping because physiological arousal is interpreted as an internal cue of threat that is distracting (disengagement) and that prompts avoidance to provide emotional relief (disengagement). Indeed, Vasey and Daleiden (1996) argue that anxious children choose coping strategies based on their emotional state, instead of the specific demands of the situation.

Emotional reasoning is the individual's preference to infer threat based on their emotional and physical response (Beck, Emery, & Greenberg, 1985; Muris, Mayer, & Bervoets, 2010). Internal cues of threat can include proprioceptions like negative cognitions and physical symptoms originating from the autonomic nervous system including potentially visible aspects of physiological arousal like sweating, and rapid breathing (Rapee and Heimberg, 1997). It appears children rely to some degree on their internal physical sensations (i.e., heart rate) when they evaluate the threat of an event (Muris, Mayer, & Bervoets, 2010). In a sub-sample of 131 nonclinical 10-13 year olds, ~21% identified heart beating very fast and ~44% identified sweating as signs or symptoms of anxiety during a vignette paradigm; of these children ~20% attributed sweating and ~57% attributed heart beating very fast as physical symptoms experienced due to internal attributions of anxiety; thus, children are capable of associating

physical symptoms (i.e., accelerated heart rate) with internal cues of anxiety (Muris, Mayer, Freher, Duncan, & van den Hout, 2010). Furthermore, in a recent study with a nonclinical sample of eighty-one 9-13 (*m*age= 10.7 years) year olds, evidence emerged that, on average, children rely on their heart rate sound to make threat judgments (Muris, Mayer, & Bervoets, 2010).

Interference occurs when threat cues (e.g., physiological arousal) divert attention and processing resources are away from the stressor or task, such that the opportunity for effective problem-focused coping is diminished (Eysenck & Calvo, 1992; Sarason, 1988; Vasey & Daleiden, 1996). Impaired performance associated with anxiety is due to a reduction in the attention available for task performance. Thus, attentional bias towards internal cues of threat may interfere with preadolescents' coping with stressors through limiting access to attentional resources for performance as well as interfering with coping with anxiety (Vasey & Daleiden, 1996).

Empirical evidence. Very little research has been done looking at the link between physiological arousal and disengaged coping, particularly with children and not in the specific context of real-time measures of arousal and coping.

Dufton and colleagues (Dufton, Dunn, Slosky, & Compas, 2010) examined a representative sample of 21 children with recurrent abdominal pain (RAP; *M*age=11.05), 21 children with anxiety (*M*age=12.29), and 21 healthy controls (*M*age= 11.05) in a semi-structured social stress interview that allowed a participant to re-experience a specific incident they found stressful (e.g., peer rebuff) with a research assistant (Ewart & Kolodner, 1991). They also assessed coping and stress reactivity (RSQ; Connor-Smith et al., 2001). They found self-reported physiological arousal was significantly positively correlated with HR during baseline in the

clinical group (RAP and anxiety). Disengagement coping during the stress task was significantly negatively correlated with HR during recovery in both groups (Dufton et al., 2010), suggesting that disengaged coping strategies reduced arousal, consistent with negative reinforcement models (Ollendick et al., 2001. They also found secondary control coping (i.e., positive thinking) with the social stressor was positively correlated with HR at all time intervals. However, in the Dufton et al., 2010 study, the measure of coping (RSQ) did not directly correspond with their measure of stress (lab activity), which may have limited the potential to detect associations between physiological reactivity and coping.

Vögele, Sorg, Studtmann, & Weber (2010) explored the relationship between cardiac autonomic regulation and coping with anger in a sample of forty-seven adolescents (Mage= 14.7 years). Coping was measured in real-time. An adaptation of the Ultimatum Game (UG) was used to induce feelings of anger; in the game, two players are given a sum of money to share, and the first player makes an offer to the second to split the money (i.e., an uneven split) and the second player must accept or reject. Participants were asked, "After you received the offer, you had one minute to think about it. What did you think during this time in relation to the offer?"; then they were prompted with, "First I thought…", and "Then I thought…".Evidence emerged that, on average, heart rate remained steady among adolescents who used cognitive reappraisals (i.e., engagement coping) during an anger provocation situation (i.e., an unfair offer); whereas heart rate accelerated among adolescents who used rumination (Vögele et al., 2010).

A 2004 study by Connor-Smith and Compas explored associations among coping, health, and anxiety. In this cross-sectional study, a sample of sixty-one undergraduate students (67% female; *M*age = 18.5 years) participated in a lab protocol where their heart beats per minute were obtained. In addition, two versions of the RSQ (the *general interpersonal version* and the

evaluation-related version), measures of emotional and behavioral problems (Young Adult Self-Report; Achenbach, 1997), and a physical health assessment (PILL; Pennebaker, 1982) were administered. HR reactivity was significantly correlated with disengaged coping (β=0.31 $p <$ .01). Disengagement coping also accounted for 27% of the variance in internalizing symptoms (F (4, 56) = 5.2, $p < .001$; Connor-Smith & Compas, 2004). This research suggests continued reliance on disengagement may be most problematic in the context of a controllable stressor (i.e., peer stress). No sex differences were found for coping, hear rate reactivity, internalizing problems, or health status.

Present Study.

Past research on coping has found somewhat inconsistent findings regarding the potential risk of disengaged coping, perhaps in part because research has relied on retrospective assessments of coping with general stress situations. We believe it is crucial to examine coping and physiological responses with real-time and context-specific measures. In addition to context-general measures of engaged and disengaged coping, the present study examined real-time, context-specific measures of engaged and disengaged coping, as well as SCL and HR, during lab simulations of salient and ecologically-valid peer stress situations (peer evaluation and peer rebuff). The present study is the first to investigate multiple psychophysiological parameters that may predict preadolescents' coping responses to peer stress and social anxiety.

Researchers have conceptualized skin conductance level (SCL) as a physiological measure of anxiety or behavioral inhibition (Fowles, 1980; Fowles, Kochanska, & Murray, 2000). SCL is influenced by sweat gland activity, which is influenced solely by the sympathetic (SNS) component of the automatic nervous system (ANS). It is considered a marker of anxiety because SCL is linked with neural networks involved with fear and anxiety (Beauchaine et al.,

2001), SCL increases in anxiety-provoking situations and under threat of punishment (Erath et al., 2011; Matthys, van Goozen, Snoek, & van Engeland, 2004), and SCL is correlated with anxiety in community and clinical samples (Erath et al., 2011; Hastings et al., 2007; Schmitz, Krämer, Tuschen-Caffier, Heinrichs, & Blechert, 2011).

HR reflects autonomic nervous system (ANS) activity, and is affected by both the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS). Although HR is a less precise measure of physiology, it is readily experienced or felt (Erath, Tu, & El-Sheikh, 2011). Several studies have established heart rate (HR) as an indicator of autonomic nervous system arousal in response to social stressors (Ewart & Kolodner, 1991; Dufton et al., 2010). In a 2009 study, anxious-solitary-excluded children experienced higher HR before and during a peer-rejection protocol than anxious-solitary or excluded children (Gazelle & Druhen, 2009). Erath and colleagues found HR increased significantly from a pre-task period to a social stress period; in more demanding situations, children experience HR accelerations, which is one reason to believe HR is a marker of anxiety (Erath, Tu, & El-Sheikh, 2011). Throughout several studies, associations between internalizing behaviors and HR accelerations during social-emotional challenges have emerged (Weems et al., 2005; Hastings, Zahn-Waxler, & Usher, 2007). Thus, it is possible that physiological arousal (i.e., increased HR and SCL) is experienced as an internal cue of threat in a challenging situation, triggering disengaged coping, which ultimately leads to anxiety problems.

Aim 1. The first aim of the present study was to investigate associations linking baseline and stress (i.e., reactivity) levels of physiological arousal (SCL, HR) with real-time, context-specific measures of coping; context-general measures of coping; and victimization measures of coping with peer stress (i.e., engaged, disengaged). Bivariate correlations examined associations

among physiological parameters and coping measures. In addition, multiple regression analyses tested unique associations linking SCL and HR with engaged and disengaged coping strategies. Each regression analysis included sex and race as control variables, baseline or stress levels of SCL and HR as predictors, and context-specific, context-general, or victimization measures of engaged or disengaged coping as the outcome. Thus, a total of twelve regression analyses were conducted. We anticipated that higher levels of physiological arousal would be associated with higher disengaged and lower engaged coping, especially with real-time measures of context-specific coping.

Aim 2. The second aim of the present study was to investigate associations linking measures of engaged and disengaged coping (real-time context-specific coping; context-general coping; coping with peer victimization) with self and parent reports of preadolescent anxiety (T1). Bivariate correlations examined associations among coping strategies and preadolescent anxiety. In addition, multiple regression analyses tested unique associations linking engaged and disengaged coping strategies with child anxiety. Each regression analysis included sex and race as control variables, real-time context-specific, context-general, or victimization measures of engaged and disengaged coping as predictors, and preadolescent- or parent-reported anxiety as the outcome. Thus, a total of six regression analyses were conducted. We anticipated that engaged coping strategies would predict decreased anxiety, whereas disengaged coping strategies would predict increased anxiety.

Aim 3. The third aim of the present study was to examine direct and indirect (via coping) pathways linking physiological arousal at T1 with preadolescent anxiety at T2. Each path analysis (AMOS; Arbuckle & Wothke, 1999) included baseline or stress levels of SCL and HR as predictors, real-time context-specific, context-general, or victimization measures of engaged

and disengaged coping as intervening variables, and T2 preadolescent- or parent-reported anxiety as the outcome. Each path analysis included sex, race, and T1 anxiety as control variables. We hypothesized that physiological arousal would predict higher disengaged and lower engaged coping which, in turn, would predict higher anxiety, especially for models including real-time, context-specific coping.

Aim 4. Finally, we aimed to explore whether associations among physiological arousal, coping, and anxiety differed by sex. Separate correlations for boys and girls were examined when significant interactions emerged.

III. METHOD

Participants

At Time 1 (T1), 123 fifth and sixth grade students from five public schools in east Alabama received parental consent to participate in the study. The sample included 123 participants, with 61 (50%) girls and 62 (50%) boys and 48 (39%) fifth graders and 75 (61%) sixth graders. The mean age of the final sample was 11.61 years. The racial composition of the participants reflected the demographics of east Alabama, which included 59% Caucasians, 35% African Americans, 1% Hispanics, and 2% Asian, and 4% other race. Parental consent and data was collected on each participant. 82% was obtained from biological mothers of the participants. The participants came from a fairly diverse socioeconomic background: 21% were from lower- to lower-middle income (less than $20,000) families, 33.6% were from middle-income ($20,001-$50,000) families, and 45.4% were from upper-middle to high-income (above $50,001) families.

Data for the present study were drawn from an ongoing longitudinal study. Time 2 (T2) data were available for only a subsample of the original T1 sample (n = 63). T2 data were collected during the spring semester of preadolescents' first year of middle school.

Procedure

Preadolescents and their guardian visited the research lab during the summer to participate in the study. Their visit to the lab took about two hours, and both participants and guardians were compensated monetarily. Preadolescents participated in lab activities while their

physiological activity was recorded, and both preadolescents and guardians completed a set of questionnaires. The University Institutional Review Board approved all study procedures.

The lab protocol included *peer evaluation* and *peer rebuff* components. Following acclimation and baseline periods, preadolescents were asked to act as if an adult research assistant (RA; same sex) was someone about their age, whom they were meeting for the first time, and to lead a three-minute conversation to get to know the RA. To get the conversation started, preadolescents were told that they could tell about themselves, ask questions about the RA, and talk about anything they wished. They were told that the conversation would be viewed on one-way Skype (a web based video chat program) by three same sex peers about their age who would serve as peer judges (they were actually fictitious). The preadolescent participants were told that the peer judges would decide how well they performed in the conversation activity compared to two other participants the peer judges had watched on video (these other participants were also fictitious). The *peer evaluation* period refers to the three-minute conversation activity. Three minutes after post-conversation interview questions, participants received a text message through Skype, from the "peer judges", indicating that the peer judges chose the other two participants as the best performers in the conversation activity. Participants were then told that they might have a chance to change the peer judges' opinions by speaking directly to the peer judges through Skype. The *peer rebuff* period refers to the three minutes following the feedback from the peer judges, during which participants considered their potential response to the peer judges. Following the peer rebuff period and several interview questions, the task was ended and participants were carefully debriefed using a process debriefing procedure (Underwood, 2005; Hubbard, 2005). Specifically, participants were led to their own conclusion

that the peer judges were not real, and the rationale for deception and the purpose of the study were discussed with the participants by the principal investigator.

Measures

Social Anxiety. Preadolescent participants completed the Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998), to assess social anxiety (Appendix A). Participants rated the 18-item self-report on a 5-point scale (0 = *Not at all* to 4 = *All the time)*. The SAS-A is comprised of three subscales: fear of negative evaluation, social avoidance and distress-general, and social avoidance and distress-new. The SAS-A has shown strong reliability and validity. In the present study, internal consistency of the SAS-A was good (α = .92). The SAS-A was administered at T1 and T2.

Parental reported anxiety. The participants' guardian, mostly mothers, completed the 71-item Child Behavior Checklist (CBCL; Achenbach, 1991; Appendix A). The participants rated their child on a three-point scale (0 = not true to 2 = very true or often). For the purpose of this study, we are using the anxious-depressed subscale (32-items) In the present study; internal consistency of the CLBCL internalizing subscale was good (α = .84). The CBCL was administered at T1 and T2.

Real-time, context-specific coping with peer stress. Coping strategies were assessed using open-ended questions during the peer stress protocol (Appendix A). After the peer evaluation period protocol, participants were asked, "Having a conversation with someone you don't know, while being judged by peers, can be challenging—how did you cope with this situation?" and a follow up question, "Did you use any other coping strategies to make yourself feel better or to help you get through the conversation task?" or "Did you use any other coping strategies?" After the peer rebuff period, participants were asked, "Not being chosen by peers

can be challenging—how did you cope with this situation?" and a follow up question, "Did you use any other coping strategies to make yourself feel better or to help you plan your response to the peer judges?" or, "Did you use any other copings strategies?" Their responses were coded by trained RAs as "problem directed," "self directed" coping strategies. Problem directed coping strategies included (1) voluntary attempts to influence the problem or situation (efforts to plan or participate in the conversation or response to the peer judges (e.g., thought about what to say), as well as efforts to make an impression on the conversation partner or peer judges (e.g., reminded myself to smile), (2) non-threatening or positive appraisals (thoughts) about the self, including the self in the situation (e.g., told myself I can do this, told myself that I did well), and (3) voluntary attempts to appraise or interpret the problem or situation in a positive or non-threatening manner, (regard one's thinking about the situation but do not involve an attempt to influence the situation itself; e.g., thought that it's no big deal or fun, imagined that you were a nice person, thought that the peer judges would be interested in what I planned to say) or acceptance of the situation (as it actually is) (e.g., figured that you can't win all the time). Self-directed coping strategies included (1) voluntary attempts to influence one's emotional state in the context of the problem or situation; they are directed toward the self rather than the problem or situation, but do not purposefully deny or distract from the situation; typically involve relaxation strategies (e.g., take a deep breath), and (2) voluntary actions or thoughts that specifically direct effort or attention away from the problem or situation; they typically involved avoidance (e.g., didn't talk, didn't think about the peer judges, didn't think about it, looked away), distraction (e.g., thought about something other than the situation), or denial (e.g., pretended like the peer judges were not watching, pretended like this wasn't real). When

participants indicated they did not feel nervous, or they forgot to use a strategy, their response was coded as "not applicable".

Raters who were unaware of participants' other data coded transcripts of the responses independently. All responses were double-coded, and inter-rater reliability was good (κs > .70). Disagreements were resolved by consensus.

Context-general coping with peer stress. Participants completed the 57-item Responses to Stress Questionnaire-Social Stress Version (RSQ; Connor-Smith et al., 2000), which assesses their responses to a sundry of stressors within the peer domain (Appendix A). The scale assesses cognitive and behavioral responses. Coping factors include *Primary Control Engagement Coping* (i.e., problem solving, emotional regulation, and emotional expression scales)*; Secondary Control Engagement Coping* (i.e., distraction, positive thinking, and acceptance)*; Disengagement Coping* (i.e., avoidance, denial, and wishful thinking)*; Involuntary Engagement* (i.e., physiological arousal and intrusive thoughts)*, and Involuntary Disengagement* (i.e., cognitive interference, emotional numbing, and inaction; Connor-Smith et al., 2000). The voluntary engagement (i.e., primary control and secondary control) and voluntary disengagement (i.e., disengagement) factors were used in the present study. The RSQ-Social Stress Version is reliable and valid (Connor-Smith et al., 2000). In the present study, internal consistency of the RSQ-Social Stress Version primary engaged (18-items) subscale was good (α = .77); the disengaged subscale (12-items) was also good (α = .72).

Coping with peer victimization. Participants completed the *When Bad Things Happen in School* (WBTH) questionnaire to assess coping responses to peer victimization (Kochenderfer-Ladd, 2004; Appendix A). Participants are asked to rate how they respond to common victimization situations. This questionnaire was adapted from Causey and Dubow's

(1992) *Self-Report Coping Scale*, tapping into conflict resolution (i.e., engaged victimization coping; composed of 5 items, like "give the kid an 'I' message" or, "tell the kid to stop") and cognitive distancing (i.e., disengaged victimization coping; made up of 5 items, like "make believe nothing happened", or "tell yourself you don't care"). The WBTH is reliable and valid (Kochenderfer-Ladd, 2004). In the present study, internal consistency of the WBTH engaged victimization subscale (5-items) was acceptable ($\alpha = .57$); the disengaged victimization subscale (5-items) was good ($\alpha = .78$).

Physiological assessment. Heart rate (HR) and skin conductance level (SCL) were measured during acclimation (5 minutes), resting baseline (3 minutes), speaking baseline (participant and researcher took turns reading aloud; 3 minutes), peer evaluation (3 minutes), waiting (3 minutes), peer rebuff (3 minutes), and recovery (3 minutes) periods. Participants remained comfortably seated with their hands resting on the armrest or in their lap throughout the physiological assessment. In the present study, pre-task (resting baseline) and peer stress (mean of peer evaluation and peer rebuff periods) levels of physiological parameters were used. The assent process included a description of the peer stress protocol, so baseline measurements of physiological parameters may be conceptualized as *pre-task levels*, which were influenced by some level of anticipatory stress. Peer stress levels of physiological parameters were not collected for six participants because they chose to abstain from the peer stress procedure.

HR. Data acquisition followed standard guidelines (Bernston et al., 1997) using a Bioamp data acquisition system (MindWare Technologies, Inc., Gahanna, OH). HR was collected through disposable silver/silver-chloride (Ag-AgCl) electrodes (1.5" foam sensor, 7% chloride gel) placed on the participants' right collarbone and left and right rib by a same-sex RA. HR was highly correlated across peer evaluation and peer rebuff; these HR scores were averaged

to create a HR-stress score. Heart rate reactivity (HRR) was computed as the residualized change score from the resting baseline period to the peer stress period.

SCL. Data acquisition also followed standard guidelines (Bernston et al., 1997) using Bioamp data acquisition system (MindWare Technologies, Inc., Gahanna, OH). SCL was measured by two disposable Ag-AgCl electrodes (1.5" x 1' foam, 0% chloride gel) placed on the palm of the non-dominant hand (participants were instructed to wash their hands with Dawn soap and dry completely prior to electrode placement). A taped loop in electrode lead cables was used to limit movement artifacts for all physiological data collection. Baseline SCL data were not included for six participants due to measurement artifacts. SCL levels during the peer evaluation periods were highly correlated and averaged to create a SCL-stress score. Skin conductance level reactivity (SCLR) was computed as the residualized change score from the resting baseline period to the peer stress period.

IV. RESULTS

Preliminary Analyses

Descriptive analyses were conducted to determine the mean, range, and standard deviation of the study variables for the total sample (Table 1). On average, preadolescents experienced some anxiety, according to self-reports and parent-reports. They reported relatively low levels of self-directed coping and relatively high levels of problem-directed coping during the peer stress protocol. They exhibited fairly typical physiological responses to peer stress (increase in HR and SCL).

Correlations were conducted for all study variables (Table 2). Baseline HR and SCL were not correlated with coping responses to peer stress, and thus no further information is presented about baseline levels of physiological parameters (although the failure to find significant associations is addressed in the Discussion). There were statistically significant correlations among physiological reactivity and several coping responses. HRR was correlated with all three forms of engaged coping: real-time, context-specific, problem-directed coping (significant, $p < .05$), context-general, engaged coping (significant, $p < .05$), and engaged victimization coping (non-significant trend, $p < .10$). SCLR was negatively correlated with disengaged victimization coping. Real-time, context-specific, problem-directed coping was correlated with context-general, engaged coping and engaged victimization coping. Context-general, disengaged coping and disengaged victimization coping were also correlated. Preadolescent-reported social anxiety was correlated with context-general, engaged coping; context-general, disengaged coping;

engaged victimization coping; and disengaged victimization coping. Preadolescent-reported social anxiety was also correlated parent-reported anxiety.

Regression analyses were conducted to examine the primary aims of the present study. In one set of regression analyses, physiological reactivity parameters (HRR and SCLR) were tested as predictors of real-time, context specific coping (lab-based); context-general coping (RSQ); or coping with peer victimization (WBTH). In the next set of regression analyses, coping strategies were examined as predictors of preadolescent- or parent-reported anxiety at T1. Sex and race were entered on the first step as control variables in all regression analyses. Interactions between physiological reactivity and sex, as well as coping and sex, were also tested; when significant interactions with sex were detected, correlations were computed separately for boys and girls. Finally, using the subsample of participants with T2 data (n = 63), path models examined direct and indirect associations linking physiological reactivity and coping at T1 with preadolescent- and parent-reported anxiety at T2.

Regression Models Linking Physiological Reactivity with Coping

Real-Time, Context-Specific Coping

Problem-directed coping. As shown in Table 3, demographic variables explained variance in real-time, context-specific, problem-directed coping at the non-significant trend level, $\Delta R^2 = .05$, $F\ (2, 103) = 2.53$, $p < .10$. Gender (female) was positively associated with problem-directed coping, $\beta = .20$, $B = .12$, $SE = .06$, $p < .05$, but race (minority) was not associated with problem-directed coping, $\beta = -.12$, $B = -.07$, $SE = .06$, $p = .28$**.** As a set, reactivity levels of physiological parameters did not explain significant variance in real-time, context-specific, problem-directed coping, $\Delta R^2 = .01$, $F\ (2, 99) = .54$, $p = .58$. SCLR was not associated

with real-time, context-specific, problem-directed coping, β = -.03, B = -.004, SE = .01, p = .74. However, HRR was significantly and positively associated with context-specific, problem-directed coping, β = .20, B = .01, SE = .006, $p < .05$. The interactions between reactivity physiological parameters and sex did not explain significant variance in real-time, context-specific, problem-directed coping.

Self-directed coping. Demographic variables explained significant variance in real-time, context-specific, self-directed coping, ΔR^2 = .06, F (2, 103) = 3.28, $p < .05$ (Table 3). Gender (female) was negatively associated with self-directed coping, β = -.20, B = -.10, SE = .05, $p <$ .05, and race (minority) was positively associated with self-directed coping at the non-significant trend level, β = .17, B = .09, SE = .05, $p < .10$. In contrast, as a set, reactivity levels of physiological parameters did not explain significant variance in real-time, context-specific, self-directed coping, ΔR^2 = .03, F (2, 101) = 1.28, p = .28. However, SCLR was positively associated with real-time, context-specific, self-directed coping at the non-significant trend level, β = .17, B = .02, SE = .01, $p < .10$. HRR was not associated with context-specific, self-directed coping, β = -.09, B = -.004, SE = .005, p = .40. The interactions between reactivity physiological parameters and sex did not explain significant variance in real-time, context-specific, self-directed coping.

Context-General Coping

Engaged coping. As shown in Table 4, demographic variables explained significant variance in context-general, engaged coping, ΔR^2 = .07, F (2, 103) = 3.9, $p < .05$. Gender (female) was positively associated with engaged coping, β = .27, B = .22, SE = .08, $p < .01$, while race (minority) was not associated with engaged coping, β = -.03, B = -.03, SE = .08, p = .75**.** Reactivity levels of physiological parameters also explained variance in context-general,

engaged coping at the non-significant trend level, $\Delta R^2 = .05$, F (2, 101) = 2.89, $p < .10$. SCLR was not associated with context-general, engaged coping, $\beta = .10$, $B = .02$, $SE = .02$, $p = .31$; however, HRR was positively associated with context-general, engaged coping, $\beta = .21$, $B = .02$, $SE = .01$, $p < .05$.

The interactions between reactivity physiological parameters and sex explained significant variance in context-general, engaged coping $\Delta R^2 = .06$, F (2, 99) = 3.85, $p < .05$ (table 4). The interaction between sex and HRR, $\beta = .22$, $B = .02$, $SE = .02$, $p = .13$, was not associated with context-general, engaged coping, while the interaction between sex and SCLR, $\beta = .30$, $B = .06$, $SE = .03$, $p < .05$, was significantly associated with context-general, engaged coping. The correlation between SCLR and context-general, engaged coping was stronger for girls, ($r = .28$, $p <. 05$), than boys ($r = -.13$, $p = .38$).

Disengaged coping. Demographic variables explained variance in context-general, disengaged coping at the non-significant trend level, $\Delta R^2 = .05$, F (2, 103) = 2.78, $p < .10$ (Table 4). Gender (female) was positively associated with disengaged coping at the non-significant trend level, $\beta = .16$, $B = -.16$, $SE = .10$, $p < .10$, while race (minority) was not associated with disengaged coping, $\beta = .14$, $B = .14$, $SE = .10$, $p = .15$**.** Reactivity levels of physiological parameters did not explain significant variance in context-general, disengaged coping, $\Delta R^2 = .002$, F (2, 101) = .13, $p = .88$. Neither SCLR, $\beta = -.05$, $B = -.009$, $SE = .02$, $p = .61$, nor HRR, $\beta = .007$, $B = .001$, $SE = .01$, $p = .94$, was associated with context-general, disengaged coping.

The interactions between reactivity physiological parameters and sex did not explain significant variance in context-general disengaged coping (Table 4). However, the interaction between sex and HRR, $\beta = -.28$ $B = -.04$, $SE = .02$, $p < .10$, was associated with context-general,

disengaged coping at the non-significant trend level, while the interaction between sex and SCLR, $\beta = .13$ $B = .03$, $SE = .04$, $p = .35$, was not. The association between HRR and context-general disengaged coping was positive (though non-significant) for boys ($r = .13$, $p = .35$), and negative (though non-significant) for girls, ($r = -.13$, $p = .34$).

Victimization Coping

Engaged coping. As shown in Table 5, demographic variables explained significant variance in engaged victimization coping, $\Delta R^2 = .11$, F (2, 103) = 6.21, $p < .01$. Gender (female) was positively associated with engaged victimization coping, $\beta = .30$, $B = .27$, $SE = .08$, $p < .01$, but race (minority) was not associated with engaged victimization coping, $\beta = .10$, $B = .09$, $SE = .09$, $p = .29$**.** Reactivity levels of physiological parameters did not explain significant variance in engaged victimization coping, $\Delta R^2 = .02$, F (2, 101) = .92, $p = .40$. Neither SCLR, $\beta = -.08$ $B = -.01$, $SE = .02$, $p = .42$, nor HRR, $\beta = .10$, $B = .009$, $SE = .009$, $p = .29$, was associated with engaged victimization coping. The interactions between reactivity physiological parameters and sex did not explain significant variance in engaged victimization coping.

Disengaged coping. Demographic variables explained significant variance in disengaged victimization coping, $\Delta R^2 = .06$, F (2, 103) = 3.36, $p < .05$ (Table 5). Gender (female) was positively associated with disengaged coping, $\beta = .20$, $B = .22$, $SE = .11$, $p < .05$, while race (minority) was not associated with disengaged coping, $\beta = .13$, $B = .15$, $SE = .11$, $p = .19$**.** Reactivity levels of physiological parameters did not explain significant variance in disengaged victimization coping, $\Delta R^2 = .03$, F (2, 101) = 1.63, $p = .20$. SCLR was negatively associated with disengaged victimization coping at the non-significant trend level, $\beta = -.18$ $B = -.04$, $SE = .02$, $p < .10$, while HRR was not associated with disengaged victimization coping, $\beta = .01$, $B = .001$, SE

= .01, p = .91. The interactions between reactivity physiological parameters and sex did not explain significant variance in disengaged victimization coping.

Regression Models Linking Coping with Anxiety at T1

Social Anxiety

Real-time, context-specific coping. As shown in Table 6, demographic variables explained a significant amount of variance in social anxiety, ΔR^2 = .05, F (2, 116) = 3.10, p < .05. Gender (female) was positively associated with social anxiety, β = .22, B = .36, SE = .15, p < .05, while race (minority), β = .01 B = .02, SE = .15, p = .88, was not significantly associated with social anxiety**.** Real-time, context-specific coping did not explain significant variance in social anxiety, ΔR^2 = .001, F (2, 114) = .03, p = .99. Neither real-time, context-specific, problem-directed coping, β = -.02, B = -.06, SE = .36, p = .86, nor real-time, context-specific, self-directed coping, β = .001, B = .003, SE = .43, p = .995, was significantly associated with social anxiety. The interactions between real-time, context-specific coping and sex did not explain significant variance in social anxiety.

Context-general coping. As shown in Table 7, demographic variables explained variance in social anxiety at the non-significant trend level, ΔR^2 = .04, F (2, 119) = 2.45, p < .10. Gender (female) was positively associated social anxiety, β = .19, B = .31, SE = .15, p < .05, while race (minority) was not associated with social anxiety, β = .05 B = .08, SE = .15, p = .57. Context-general coping explained significant variance in social anxiety, ΔR^2 = .19, F (2, 117) = 14.71, p < .001. Context-general, engaged coping was not significantly associated with social anxiety, β = -.07, B = -.14, SE = .18, p = .46, while context-general, disengaged coping, β = .48, B = .80, SE =

.16, $p < .001$, was significantly associated with social anxiety**.** The interactions between context-general coping and sex did not explain significant variance in social anxiety.

Victimization coping. As shown in Table 8, demographic variables explained variance in social anxiety at the non-significant trend level, $\Delta R^2 = .04$, F (2, 119) = 2.45, $p < .10$. Gender (female) was associated with social anxiety, $\beta = .19$, $B = .31$, $SE = .15$, $p < .05$, while race (minority), $\beta = .05$ $B = .08$, $SE = .15$, $p = .57$, was not associated with social anxiety**.** In addition, victimization coping explained variance in social anxiety at the non-significant rend level, $\Delta R^2 = .04$, F (2, 117) = 2.53, $p < .10$. However, neither engaged victimization coping, $\beta = .12$ $B = .22$, $SE = .18$, $p = .22$, nor disengaged victimization coping, $\beta = .15$, $B = .21$, $SE = .14$, $p = .12$, was significantly associated with social anxiety. As a set, the interactions between victimization coping and sex did not explain significant variance in social anxiety, $\Delta R^2 = .03$, F (2, 115) = 1.81, $p = .17$. The interaction between engaged victimization coping and sex was associated with social anxiety at the non-significant trend level, $\beta = -.53$ $B = -.65$, $SE = .35$, $p < .10$, while the interaction between disengaged victimization coping and sex, $\beta = .03$ $B = .04$, $SE = .28$, $p = .90$, was not associated with social anxiety. The association between engaged victimization coping and social anxiety was stronger for boys, ($r = .34$, $p < .01$), than girls, ($r = -.02$, $p = .86$).

Parent-Rated Anxiety

Real-time, context-specific coping. As shown in Table 6, demographic variables did not explain significant variance in parent-rated anxiety, $\Delta R^2 = .02$, F (2, 116) = .10, $p = .37$. Neither gender (female), $\beta = .13$, $B = .05$, $SE = .04$, $p = .18$, nor race (minority), $\beta = -.05$ $B = -.02$, $SE = .04$, $p = .59$, was associated with parent-rated anxiety**.** In addition, real-time, context-specific coping did not explain significant variance in parent-rated anxiety, $\Delta R^2 = .005$, F (2, 114) = .26,

p = .76. Neither context-specific, problem-directed coping, β = -.03, B = -.02, SE = .10, p = .82, nor context-specific, self-directed coping, β = -.09, B = -.08, SE = .12, p = .51, was significantly associated with parent rated-anxiety. The interactions between real-time, context-specific coping and sex did not explain significant variance in parent-rated anxiety.

Context-general coping. As shown in Table 7, demographic variables did not explain significant variance in parent-reported anxiety, ΔR^2 = .02, F (2, 119) = 1.18, p = .31. Neither gender (female), β = .13, B = .06, SE = .04, p = .15, nor race (minority), β = -.06 B = -.03, SE = .04, p = .53 were significantly associated with parent-reported anxiety. In addition, context-general coping did not explain significant variance in social anxiety, ΔR^2 = .02, F (2, 117) = 1.41, p = .25. Neither context-general, engaged coping, β = -.15, B = -.07, SE = .05, p = .18, nor context-general, disengaged coping, β = .17, B = .07, SE = .05, p = .13, was significantly associated with parent-reported anxiety. The interactions between context-general coping and sex did not explain significant variance in parent-rated anxiety.

Victimization coping. As shown in Table 8, demographic variables did not explain significant variance in parent-rated anxiety, ΔR^2 = .02, F (2, 119) = 1.18, p = .31. Neither gender (female), β = .13, B = .06, SE = .04, p = .15, nor race (minority), β = -.06 B = -.03, SE = .04, p = .53, was associated with parent-rated anxiety. In addition, victimization coping did not explain significant variance in parent-rated anxiety, ΔR^2 = .02, F (2, 117) = 1.02, p = .36. Neither engaged victimization coping, β = -.07 B = -.03, SE = .05, p = .48, nor disengaged victimization coping, β = -.10, B = -.04, SE = .04, p = .30, was significantly associated with parent-rated anxiety. The interactions between victimization coping and sex did not explain significant variance in parent rated anxiety.

Path Analyses Linking Physiological Reactivity and Coping at T1 with Anxiety at T2

Social Anxiety

Real-time, context-specific coping. Path analysis revealed that higher HRR was associated with higher real-time, context-specific, problem-directed coping (β = .22, B = .01, SE = .005, $p < .05$), which, in turn, predicted lower T2 social anxiety (β = -.36, B = -1.25, SE = .34, $p <.001$), controlling for T1 social anxiety. Neither HRR nor SCLR directly predicted T2 social anxiety (for HRR, β = .09, B = .02, SE = .02, p = .37; for SCLR, β = .001, B = .000, SE = .38, p = .99). In addition, consistent with regression analyses, SCLR was not associated with real-time coping or social anxiety, and HRR was not associated with real-time, context-specific, self-directed coping. Self-directed coping also did not predict T2 social anxiety. T1 social anxiety strongly predicted T2 social anxiety (β = .58, B = .74, SE = .12, $p < .001$). The full set of predictors accounted for 54% of the variance in T2 social anxiety.

Context-general coping. Path analysis revealed that higher HRR was associated with higher context-general engaged coping (β = .26, B = .02, SE = .008, $p < .05$), but context-general engaged coping did not predict T2 social anxiety. Neither HRR nor SCLR directly predicted T2 social anxiety (for HRR, β = .04, B = .008, SE = .02, p = .71; for SCLR, β = .03, B = .008, SE = .04, p = .83). In addition, consistent with regression analyses, SCLR was not associated with context-general disengaged or engaged coping, and HRR was not associated with context-general, disengaged coping. Context-general, disengaged coping also did not predict T2 social anxiety. T1 social anxiety strongly predicted T2 social anxiety (β = .61, B = .70, SE = .13, $p <$ .001). The full set of predictors accounted for 41% of the variance in T2 social anxiety.

Victimization coping. Path analysis revealed that higher HRR was associated with higher engaged victimization coping (β = .18, B = .02, SE = .008, p < .05), but engaged victimization coping did not predict T2 social anxiety. HRR was not associated with disengaged victimization coping. In addition, SCLR was associated with disengaged and engaged victimization coping (for disengaged, β = -.24, B = -.05, SE = .02, p < .05; for engaged, β = -.16, B = -.03, SE = .02, p < .10), but victimization coping did not predict T2 social anxiety. Neither HRR nor SCLR directly predicted T2 social anxiety (for HRR, β = .03, B = .001, SE = .005, p = .77; for SCLR, β = .004, B = .000, SE = .009, p = .97). Pre-transition social anxiety strongly predicted T2 social anxiety (β = .61, B = .63, SE = .11, p < .001). The full set of predictors accounted for 43% of the variance in T2 social anxiety.

Parent-Rated Anxiety.

Real-time, context-specific coping. Path analysis revealed that higher HRR was associated with higher real-time, context-specific, problem-directed coping (β = .22, B = .01, SE = .005, p < .05), which, in turn, predicted lower T2 parent-reported anxiety, controlling for T1 parent-reported anxiety (β = -.21, B = -.16, SE = .08, p <.05). Neither HRR nor SCLR directly predicted parent-reported anxiety (for HRR, β = .11, B = .005, SE = .005, p = .33; for SCLR, β = -.06, B = -.005, SE = .005, p = .33). In addition, consistent with regression analyses, SCLR was not associated with real-time coping or anxiety, and HRR was not associated with real-time, self-directed coping. Self-directed coping also did not predict T2 parent-reported anxiety. T1 parent-reported anxiety strongly predicted T2 parent-reported anxiety (β = .60, B = .64, SE = .11, p < .001). The full set of predictors accounted for 45% of the variance in T2 parent-reported anxiety.

Context-general coping. Path analysis revealed that higher HRR was associated with context-general engaged coping (β = .26, B = .02, SE = .008, $p < .05$), but context-general engaged coping did not predict T2 parent-reported anxiety. Neither HRR nor SCLR directly predicted T2 parent-reported anxiety (for HRR, β = .06, B = .003, SE = .005, p = .56; for SCLR, β = -.06, B = -.005, SE = .009, p = .58). In addition, consistent with regression analyses, SCLR was not associated with context-general coping or anxiety, and HRR was not associated with context-general disengaged coping. Context-general, disengaged coping also did not predict T2 parent-reported anxiety. T1 parent-reported anxiety strongly predicted T2 parent-reported anxiety (β = .62, B = .66, SE = .11, $p < .001$). The full set of predictors accounted for 43% of the variance in T2 parent-reported anxiety.

Victimization coping. Path analysis revealed that higher HRR was associated with higher engaged victimization coping (β = .16, B = .02, SE = .008, $p < .05$), but engaged victimization coping did not predict T2 parent-reported anxiety. Neither HRR nor SCLR directly predicted T2 parent-reported anxiety (for HRR, β = .03, B = .001, SE = .005, p = .77; for SCLR, β = .004, B = .000, SE = .009, p = .97). SCLR was negatively associated with disengaged and engaged victimization coping (for disengaged, β = -.24, B = -.05, SE = .02, $p < .05$; for engaged, β = -.16, B = -.03, SE = .02, $p < .10$), but victimization coping did not predict T2 anxiety. HRR was not associated with disengaged victimization coping. T1 parent-reported anxiety strongly predicted T2 parent-reported anxiety (β = .61, B = .63, SE = .11, $p < .001$). The full set of predictors accounted for 43% of the variance in parent-reported anxiety in middle school.

V. DISCUSSION

In preadolescence, biological (e.g., puberty), cognitive (e.g., social comparisons), school (e.g., middle school transition), and social (e.g., exclusive peer cliques) changes converge to produce increasing levels of peer stress. The present study examined whether involuntary physiological responses to peer stress experiences in preadolescence are associated with voluntary coping responses. To our knowledge, this is the first study to examine real-time physiological and coping responses to a salient peer stress experience during preadolescence. Preadolescents' physiological and coping responses before the transition to middle school were also examined as longitudinal predictors of anxiety across the transition to middle school. Hypotheses were tested with a moderately-sized sample and multiple indices of physiological responding, coping, and anxiety.

The first aim of this study was to investigate associations linking baseline and reactivity levels of physiological activity with real-time context-specific coping; context-general coping; and coping with peer victimization. Analyses consistently revealed that higher HRR was associated with higher levels of engaged coping responses to peer stress. SCLR was generally not associated with coping responses. The second and third aims of this study were to investigate associations linking measures of engaged and disengaged coping (real-time, context-specific coping; context-general coping; coping with peer victimization) with preadolescent and parent reports of preadolescent anxiety (T1) and to examine direct and indirect (via coping) pathways linking physiological responses at T1 with preadolescent anxiety and T2. Support emerged for a model in which HRR was associated with higher engaged coping responses to real-time peer stress experiences (peer evaluation and peer rebuff) which, in turn, predict lower levels of anxiety across the transition to middle school.

The following sections address: (1) associations linking physiological reactivity with coping, including a summary of results and conceptual explanations (2) associations linking physiological and coping responses with anxiety, including a summary results and conceptual explanations (3) a summary of sex and ethnic differences in physiological and coping responses, and (4) limitations and future directions for research.

Linking Physiological Reactivity with Coping

In the present study, higher HRR was associated with higher levels of (1) real-time, context-specific, problem-directed coping during the peer stress protocol (e.g., focused on the conversation, thought about things to say to the peer judges); (2) context-general engaged coping with peer stress (RSQ questionnaire; i.e., try to think of different ways to change the problem or fix the situation, do something to try to fix the problem or take action to change things); and (3) engaged coping with peer victimization (WBTH questionnaire; e.g., tell the kid to stop, make a plan with the kids to get along; the latter association emerged only in correlational analyses). The results are consistent with one prior study which reported that HR was positively correlated with secondary control coping (i.e., positive thinking) in a sample of children with recurrent abdominal pain (Dufton et al., 2010), but inconsistent with one study which reported that HRR was associated with disengagement coping in a sample of young adults (Connor-Smith & Compas, 2004). The age of participants or the assessment of coping may explain the differences between the studies. SCLR was associated with higher real-time, context-specific, self-directed coping with peer stress, but with lower disengaged coping (i.e., make believe nothing happened, tell yourself you don't care) with peer victimization. SCLR results should be interpreted with caution because they were inconsistent and associations did not reach the conventional level of significance (both were non-significant trends).

Very few prior studies have examined associations between psychophysiological responses and coping responses; thus, they are not well understood. Results of the present study suggest that higher physiological responding (e.g., increased heart rate) may promote active and engaged coping responses (at least in the current non-clinical sample), rather than diverting attention and prompting disengaged coping (i.e., counting to ten or pretending the situation did not happen) responses. These results may be understood according to Polyvagal Theory. Porges (2007) contends that the parasympathetic nervous system (PNS) serves as a "brake" (via the ventral vagal complex) that decelerates heart rate and fosters calmness, attentional focus, and social engagement under normal circumstances. Under threatening conditions, the vagal brake can be withdrawn, yielding an increase in arousal and metabolic output (e.g., increased heart rate) that allows individuals to engage with environmental demands and employ active (e.g., engaged) coping strategies in a regulated manner. Although extreme levels of vagal withdrawal may reflect anxiety and contribute to fight- or flight-responses, moderate vagal withdrawal and corresponding moderate elevations in heart rate may reflect awareness of environmental demands and provide the physiological resources necessary for an engaged response to stress. Indeed, research consistently indicates that higher baseline vagal tone (measured as higher RSA) and vagal withdrawal under stress (measured as reductions in RSA) are linked with positive social and psychological adjustment and protect children against maladjustment in the context of environmental risk (Beauchaine et al., 2001; El-Sheikh & Erath, 2011; Porges, 2007). In the present study, heart rate elevations (HRR) may reflect moderate vagal withdrawal, consistent with its prediction of engaged coping responses, such as focusing on a social interaction, problem-solving, positive reappraisal, seeking social support, and conflict resolution. Thus, one possibility is that mobilization of physiological resources (e.g., HRR) enables or facilitates

engaged cognitive and behavioral coping responses; an alternative interpretation is that HRR reflects (rather than supports) more engaged voluntary coping responses. That is, cognitive or behavioral engagement may produce an increase in heart rate. The cross-sectional design of the present study does not permit strong conclusions about directionality, and it is likely that involuntary physiological and voluntary coping responses are reciprocally related.

Polyvagal Theory also explains that the SNS is activated and promotes "fight-or-flight" responses under threatening circumstances, and SNS activation may particularly occur when the PNS mechanism for stress responding (vagal withdrawal) is insufficient or dysfunctional (Porges, 2007). Consistent with this theoretical model, it was anticipated that higher SCLR to peer stress experiences would be associated with disengaged coping responses (e.g., avoidance, distraction or denial). However, SCLR was inconsistently and weakly associated with coping responses in the present study, including higher levels of self-directed (disengaged) coping with real-time peer stress and lower levels of disengaged coping with peer victimization. Thus, little support emerged for a direct, linear association between SCLR and coping responses.

For the most part, hypotheses of the present study were based on conceptual models that focused on the emotional messages and cognitive consequences of physiological arousal. Emotional reasoning models propose that emotional and physiological arousal serve the functions of attaching meaning to situations (e.g., appraisals of threat) and motivating responses that sustain favorable conditions or reduce unfavorable conditions (e.g., avoidance of threat; Beck, Emery, & Greenberg, 1985; Muris, Mayer, & Bervoets, 2010). Emotional reasoning is generally adaptive, but becomes maladaptive when it diverts problem-focused attention or triggers disengaged-avoidant responses in situations that are controllable and developmentally important (e.g., social interactions). Indeed, cognitive interference models suggest that

physiological arousal may be interpreted as an internal cue of threat that is distracting (disengagement) and that prompts avoidance to provide emotional relief (disengagement; Rapee & Heimberg, 1997; Vasey and Daleiden, 1996). However, these cognitive interference models were developed based on research with clinically anxious individuals, and results of the present study suggest that the same model may not apply to a relatively normal, school-based sample of preadolescents.

Linking Physiological and Coping Responses with Anxiety

Prior theorizing and research suggest that coping strategies may mediate the association between stress experiences and psychological adjustment (Sontag et al., 2008). In particular, developmental models contend that disengaged responses to peer problems, such as withdrawal and avoidance, are negatively reinforced due to the emotional relief associated with avoidance. Persistent disengagement or avoidance, in turn, may lead to negative social experiences due to insufficient development of social-interaction skills and the non-normative appearance of social withdrawal in preadolescence. Social avoidance and peer maltreatment diminish preadolescents' perceived control in social situations and produce distress that may ultimately lead to significant anxiety (Rubin & Burgess, 2001). Empirical research is generally consistent with this model (Compas et al., 2001; Skinner & Zimmer-Gembeck, 2007), although research on coping with peer stress specifically is comparatively underdeveloped. Relevant studies generally suggest that engaged coping with peer stress is linked with positive peer adjustment and fewer internalizing problems (and that disengaged coping with peer stress is linked with negative peer adjustment and more internalizing problems; Jaser et al., 2007; Kochenderfer-Ladd, 2004; Kochenderfer-Ladd & Skinner, 2002; Reijntnes et al., 2006b; Sontag et al., 2008), but much of this research is limited by measures of coping with non-specific social stress, single informants of coping and

adjustment, or cross-sectional analyses.

In the present study, the hypotheses that engaged coping with peer stress would predict decreased anxiety (and that disengaged coping would predict increased anxiety) were partially supported. Specifically, context-general, disengaged coping (i.e., try not to feel anything, when I'm around other people I act like the problems never happened) was concurrently associated with higher social anxiety. Most importantly, some support emerged for a developmental model of anxiety in which HRR was associated with real-time, context-specific, problem-directed coping which, in turn, predicted both lower preadolescent-reported social anxiety and lower parent-reported anxiety at T2, controlling for respective anxiety levels at T1. Thus, HRR may reflect or promote active engagement with peer stress, and active engagement (e.g., problem-solving, conflict resolution, seeking social support, positive cognitive appraisals) with developmentally normative peer stress experiences may yield positive social experiences that limit subsequent anxiety or prevent negative social experiences that exacerbate the development of anxiety in preadolescence.

It is worth noting that real-time assessment of coping during lab-based simulations of peer evaluation and peer rebuff was the most successful coping measure. Only the real-time, context-specific assessment of (engaged) coping predicted change (decrease) in anxiety across the transition to middle school. Although associations linking physiological reactivity and anxiety with coping were only slightly more consistently supported with real-time, context-specific measures of coping (compared to context-general coping and questionnaire-based coping with peer victimization), results of the present study suggest that ecologically-relevant assessments of coping should be further investigated and may yield more robust and reliable associations with the predictors and outcomes of coping.

Sex and Ethnic Differences

Girls reported more real-time, context-specific, problem-direct coping; context-general engaged coping; engaged victimization coping; context-general disengaged coping; disengaged victimization coping; and higher HRR to peer stress than boys. Boys reported more real-time, context-specific, self-directed coping than girls. Additionally, girls reported more social anxiety than boys. Thus, girls report more social anxiety and more overall coping strategies than boys, which is generally consistent with prior research (La Greca & Lopez, 1998; Rose & Rudolph, 2006). Some ethnic differences also emerged. Caucasian preadolescents reported more real-time, context-specific, self-directed coping; context-general disengaged coping; and disengaged victimization coping than minorities.

Interactions between sex and both physiological and coping responses were also examined. The association between SCLR and context-general engaged coping was stronger for girls than boys, while the association between HRR and context-general disengaged coping was positive (though non-significant) for boys but negative (though non-significant) for girls. Additionally, the association between engaged victimization coping and social anxiety was stronger for boys than girls. Thus, clear and consistent patterns of sex differences in associations linking physiological reactivity and coping with anxiety were not evident.

Limitations and Future Directions

It is important to note that associations among physiological reactivity, coping responses, and anxiety were generally modest to moderate in magnitude. Thus, although results of the present study suggest that involuntary physiological responses (HRR specifically) may contribute to voluntary coping responses, these results do not suggest that physiological responses are the primary determinants of coping responses. Furthermore, some hypotheses were

not supported. For example, baseline physiological parameters (e.g., HR and SCL) were not associated with coping or anxiety measures. Baseline levels of physiological parameters may not be relevant to coping (voluntary responses to stress) because they do not reflect responses to stress. It is also notable that baseline physiological parameters in the present study may not represent true baseline levels, as preadolescents may have experienced anticipatory stress about the peer stress protocol, which was described upon arrival at the lab (during the assent process). In addition, physiological parameters were generally not associated with disengaged coping, and disengaged coping did not predict increased anxiety. As noted, the cognitive interference model (upon which these hypotheses were built) may be more relevant to clinically anxious children with extremely high levels of physiological arousal (Morris, 2001). It is also possible that levels of engaged coping strategies are more important in the development of (subclinical) anxiety, compared to levels of disengaged coping strategies (analyses tested the effects of engaged and disengaged coping strategies independent of one another).

The present study was also limited by a relatively small sample size, particularly for longitudinal analyses. Future research should replicate this study with a larger sample. As noted, results with the normative, school-based sample may not generalize to higher-risk or clinically anxious preadolescents. It would be informative to examine the current hypotheses with a clinically anxious sample. Another limitation was the low inter-item reliability of the engaged subscale of WBTH (Kochenderfer-Ladd, 2004), which may contribute to the general lack of hypothesized associations with the WBTH. Finally, the present study included HR and SCL as indices of physiological responding, but not other measures, such as RSA. Given its relevance to our explanation for HRR results in the present study, future studies should include RSA as a predictor of coping responses.

Despite these limitations, the present study includes several innovations, including assessment of physiological reactivity to ecologically-relevant peer stress situations in preadolescence; measures of real-time, context specific coping and general coping; and analyses that crossed the transition to middle school and predicted both preadolescent- and parent-reported anxiety. Results consistently indicated that HRR is associated with higher levels of engaged coping with peer stress, and suggested that engaged coping with peer stress may protect against the development of anxiety in preadolescence. Results may have implications for intervention, pending replication with a higher-risk sample. For example, interventions often encourage children to employ disengaged coping strategies (e.g., relax, think about something else) when they experience stress and physiological arousal (e.g., racing heart). The present study suggests that heart rate elevation, instead, may be reinterpreted as a useful signal from the body that promotes problem-solving. Results of the present study also suggest that physiological under-responsiveness to stress may contribute to the coping difficulties of some children.

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APPENDICES

Appendix A

Measures

Self-reported Social Anxiety (La Greca & Lopez, 1998)

My Worries

Read each of the following sentences carefully and circle the number that best describes how you feel.

	Not at all	Hardly ever	Some-times	Most of the time	All the time
1. I worry about doing something new in front of others.	0	1	2	3	4
2. I worry about being teased.	0	1	2	3	4
3. I feel shy around people I don't know.	0	1	2	3	4
4. I only talk to people I know really well.	0	1	2	3	4
5. I feel that peers talk about me behind my back.	0	1	2	3	4
6. I worry about what others think of me.	0	1	2	3	4
7. I'm afraid that others will not like me.	0	1	2	3	4
8. I get nervous when I talk to peers I don't know very well.	0	1	2	3	4
9. I worry about what others say about me.	0	1	2	3	4
10. I get nervous when I meet new people.	0	1	2	3	4
11. I worry that others don't like me.	0	1	2	3	4
12. I am quiet when I'm with a group of people.	0	1	2	3	4
13. I feel that others make fun of me.	0	1	2	3	4
14. If I get into an argument, I worry that the other person will not like me.	0	1	2	3	4
15. I'm afraid to invite others to do things with me because they might say no.	0	1	2	3	4
16. I feel nervous when I'm around certain people.	0	1	2	3	4
17. I feel shy even with peers I know very well.	0	1	2	3	4
18. It's hard for me to ask others to do things with me.	0	1	2	3	4

Open Ended Coping Questions

(1) **First of all, how do you think the conversation went?** (Give a relatively neutral response—not a response that strongly reinforces the participant's positive or negative impressions.)

(2) Having a conversation with someone you don't know, while being judged by peers, can be challenging—how did you cope with this situation?

DOES NOT UNDERSTAND "COPE": Say, "Most kids feel at least a little bit nervous when they talk to people they don't know or when they're judged by their peers—some feel just a little nervous and others feel pretty nervous. If you felt nervous or uncomfortable at all, how did you deal with it to make yourself feel better, or what did you do so that you could get through the task?" *Then skip #3 below.*

INVOLUNTARY UPSET RESPONSE: If the participant gives an involuntary response (e.g., I felt somewhat nervous), then repeat the involuntary response and question (e.g., You said that you "felt somewhat nervous"—how did you deal with that).

NO ANXIETY OR NOT DIFFICULT: If the participant reports that he/she did not feel anxious or did not find the task challenging, then refer back to the pre-activity questions or the initial post-activity question and ask the coping question again. You mentioned that you (thought it was/would be difficult and/or felt anxious) . . . how did you deal with that?

VAGUE RESPONSES: When the response is not a clear coping strategy, follow-up by repeating what the participant said and asking for more information (e.g., You said that you "just let it go." Can you tell me more about what you mean by that?).

REFERENCE TO SIMILAR SITUATION: If the participant refers to a time when they were in a similar situation, and responded in a certain way or were told to respond in a certain way by someone else (e.g., parent), say, "Is that what you did in this situation?"

(3) Did you use any other coping strategies to make yourself feel better or to help you get through the conversation task? *Then skip #4 below.*

(4) Did you use any other coping strategies?

Rebuff Coping

(1) Not being chosen by peers can be challenging—how did you cope with this situation?

DOES NOT UNDERSTAND COPE OR NOT CHALLENGED/ANXIOUS. Say, most teens feel at least a little bit upset—like, a little bothered or disappointed or mad, if other teens don't choose them—some feel just a little upset and others feel pretty upset. If you felt upset at all when you weren't chosen, how did you deal with it to make yourself feel better, or what did you do so that you could plan your response to the peer judges? *Then skip question #2 below because you just asked it.*

INVOLUNTARY UPSET RESPONSE: If the participant gives an involuntary response (e.g., I felt somewhat nervous), then repeat the involuntary response and question (e.g., You said that you "felt somewhat nervous"—how did you deal with that).

VAGUE RESPONSES: When the response is not a clear coping strategy, follow-up by repeating what the participant said and asking for more information (e.g., You said that you "just let it go." Can you tell me more about what you mean by that?).

REFERENCE TO SIMILAR SITUATION: If the participant refers to a time when they were in a similar situation, and responded in a certain way or were told to respond in a certain way by someone else (e.g., parent), say, "Is that what you did in this situation?"

(2) Did you use any other coping strategies to make yourself feel better or to help you plan your response to the peer judges? *Then skip #3 below.*

(3) Did you use any other copings strategies?

NSF Peer Stress Study Coping Codes

Problem/Task-Focused (PF)-problem directed

PF coping strategies are voluntary attempts to influence the problem or situation. PF strategies include efforts to plan or participate in the conversation or response to the peer judges (e.g., thought about what to say), as well as efforts to make an impression on the conversation partner or peer judges (e.g., reminded myself to smile).

Examples:

(for conversation) "I thought about things to talk about." (may give specific examples of what they talked about or asked) "Just tried to be myself." "Just did what I was supposed to do." "I did/tried my best."

(for rebuff) "I thought about what I would say to the peer judges" "I thought about what to say to them or ask them" "I'd talk to them about why I wasn't chosen" "I'd try to persuade them"

Emotion/Self-Focused (EF)-self directed

EF coping strategies are voluntary attempts to influence one's emotional state in the context of the problem or situation. EF coping strategies are directed toward the self rather than the problem or situation (but do not purposefully deny or distract from the situation; see disengagement coping below). EF strategies typically involve relaxation strategies (e.g., take a deep breath).

Examples: (for conversation and rebuff) "I just calmed myself down."(can follow-up to get specifics about how). "Relaxed" "Took deep breaths" "Counted"

Positive Appraisals—Self (PASelf)-problem directed

PAself coping strategies involve non-threatening or positive appraisals (thoughts) about the self, including the self in the situation (e.g., told myself I can do this, I did my best, told myself that I did well). They are different from PASituation strategies, which are focused on the situation (see below).

Examples: (for conversation and rebuff) "told myself I can do this," "told myself that I did well," "I did my best," "thought that I have interesting things to say" *"**felt/thought** I did/tried my best."*

Positive Appraisals—Situation (PASituation)-problem directed

PA coping strategies are voluntary attempts to appraise or interpret the problem or situation in a positive or non-threatening manner. PA strategies differ from PF strategies because they regard one's thinking about the situation but do not involve an attempt to influence the situation itself. PA strategies differ from EF strategies because PA strategies regard one's

thinking about the situation rather than more direct attempts to regulate emotions. PA strategies typically involve non-threatening appraisals (e.g., thought that it's no big deal or fun, imagined that you were a nice person, thought that the peer judges would be interested in what I planned to say) or acceptance of the situation (as it actually is) (e.g., figured that you can't win all the time).

Examples:

(for conversation) "I thought of you as a friend" "Just think of you as a regular person" "It's not like the people watching know me" "I thought it was fun"

(for rebuff) "It's their decision, just their opinion" "Maybe the other participants were better in the conversation, but it's okay with me" "It's ok" "I tell myself that it's fine"

Disengagement (DE)-self directed

DE strategies are voluntary actions or thoughts that specifically direct effort or attention away from the problem or situation. DE strategies typically involve avoidance (e.g., didn't talk, didn't think about the peer judges, didn't think about it, looked away), distraction (e.g., thought about something other than the situation), or denial (e.g., pretended like the peer judges were not watching, pretended like this wasn't real). DE strategies also involve attempts to terminate motor responses (e.g., tried to stop fidgeting).

Examples:

(for conversation) "Didn't think about the peer judges" "Pretended the peer judges weren't watching me" "Pretend like I'm somewhere else"

(for rebuff) "Just thought of other things, like my friends and family" (something not related to the task—but follow-up- to make sure it's not a topic they want to talk about with the peer judges) "I blocked it out of my mind (not being chosen)" "Just left it alone, didn't think about it (not being chosen)"

Motor (M)-self directed

M strategies include any physical/motor fidgeting, which is generally involuntary.

Notes: Code identifiable coping responses in the order they appear. Use participants' broader response as context when necessary. Involuntary responses (e.g., I was nervous) and non-responses (e.g., I didn't feel nervous or cope, forgot to cope) should not be coded. Use each code no more than once for each task.

Negative Appraisals (NA)- self-directed

Negative appraisals involve negative (e.g., self-deprecating) thoughts that are not accompanied by any more positive (e.g., non-threatening) thoughts or coping strategies. Code NA if the appraisal is nothing but negative and not constructive (e.g., just kept thinking about how I wasn't chosen). If there is a constructive element, such as (e.g., think about WHY I wasn't chosen), then the response is more like a PF. And, if the appraisal/interpretation of the self or situation leans positive, then it's a positive-self or positive-situation. If it's a completely neutral appraisal (e.g., I thought about how I did some things poorly and some things well), ere on the positive side (PA).

Examples:

(for rebuff) "I thought that I didn't do well in the activity," "I thought about how they didn't pick me."

Parent-reported Child Behavior Checklist (Achenbach, 1991)

Child Behavior Checklist

Below is a list of items that describe children and youths. For each item that describes your child **now or within the past 6 months**, please circle the appropriate number. Please answer all items as well as you can, even if some do not seem to apply to your child.

	Not true (as far as you know)	Somewhat or Sometimes true	Very true or Often true
1. Acts too young for his/her age	0	1	2
2. Drinks alcohol without parents' approval	0	1	2
3. Argues a lot	0	1	2
4. Fails to finish things he/she starts	0	1	2
5. There is very little he/she enjoys	0	1	2
6. Can't concentrate, can't pay attention for long	0	1	2
7. Can't sit still, restless, or hyperactive	0	1	2
8. Confused or seems to be in a fog	0	1	2
9. Cries a lot	0	1	2
10. Cruelty, bullying, or meanness to others	0	1	2
11. Daydreams or gets lost in his/her thoughts	0	1	2
12. Demands a lot of attention	0	1	2
13. Destroys his/her own things	0	1	2
14. Destroys things belonging to his/her family or others	0	1	2
15. Disobedient at home	0	1	2
16. Disobedient at school	0	1	2
17. Doesn't seem to feel guilty after misbehaving	0	1	2
18. Breaks rules at home, school, or elsewhere	0	1	2
19. Fears certain animals, situations, or places other than school	0	1	2
20. Fears going to school	0	1	2
21. Fears he/she might think or do something bad	0	1	2
22. Feels he/she has to be perfect	0	1	2
23. Feels or complains that no one loves him/her	0	1	2
24. Feels worthless or inferior	0	1	2
25. Gets in many fights	0	1	2
26. Hangs around with others who get in trouble	0	1	2
27. Impulsive or acts without thinking	0	1	2
28. Would rather be alone than with others	0	1	2
29. Lying or cheating	0	1	2
30. Nervous, highstrung, or tense	0	1	2
31. Nightmares	0	1	2
32. Constipated, doesn't move bowels	0	1	2
33. Too fearful or anxious	0	1	2
34. Feels dizzy or lightheaded	0	1	2
35. Feels too guilty	0	1	2
36. Overtired without good reason	0	1	2

	Not true (as far as you know)	Somewhat or Sometimes true	Very true or Often true
37. Physical problems without known medical cause:			
a. Aches or pains (not stomach or headaches)	0	1	2
b. Headaches	0	1	2
c. Nausea, feels sick	0	1	2
d. Problems with eyes (not if corrected by glasses)	0	1	2
e. Rashes or other skin problems	0	1	2
f. Stomachaches	0	1	2
g. Vomiting, throwing up	0	1	2
38. Physically attacks people	0	1	2
39. Poor school work	0	1	2
40. Prefers being with older kids	0	1	2
41. Refuses to talk	0	1	2
42. Runs away from home	0	1	2
43. Screams a lot	0	1	2
44. Secretive, keeps things to self	0	1	2
45. Self-conscious or easily embarrassed	0	1	2
46. Sets fires	0	1	2
47. Sexual problems	0	1	2
48. Too shy or timid	0	1	2
49. Inattentive or easily distracted	0	1	2
50. Stares blankly	0	1	2
51. Steals at home	0	1	2
52. Steals outside the home	0	1	2
53. Stubborn, sullen, or irritable	0	1	2
54. Sudden changes in mood or feelings	0	1	2
55. Sulks a lot	0	1	2
56. Suspicious	0	1	2
57. Swearing or obscene language	0	1	2
58. Talks about killing self	0	1	2
59. Teases a lot	0	1	2
60. Temper tantrums or hot temper	0	1	2
61. Thinks about sex too much	0	1	2
62. Threatens people	0	1	2
63. Smokes, chews, or sniffs tobacco	0	1	2
64. Truancy, skips school	0	1	2
65. Underactive, slow moving, or lacks energy	0	1	2
66. Unhappy, sad, or depressed	0	1	2
67. Unusually loud	0	1	2
68. Uses drugs for nonmedical purposes (don't include alcohol or tobacco)	0	1	2
69. Vandalism	0	1	2
70. Withdrawn, doesn't get involved with others	0	1	2
71. Worries	0	1	2

Response to stress in adolescents, (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000).

Responses to Stress Questionnaire

Even when things are going well for teenagers, almost everyone still has some tough times getting along with other people.

So that we can find out how things have been going for you lately, please put a check mark by all the things on this list that have been a problem for you since the start of the school year.

Being around kids who are rude	☐	Fighting with other kids	☐
Not having as many friends as you want	☐	Having problems with a friend	☐
Having someone stop being your friend	☐	Being left out or rejected	☐
Being teased or hassled by other kids	☐	Asking someone out and being turned down	☐
Feeling pressured to do something	☐		

Circle the number that shows how stressful, or how much of a hassle these problems were for you.

1	2	3	4
Not at all	A little	Somewhat	Very

This is a list of things that people sometimes do, think or feel when something stressful happens. Everybody deals with problems in their own way—some people do a lot of the things on this list or have a bunch of feelings, other people just do or think a few things.

Think of the situations you just checked off. For each item on the list below, circle **one** number from 1 (not at all) to 4 (a lot) that shows **how much** you do or feel these things when you have problems with other kids like the ones you just checked off. Please let us know about everything you do, think, and feel, even if you don't think it helps make things better.

How much do you do this?	Not at all	A little	Some	A lot
1. I try not to feel anything.	1	2	3	4
2. When I have problems with other kids I feel sick to my stomach or get headaches.	1	2	3	4
3. I try to think of different ways to change the problem or fix the situation.	**1**	**2**	**3**	**4**

Write one plan you thought of:

_____

_____

_____

How much do you do this?

	Not at all	A little	Some	A lot
4. When problems with other kids happen, I don't feel anything at all, it's like I have no feelings.	1	2	3	4
5. I wish that I were stronger, smarter, or more popular so that things would be different.	1	2	3	4
6. **I keep remembering** what happened with the other kids or **can't stop thinking** about what might happen.	1	2	3	4
7. I let someone or something know how I feel. (Circle a number)	**1**	**2**	**3**	**4**

Check all that you have talked to:

Parent ☐ Friend ☐ Brother/Sister ☐ Pet ☐

Teacher ☐ God ☐ Stuffed Animal ☐ None of these ☐

8. I decide I'm okay the way I am, even though I'm not perfect.	1	2	3	4
9. When I'm around other people I act like the problems never happened.	1	2	3	4
10. I just have to get away when I have problems with other kids, I can't stop myself.	1	2	3	4
11. I deal with the problem by wishing it would just go away, that everything would work itself out.	1	2	3	4
12. I get really jumpy when I'm having problems getting along with other kids.	1	2	3	4
13. I realize that I just have to live with things the way they are.	1	2	3	4
14. When I have problems with other kids, I just **can't** be near anything that reminds me of the situation.	1	2	3	4
15. I **try** not to think about it, to forget all about it.	1	2	3	4

16. When problems with other kids come up I really don't know what I feel.	1	2	3	4
17. I ask other people for help or for ideas about how to make the problem better.	1	2	3	4

	How much do you do this?			
	Not at all	A little	Some	A lot
18. When I'm having problems getting along with other kids, I can't stop thinking about them when I try to sleep, or I have bad dreams about them.	1	2	3	4
19. I tell myself that I can get through this, or that I'll do better next time.	1	2	3	4
20. I let my feelings out. (Remember to circle a number)	**1**	**2**	**3**	**4**

I do this by: (Check all that apply)

Writing in my journal/diary	☐	Drawing/painting	☐
Complaining to let off steam	☐	Being sarcastic/making fun	☐
Listening to music	☐	Punching a pillow	☐
Exercising	☐	Yelling	☐
Crying	☐	None of these	☐

21. I get help from other people when I'm trying to figure out how to deal with my feelings. (Remember to circle a number)	**1**	**2**	**3**	**4**

Check all that you went to:

Parent	☐	Friend	☐	Brother/Sister	☐	Pet	☐
Teacher	☐	God	☐	Stuffed anim...	☐	None of these	☐

22. I **just can't** get myself to face the person I'm having problems with or the situation.	1	2	3	4
23. I wish that someone would just come and get me out of the mess.	1	2	3	4
24. I do something to try to fix the problem or take action to change things.	**1**	**2**	**3**	**4**

Write one thing you did:

25. Thoughts about the problems with other kids just pop into my head.	1	2	3	4

	How much do you do this?			
	Not at all	A little	Some	A lot
26. When I have problems with other kids, I feel it in my body.	**1**	**2**	**3**	**4**

Check all that happen:

My heart races ☐ My breathing speeds up ☐

I feel hot or sweaty ☐ My muscles get tight ☐

None of these ☐

****Before you keep working, remember what kinds of problems with other kids you told us about. Remember to answer these questions thinking about those problems.**

	How much do you do this?			
	Not at all	A little	Some	A lot
27. I try to stay away from people and things that make me feel upset or remind me of the problem	1	2	3	4
28. I don't feel like myself when I have problems with other kids, it's like I'm far away from everything.	1	2	3	4
29. I just take things as they are, I go with the flow.	1	2	3	4
30. I think about happy things to take my mind off the problem or how I'm feeling.	1	2	3	4
31. When problems with other kids come up, I can't stop thinking about how I am feeling.	1	2	3	4
32. I get sympathy, understanding, or support from someone. (Remember to circle a number)	**1**	**2**	**3**	**4**

Check all you went to:

Parent ☐ Friend ☐ Brother/siste ☐

Teacher ☐ None of these ☐

33. When problems with other kids happen, I can't always control what I do. (Remember to circle a number) **1** **2** **3** **4**

Check all that happen:

I can't stop eating ☐ I can't stop talking ☐

I do dangerous things ☐ I have to keep fixing/checking things ☐ None of these ☐

	How much do you do this?			
	Not at all	A little	Some	A lot
34. I tell myself that things could be worse.	1	2	3	4
35. My mind just goes blank when I have problems with other kids, I can't think at all.	1	2	3	4
36. I tell myself that it doesn't matter, that it isn't a big deal.	1	2	3	4
37. When I have problems with other kids right away I feel really: (**Check all that apply**; remember to circle a number, too)	**1**	**2**	**3**	**4**
38. It's really hard for me to concentrate or pay attention when I have problems with other kids.	1	2	3	4
39. I think about the things I'm learning from the situation, or something good that will come from it.	1	2	3	4
40. When I have problems with other kids I **can't stop** thinking about what I **did or said.**	1	2	3	4
41. When something goes wrong with other kids, I say to myself, "This isn't real."	1	2	3	4
42. When I'm having problems with other kids I end up just lying around or sleeping a lot.	1	2	3	4

Angry ☐ Sad ☐ Scared ☐

Worried/anxious ☐ None of these ☐

43. I keep my mind off problems with other kids by: (Remember to circle a number) **1** **2** **3** **4**

Check all that you do:

Exercising ☐ Seeing Friends ☐ Watching TV ☐

Playing video games ☐ Doing a hobby ☐ None of these ☐

44. When problems with other kids come up, I get upset by things that don't usually bother me.	1	2	3	4
45. I do something to calm myself down when I'm having problems with other kids. (Remember to circle a number).	**1**	**2**	**3**	**4**

Check all that you do:

Take deep breaths ☐ Pray ☐ Walk ☐

Listen to music ☐ Take a break ☐ Meditate ☐ None of these ☐

	How much do you do this? Not at all	A little	Some	A lot
46. I just freeze when I have a problem with other kids, I **can't** do anything.	1	2	3	4
47. When I'm having a problem with other kids, sometimes I act without thinking.	1	2	3	4
48. I keep my feelings under control when I have to, then let them out when they won't make things worse.	1	2	3	4
49. When problems with other kids happen I can't seem to get around to doing things I'm supposed to do.	1	2	3	4
50. I tell myself that everything will be all right.	1	2	3	4
51. When I have problems with other kids, **I can't stop** thinking about why they happen to me.	1	2	3	4
52. I think of ways to laugh about it so that it won't seem so bad.	1	2	3	4
53. My thoughts start racing when I'm having a tough time with other kids.	1	2	3	4
54. I imagine something really fun or exciting happening in my life.	1	2	3	4
55. When a rough situation with other kids happen, I can get so upset that I can't remember what happened or what I did.	1	2	3	4
56. I try to believe it never happened	1	2	3	4
57. When I have problems with other kids, sometimes I can't control what I do or say.	1	2	3	4

When Bad Things Happen at School (Kochenderfer-Ladd, 2004)

Things that Happen in School

Occasionally bad things happen to kids when they're in school. Below are some examples of bad things that sometimes happen to kids. We want you to think about what you might think or feel if these things happened to you.

(1) A kid was just standing in a cafeteria line waiting to get his/her lunch, and the kid behind him/her started calling him/her names.

(2) A kid was playing alone outside and another kid went over to where he/she was playing, pushed him/her down, and started kicking him/her.

Now we would like for you to imagine that one of these bad things happened to you earlier today. Can you imagine any of those things happening to you**? Yes _____ No_____**

Please answer the following questions about what you might do if someone were picking on you—and how you would feel. Remember there are no right or wrong answers.

		How much would you feel the following:		
		Not at all	Kind of	Very
1	Angry	1	2	3
2	Scared	1	2	3
3	Embarrassed	1	2	3
4	Upset	1	2	3
5	Feel like crying	1	2	3

Think about what you would do if you had just experienced a situation like the ones you just read about (last page). Please answer the following questions about what you might do.

		No, would not do that	Maybe do that	Definitely do that
6	Tell yourself it didn't matter.	0	1	2
7	Think about getting even with the kid.	0	1	2
8	Get help or advice from a teacher.	0	1	2
9	Tell the kid to stop.	0	1	2

10	Make believe nothing happened.	0	1	2
11	Imagine something bad happening to the kid.	0	1	2
12	Tell yourself it was no big deal.	0	1	2
13	Try to forget it ever happened.	0	1	2
14	Give the kid an “I” message.	0	1	2
15	Talk to someone about how it made you feel.	0	1	2
16	Ask a friend to help you get back at the kids.	0	1	2
17	Tell the teacher what happened.	0	1	2
18	Take some time to cool off before responding.	0	1	2
19	Get help or advice from a friend.	0	1	2
20	Tell yourself that you don’t care.	0	1	2
21	Want to hurt the kid in some way.	0	1	2
22	Make a plan with the kid to get along.	0	1	2
23	Get help or advice from a family member.	0	1	2

Appendix B
Tables

Table 1.

Descriptive Statistics for All Study Variables

	N	Minimum	Maximum	*M*	*SD*
HR Baseline	122	54.94	125.43	83.12	12.36
SCL Reactivity	107	-4.67	8.25	0.00	2.74
HR Reactivity	119	-11.92	17.27	0.00	5.01
SCL Baseline	110	1.05	16.86	6.27	4.07
Context-General Disengage Total (RSQ)	122	1.08	3.42	2.31	.49
Context-General Engage Total (RSQ)	122	1.22	3.67	2.62	.43
Context-Specific, Self Directed Coping	220	.00	1.00	.17	.25
Context-Specific, Problem Directed Coping	119	.00	1.00	.74	.30
Disengaged Victimization Coping (WBTH)	122	.00	2.00	.65	.56
Engaged Victimization Coping (WBTH)	122	.00	2.00	1.02	.44
Social Anxiety	122	1.00	4.61	2.38	.81
Parent-Rated Anxiety	123	.00	.92	.23	.21

Note: HR is heart rate, SCL is skin conductance level

Table 2.

Correlations for all Study Variables

(*N*=123)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	_														
2. Female	-.24**	_													
3. Minority	-.33**	.06	_												
4. Parent Anxiety	-.04	.13	-.05	_											
5. Social Anxiety	-.10	.19*	.06	.21*	_										
6. RSQ Engage	-.03	.25**	.002	-.03	.21*	_									
7. RSQ Disengage	-.25**	.16	.16	.10	.46**	.52**	_								
8. WBTH Engage	-.15	.30**	.13	-.05	.20*	.50**	.36**	_							
9. WBTH Disengage	-.16	.15	.20*	-.10	.20*	.35**	.47**	.27**	_						
10. Live Problem Directed	-.11	.20*	-.06	.06	.02	.27**	.19*	.22*	.04	_					
11. Live Self Directed	.12	-.18	.16	-.09	-.02	-.12	-.09	-.10	.003	-.72	_				
12. SCL Baseline	.17	-.08	-.28**	-.06	-.09	-.01	-.03	.01	.08	.11	-.12	_			
13. HR Baseline	-.12	.17	-.03	.19*	.02	-.01	.08	.06	-.01	-.02	.04	.18	_		
14. SCL Reactivity	.05	-.16	-.31**	-.06	-.05	.05	-.12	-.16	-.23*	-.04	.14	.000	-.14	_	
15. HR Reactivity	.08	.25**	-.08	.11	-.04	.26**	.04	.18^{+}	.07	.22*	-.14	.06	.000	-.03	_

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

Note:Parent Anxiety = parent rated anxiety
RSQ Engage = context-general engaged coping
RSQ Disengage = context-general disengaged coping
WBTH Engage = engaged victimization coping
WBTH Disengage = disengaged victimization coping
Live Problem Directed = real-time, context-specific, problem-directed coping
Live Self Directed = real-time, context-specific, self-directed coping

Table 3.

Linking Physiological Reactivity with Real-Time, Context-Specific Coping

	Real-Time, Context-Specific, Problem-Directed Coping				Real-Time, Context-Specific, Self-Directed Coping			
Predictors	*β*	*B*	*SE*	ΔR^2	*β*	*B*	*SE*	ΔR^2
Step 1: Controls				$.05^{+}$				$.06^{*}$
Sex	$.20^{*}$	.12	.06		$-.20^{*}$	-.10	.05	
Race	-.12	-.07	.06		$.17^{+}$	.09	.05	
Step 2: Predictors				.04				.03
HRR	$.20^{*}$	.01	.006		-.09	.-.004	.005	
SCLR	-.03	-.004	.01		$.17^{+}$	.02	.01	
Step 3: 2 way interactions				.01				.01
Sex x HRR	.02	.001	.01		.05	.004	.01	
Sex x SCLR	.14	.02	.02		-.16	-.02	.02	

$^{+}p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Note: HRR = heart rate reactivity, SCLR = skin conductance level reactivity

Table 4.

Linking Physiological Reactivity with Context-General Coping

	Context-General Engaged Coping				Context-General Disengaged Coping			
Predictors	*β*	*B*	*SE*	ΔR^2	*β*	*B*	*SE*	ΔR^2
Step 1: Controls				$.07^{*}$				$.05^{+}$
Sex	$.27^{**}$	.22	.08		$.16^{+}$	-.16	.10	
Race	-.03	-.03	.08		.14	.14	.10	
Step 2: Predictors				$.05^{+}$				.002
HRR	$.21^{*}$	.02	.01		.007	.001	.01	
SCLR	.10	.02	.02		-.05	-.009	.02	
Step 3: 2 way interactions				$.06^{*}$				.04
Sex x HRR	.22	.02	.02		$-.28^{+}$	-.04	.02	
Sex x SCLR	$.30^{*}$	.06	.03		.13	.03	.04	

$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Note: HRR = heart rate reactivity, SCLR = skin conductance level reactivity

Table 5.

Linking Physiological Reactivity with Victimization Coping

	Engaged Victimization Coping				Disengaged Victimization Coping			
Predictors	β	*B*	*SE*	ΔR^2	β	*B*	*SE*	ΔR^2
Step 1: Controls				.11**				.06*
Sex	.30**	.27	.08		.20*	.22	.11	
Race	.10	.09	.09		.13	.15	.11	
Step 2: Predictors				.02				.03
HRR	.10	.009	.009		.01	.001	.01	
SCLR	-.08	-.01	.02		-.18+	-.04	.02	
Step 3: 2 way interactions				.02				.001
Sex x HRR	.06	.007	.02		-.04	-.006	.02	
Sex x SCLR	.21	.05	.03		.001	.000	.04	

$^{+}p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Note: HRR = heart rate reactivity, SCLR = skin conductance level reactivity

Table 6.

Linking Real-Time, Context-Specific Coping with Anxiety

	Social Anxiety				Parent-Reported Anxiety			
Predictors	β	*B*	*SE*	ΔR^2	β	*B*	*SE*	ΔR^2
Step 1: Controls				.05*				.02
Sex	.22**	.36	.15		.13	.05	.04	
Race	.01	.02	.15		-.05	-.02	.04	
Step 2: Predictors				.001				.005
Real-Time, Context-Specific, Problem-Directed Coping	-.02	-.06	.36		-.03	-.02	.10	
Real-Time, Context-Specific, Self-Directed Coping	.001	.003	.43		-.09	-.08	.12	
Step 3: 2 way interactions				.02				.04+
Sex x PDC	-.54	-.99	.75		-.07	-.04	.20	
Sex x SDC	-.23	-1.14	.90		.25	.34	.24	

$^{+}p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Note: PDC = real-time, context-specific, problem-directed coping; SDC = real-time, context-specific, self-directed coping

Table 7.

Linking Context-General Coping with Anxiety

	Social Anxiety				Parent-Reported Anxiety			
Predictors	*β*	*B*	*SE*	ΔR^2	*β*	*B*	*SE*	ΔR^2
Step 1: Controls				$.04^{+}$				.02
Sex	$.19^{*}$	.31	.15		.13	.06	.04	
Race	.05	.08	.15		-.06	-.03	.04	
Step 2: Predictors				$.19^{***}$				.02
Context-General, Engaged Coping	-.07	-.14	.18		-.15	-.07	.05	
Context-General, Disengaged Coping	$.48^{***}$	.80	.16		.17	.07	.05	
Step 3: 2 way interactions				.02				.01
Sex x EC	.04	.02	.38		.82	.13	.11	
Sex x DC	-.78	-.51	.32		-.58	-.10	.09	

$^{+}p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Note: EC = context-general, engaged coping; DC= context-general, disengaged coping

Table 8.

Linking Victimization Coping with Anxiety

	Social Anxiety				Parent-Reported Anxiety			
Predictors	*β*	*B*	*SE*	ΔR^2	*β*	*B*	*SE*	ΔR^2
Step 1: Controls				.04^{+}				.02
Sex	.19*	.31	.15		.13	.06	.04	
Race	.05	.08	.15		-.06	-.03	.04	
Step 2: Predictors				.04^{+}				.02
Engaged Victimization Coping	.12	.22	.18		-.07	-.03	.05	
Disengaged Victimization Coping	.15	.21	.14		-.10	-.04	.04	
Step 3: 2 way interactions				.03				.001
Sex x EVC	-.53^{+}	-.65	.35		-.02	-.006	.10	
Sex x DVC	.03	.04	.28		-.07	-.03	.08	

$^{+}p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Note: EVC = engaged victimization coping; DVC = disengaged victimization coping