The Differential Impact of the Perceived Motivational Climate in Physical Activity Settings on Adolescents' Psychophysiological Stress & Motivational Responses

By
Candace Marie Hogue
Ph.D., University of Kansas, 2017
M.S.E., University of Kansas, 2012
B.B.A. & B.Sc., Emory University, 2003

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Mary D. Fry, PhD
Chairperson

Andrew C. Fry, PhD

Nancy Hamilton, PhD

Susumu Iwasaki, PhD

Susan Harvey, PhD

Date Defended: April 28th, 2017

The Dissertation Committee for Candace Marie Hogue
certifies that this is the approved version of the following dissertation:

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Chairperson, Mary D. Fry, PhD

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Abstract

The purpose of this research was to investigate whether the leader-driven motivational climate in physical activity settings has a differential impact on adolescent psychological and physiological stress (i.e., salivary cortisol) and motivational responses, as achievement goal theory (Nicholls, 1984, 1989) would suggest. It is important to investigate these relationships, as psychological stress and stress-responsive hormones have been implicated in a variety of biochemical processes that threaten the mental and physical health of youth (McEwen & Stellar, 1993), whereas social support and physical activity have been shown to counter stress and enhance health and well-being (Cohen & Wills, 1985; Norris, Carroll, & Cochrane, 1992). It is equally important to recognize that although youth consistently respond more favorably to caring, task-involving motivational climates in physical activity settings, ego-involving climates remain prevalent in youth sport contexts. If physical education and sport are to serve as formidable catalysts for youth to live more physically active, healthier lifestyles, it may be worth understanding how controllable elements within the psychosocial context of sport/physical activity affect these outcomes. Achievement goal theory is a theoretical framework that has provided insight into how leaders can structure activities and provide feedback in order to help foster a continued interest in physical activity and promote more advantageous cognitive, affective, and behavioral responses in youth (Braithwaite, Spray, & Warburton, 2011).

In developing achievement goal theory (Nicholls, 1984, 1989), Nicholls sought to understand how we can optimize not just the motivation, but the experience of each child in achievement settings. Decades of research investigating achievement goal theory has revealed that when leaders emphasize and reward high effort and personal improvement, create a fair and cooperative atmosphere, and help youth learn from their mistakes, this reliably elicits more

positive, adaptive behavioral and psychological responses (e.g., high effort and positive affect), interpersonal relations (e.g., pro-social actions), and intrinsic motivation (Harwood, Keegan, Smith, & Raine, 2015; Ntoumanis & Biddle, 1999). Nicholls referred to such environments as task-involving motivational climates. In contrast, research has shown that when leaders create an ego-involving motivational climate, by pitting athletes against one another, placing high importance on talent and outperforming others, emphasizing punitive responses for making mistakes or losing, and giving the majority of praise and recognition to the best performers, this can hinder motivation and elicit maladaptive psychological and behavioral responses. For instance, ego-involving climates are more often associated with troubling, even maladaptive responses such as less favorable opinions of coaches and teammates, antisocial behavior (e.g., cheating and poor sportspersonship), and lower self-esteem and self-efficacy (Fry & Gano-Overway, 2010; Gano-Overway et al., 2009; Ntoumanis & Biddle, 1999; Smith & Smoll, 1997) – each of which are likely to contribute to a context of heightened psychosocial stress (Dickerson, Gruenewald, & Kemeny, 2004; Dickerson, Kemeny, Aziz, Kim, & Fahey, 2004).

Social-rankings and feeling socially evaluated can trigger a dual rise in cortisol and inflammation, an atypical physiological condition shown to comprise mental and physical health (Segerstrom & Miller, 2004), with stronger perceptions resulting in more pronounced physiological responses (Dickerson, Gruenewald, & Kemeny, 2009). Likewise, other forms of psychosocial stress, in particular unfulfilled desire for social-acceptance and discontent regarding interpersonal relations, also trigger a coordinated stress response (e.g., elevated cortisol and shame), as do social situations involving performance-based rankings, directly competing for another person's attention (e.g., coach), and negative social interactions such as social conflict or defeat (Chiang, Eisenberger, Seeman, & Taylor, 2012). Thus it seems that the very features

found to trigger a threatening stress response are either a defining characteristic of an ego-involving climate or are commonly experienced by participants within such climates (Hogue, Fry, Fry, & Pressman, 2013).

As research utilizing achievement goal theory progressed, it became clear that the motivational climate was made up of more than task- and ego-involving features, as identified by Nicholls (1984, 1989). There is also a relationship component of the motivational climate that is nicely captured by Newton and colleagues (2007) Caring Climate Scale. While caring and task-involving climates compliment one another, they are distinctly different aspects of the motivational climate (Newton, Fry, et al., 2007); Feeling valued, safe, and having sense of belonging among group members (i.e., caring climates) also promote more positive experiences and adaptive responses in youth (Fry & Gano-Overway, 2010; Fry et al., 2012). Of relevance to note, physical activity settings with motivational climates that are highly caring and task-involving seem particularly suitable for fostering positive psychosocial development in youth, including the promotion of more adaptive forms of conflict resolution, cooperation, and appreciation of others (Brown & Fry, 2011) – all of which are characteristics of social support likely to help buffer the performance related stress youth may experience while engaging in physical activities amongst peers (Cohen & Pressman, 2004).

The motivational climate literature is largely centered around cognitive, affective, and behavioral responses, yet the widespread implications of psychological stress and dearth of literature exploring this association underscore the importance of investigations into the impact of motivational climate on stress-related outcomes. Furthermore, because adolescents are particularly vulnerable to the negative effects of stress (Romeo, 2010) the purpose of this research was to extend our knowledge of how the motivational climate in physical activity

settings influence the stress responses of adolescents. Consistent with the tenants of achievement goal theory, it was hypothesized that caring, task-involving climates would elicit more positive responses in youth with respect to stress and motivational outcomes in physical activity settings, while ego-involving climates would yield more concerning responses.

In the first investigation, middle school students (n = 47) were separated by gender and randomly assigned to a 30-minute instructional juggling session where the motivational climate was manipulated to be either caring and task-involving or ego-involving. Salivary cortisol was measured at four times over the 3 hour study, including one baseline (t = 0 min; juggling session start) and three response measures (t = +30, t = +45, and t = +60 min). The Competitive State Anxiety Inventory-2 (CSAI-2: Martens, Burton, Vealey, Bump, & Smith, 1990), Positive Affect and Negative Affect Scales (PANAS; Watson, Clark, & Tellegen, 1988), Sport Satisfaction Scale (Duda & Nicholls, 1992), and Effort subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989) were used to assess motivational responses to the climate intervention. Individual items were utilized to assess stress related responses, including self-reported stress and perceived social-evaluative threat as a manipulation check, and experiences of shame, humiliation, self-consciousness, and feeling judged by peers as markers of psychosocial stress in each respective climate. Similarly, adaptive motivational responses were also quantified using individual items, including subjective social status (i.e., feeling esteemed and respected by peers), as well as excitement and interest in continuing to juggle.

Results revealed an ego-involving climate can procure a significant rise in salivary cortisol (i.e., a stress-responsive hormone) in youth, along with greater humiliation, self-consciousness, shame, negative affect, and anxiety relative to a caring, task-involving climate. Adolescents in the caring, task-involving group responded more favorably, with greater reported

effort, enjoyment, positive affect, and interest in and excitement to continue juggling. Moreover, youth in the caring, task-involving climate reported experiencing markedly higher levels of admiration and esteem from their peers, compared to youth placed in the ego-involving climate.

Study 2 investigated the relationship between the perceived motivational climate in high school physical education classes and students' (N = 349; M_{age} = 15.69) state cognitive stress and coping appraisals (Gaab, Rohleder, Nater, & Ehlert, 2005), greater life stress (Cohen, Kamarck, & Mermelstein, 1983), and internalized shame (Cook, 1996). Consistent with achievement goal theory (Nicholls, 1984, 1989), results from this study link perceptions of a task-involving climate in physical education class with adaptive psychological coping appraisals and an ego-involving climate with shame and greater life stress.

In sum, an ego-involving climate may have an adverse effect on youth that extends far beyond sporting contexts. This research has helped demonstrate that youth respond more positively when leaders make an effort to give praise for trying hard and applaud personal improvement. In contrast, the results of this research suggest youth may be particularly vulnerable to psychosocial stress in physical activity settings where the motivational climate is perceived to be ego-involving; and while a caring, task-involving climate likely facilitates efforts to utilize physical education as a means to promote student health and interest in physical activity, an ego-involving climate elicits responses more likely to undermine these efforts. In conclusion, a physical activity setting with a more caring, task-involving motivational climate seems a compelling vehicle in which to promote adolescent well-being and foster a greater interest in physical activity.

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Rock Chalk, Jayhawk.

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Study 1

The Differential Impact of Motivational Climate on Adolescents' Psychological and Physiological Stress Responses

Candace M. Hogue

Author Note

This research was funded by the Society for Health & Physical Educators, the University of Kansas School of Education Graduate Research Fund, and the University of Kansas Department of Health, Sport & Exercise Sciences.

Abstract

Objectives: The purpose of this study was to investigate whether motivational climates have a differential impact on adolescent psychological and physiological stress responses (i.e., salivary cortisol). It is important to investigate this relationship, as psychological stress and stress-responsive hormones have been implicated in a variety of biochemical processes deleterious to mental and physical health. Although youth consistently respond positively to caring, task-involving physical activity settings, ego-involving climates remain prevalent in youth sport contexts.

Design: Middle school students (n = 47) were separated by gender and randomly assigned to either a caring, task-involving or ego-involving 30 min instructional juggling session.

Method: Salivary cortisol was measured at four times over the 3 hr study, including one baseline (t = 0 min; juggling session start) and three response measures (t = +30, t = +45, and t = +60 min). Psychological stress and motivational responses were also examined, including anxiety, affect, enjoyment, and effort. Individual items were utilized to substantiate stress perceptions and assess psychological responses.

Results: Results revealed an ego-involving climate procured a significant rise in salivary cortisol and greater humiliation, self-consciousness, shame, negative affect, and anxiety, relative to the caring, task-involving group, while adolescents in the caring, task-involving group responded more favorably (e.g., greater effort and enjoyment).

Conclusions: These findings suggest the motivational climate can differentially impact adolescents' stress responses, with an ego-involving climate eliciting both physiological and psychological stress responses in youth. In contrast, a caring, task-involving climate may buffer performance related stressors that accompany group achievement settings and yield a protective response.

Keywords: Motivation, Cortisol, Stress Buffering, Caring Climate, Physical Activity, Achievement Goal Theory

The Differential Impact of Motivational Climate on Adolescents' Psychological and Physiological Stress Responses

Empirical and anecdotal evidence suggest coaches and physical educators will largely determine whether youth enjoy physical activity and whether they will reap the many benefits that can be gained from sport participation (Petitpas, Cornelius, Van Raalte, & Jones, 2005; Smith, Smoll, & Cumming, 2007). Research has shown that the motivational climate is particularly important in determining these outcomes. For instance, a breadth of research has illustrated how the motivational climate can impact the cognitions, affect, and behaviors of youth in activity-based settings, with caring and task-involving climates consistently yielding more adaptive responses than ego-involving climates (Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010; Fry & Gano-Overway, 2010; Gano-Overway & Guivernau, 2014; Harwood et al., 2015). What is less understood, however, is whether youth exhibit a physiological stress response to a particular motivational climate. Similarly, relatively little is known about how the motivational climate impacts the shame-related emotions of adolescents while engaged in physical activities amongst peers. Given the widespread implications for mental and physical health and well-being associated with psychological stress, it is important to examine these relationships. As such, the purpose of this study was to investigate whether the perceived motivational climate would differentially impact the physiological stress responses to psychological stress, as measured by salivary cortisol, of adolescents in a physical education-type setting. As a secondary purpose, psychological stress, shame, and motivational responses were examined.

Achievement goal theory (Nicholls, 1984, 1989) proposes that to optimize the motivation and the experience of all youth, leaders would do well to foster a cooperative atmosphere, emphasize the value and importance of high effort and personal improvement, and treat mistakes as part of the learning process (i.e., create a task-involving climate). Nicholls further contends

that motivation will be hindered if leaders emphasize relative ability and outperforming others (e.g., winning), promote intragroup rivalry, punish mistakes, and give the majority of praise and recognition to the best performers (i.e., create an ego-involving climate). Advocates of Nicholls' (1984, 1989) achievement goal theory have expanded our understanding of motivational climates by incorporating a previously unexplored relationship component: caring. Newton and colleagues (2007) add that feeling valued, safe, and having a sense of belonging (i.e., a caring climate) in physical activity settings will also promote adaptive responses and foster positive experiences for youth. A growing body of research strongly supports these contentions (e.g., Duda, 2013; Fry et al., 2012). In contrast, climates that are less caring and ego-involving have typically been linked to more concerning responses, including less favorable opinions of coaches and teammates, more antisocial behaviors (e.g., cheating and poor sportspersonship), and lower self-esteem and self-efficacy (Fry & Gano-Overway, 2010; Fry et al., 2012); each of which have psychosocial underpinnings likely to contribute to social-evaluative threat, shame-related emotions (e.g., humiliation), and feeling that despite one's best effort he/she cannot impact the outcome – all powerful predictors of the hormonal stress response, cortisol (Dickerson & Kemeny, 2004).

It has long been held that when leaders utilize social comparisons as an instructional method and punish losing and mistakes in an attempt to motivate their athletes (i.e., create an ego-involving climate), this fosters a threatening psychosocial environment for youth (Smith et al., 2007). Results from a similar experimentally manipulated motivational climate intervention with college students support this contention in that a high ego-involving climate validated feelings of social-evaluative threat and uncontrollability, and causally linked ego-involving

climates with a concomitant rise in stress, shame, self-consciousness, and salivary cortisol (Hogue, Fry, et al., 2013).

This is important, given the psychological and behavioral consequences of shame-related emotions and the deleterious effects of heightened cortisol, including affective and psychological disorders (e.g., depression), sleep disturbances, lessened vigor, cardiovascular and immune dysfunction, and obesity (McEwen & Stellar, 1993). Also important, the psychosocial features known to elicit stress-responsive elevations in cortisol (i.e., social evaluation and uncontrollability) can be equally taxing psychologically. In the Hogue et al. (2013) intervention, participants in the ego-involving group experienced significantly more shame and anxiety, and reported feeling more self-conscious and stressed than the caring, task-involving group. In contrast, the motivational efforts and enjoyment in the ego-involving session were notably lower than caring, task-involving counterparts and were blunted, relative to ego-involving participants' self-reports of effort and enjoyment when learning a new skill in general. Similar motivational responses of youth have been substantiated in physical education settings as well (for a review see Braithwaite et al., 2011).

Epidemiological researchers advocate for both a subjective measure of stress (e.g., questionnaires) and a measurement of salivary cortisol, as a biomarker of stress, when investigating psychophysiological stress responses (De Vriendt, Moreno, & De Henauw, 2009). Salivary cortisol is one of the most widely utilized and well-understood indicators of psychological stress, and is considered a marker of psychobiological functioning. Cortisol has been implicated in poor physical and psychological health and well-being, including threatened immunity and compromised psychological functioning. For example, adolescents with stress induced cortisol elevations are at greater risk for major depression (Goodyer, Tamplin, Herbert,

& Altham, 2000), obesity (Björntorp, 2001), and behavioral problems (Susman, Dorn, Inoff-Germain, Nottelmann, & Chrousos, 1997). Moreover, most children will experience physical education and/or youth sport throughout their childhood and adolescent years. These contexts are critical domains for teachers and coaches to strive to help young people have positive physical activity experiences that will help foster their commitment to a healthy lifestyle as they develop. If youth are experiencing stress in these settings, it is likely that they will not have fun, not seek out opportunities to be physically active, and not reap the many benefits of a physically active lifestyle.

Importantly, elevated cortisol is believed to play a central role in processes that would, in effect, act to counter efforts to utilize physical education as a means to improve the mental and physical health and well-being of youth. For example, heightened cortisol is believed to play a central role in the pathogenesis of mood disorders and the accompanied cognitive impairments (e.g., Young, 2004), and has been shown to hinder athletic performance (Lautenbach, Laborde, Achtzehn, & Raab, 2014) and increase social submissiveness (Gruenewald, Kemeny, Aziz, & Fahey, 2004). While this is by no means an exhaustive list, these findings underscore the importance of understanding the impact the motivational climate in sporting/physical education-type settings has on adolescents' salivary cortisol levels.

For many reasons it is expected that motivational climates that are highly caring and task-involving would also engender a protective response to psychological stress in performance settings. To begin, as others have discussed (e.g., Smith et al., 2007), fostering a cooperative atmosphere and utilizing self-referenced criteria as a means of measuring success (i.e., a task-involving climate) would likely lessen feelings of uncontrollability and social-evaluative threat. Furthermore, not only does social support (e.g., a caring climate) cultivate more positive

responses in youth sport contexts (Fry & Gano-Overway, 2010), but it alleviates many of the harmful physiological consequences of stress (Thorsteinsson & James, 1999; Uchino, 2006). Central contributors to the stress buffering hypothesis argue it is the quality of group relationships that yield protective health benefits (Cassel, 1976), specifically, "information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations" (pp. 300; Cobb, 1976). Cohen and Pressman (2004) have added that feeling valued and having a sense of belonging are also vital to buffering one from the many deleterious consequences of stress. In support of this notion, higher basic psychological need satisfaction, including the need for relatedness (i.e., a construct that reflects caring and connectedness), has been shown to mitigate the stress response (e.g., cortisol) in performance settings (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Quested et al., 2011), as have highly caring, task-involving climates (Hogue, Fry, et al., 2013). In sum, the very features that define caring, task-involving climates mirror the psychosocial characteristics thought to buffer stress and yield protective physiological and psychological responses.

Given recent efforts to utilize school-based physical education as a means to combat childhood obesity, promote well-being, and to foster healthy, active lifestyles among youth, it is vital that researchers work to understand how controllable elements within the environment influence the motivation, health, and well-being of youth. As such, the purpose of the current investigation was to examine whether an ego-involving climate would differentially impact adolescent psychological and physiological stress and motivational responses compared to a caring, task-involving climate. It was hypothesized that middle school students in the ego-involving group would respond with significantly higher cortisol, relative to students in the caring, task-involving group, and less adaptive psychological responses including greater stress-related responses (e.g., shame and

humiliation), negative affect, and anxiety. In contrast, it was hypothesized that the caring, task-involving group would respond with more adaptive psychological responses, including greater self-confidence, positive affect, effort, enjoyment, perceived social status, interest in continuing to juggle, and excitement to continue juggling. Lastly, although it has been suggested that gender differences in cognitive and/or emotional responses to psychosocial stress may yield significantly different salivary cortisol responses (Kirschbaum, Wust, & Hellhammer, 1992), more recent controlled investigations (i.e., Trier Social Stress Test) indicate non-significant gender differences in youth salivary cortisol responses to psychosocial stress (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004). In light of these inconsistencies, we investigated gender differences, but hypothesized non-significant gender differences for each of the response variables.

Method

Participants

Participants were middle school students ($N = 47$, age range: 10-14 years, *Mage* = 11.98, $SD = .94$) enrolled in a physical education class who were pre-screened for potential confounds and amenable to pre-study instructions (see Procedure section for screening and instruction details). Pre-screened study participants with parental consent were separated by gender and randomly assigned to a caring, task-involving climate or an ego-involving climate resulting in the following groups: (1) females in caring, task-involving ($n = 15$), (2) males in caring, task-involving ($n = 14$), (3) females in ego-involving ($n = 11$), and (4) males in ego-involving ($n = 7$). Students identified as Caucasian (66%), Pacific Islander/Asian (12.8%), African American (8.5%), Other (4.3%), and Hispanic/Latina (2.1%). The study was approved by the Institutional Review Board at the researchers' university.

An a priori power analysis revealed an optimal sample size of $N = 80$ for a .85 or greater

power to detect whether the magnitude of cortisol concentrations rose in the ego-involving group were greater than the caring, task-involving group; however, due to limited funding and the expense of assessing cortisol, we were unable to include 80 participants. It is important to note that our power analyses revealed that a sample size of $N = 60$ was predicted to yield power of .78. These findings were based on psychoneuroendocrine research, as there has been only one other published study examining the impact of the motivational climate on cortisol – power in that study ($N = 90$; Hogue et al., 2013) was .89.

Salivary Cortisol

Youth provided a total of four saliva samples ($t = 0$, +30, +45, +60 min, relative to the start of the juggling session) via Salivettes (Sarstedt, Nümbrecht, Germany) in order to assess fluctuations in cortisol (see Figure 1 for the sampling timeline), a reliable means of sampling salivary cortisol (Nicolson, 2008). Salivettes are small cotton rolls that allow for the collection of saliva by placing them under the tongue until saturated (i.e., 1.5-2 minutes). Once saturated, each Salivette was placed in a small plastic tube and was visually scanned for contamination (e.g., blood). Salivettes were then spun at 3000 rpm for 15 min, aliquoted into 3 saliva samples, and stored at -20° C until assayed. Prior to analysis, saliva samples were thawed to room temperature (~25 °C) and salivary cortisol concentrations were determined following Salimetrics assay procedures, which included analyzing all samples for each subject in the same assay. Samples were analyzed within 21 days, in duplicate, by the primary investigator using Salimetrics EIA kit (Salimetrics, State College, PA). The mean intra- and inter-assay CV% (i.e., coefficient of variation) were 3.9%, and 7.2%, respectively. These are acceptable CV%'s that indicate the variability within each assay (i.e., intra-assay) was 3.9%, while the variation between assays was 7.2%. Moreover, the cortisol levels of the ego-involving group increased more than

90%, thus alleviating any concern that the significance of the ego-involving group's rise in cortisol was due to assay variability. Likewise, the apex of the ego-involving group post-climate intervention was > 80% higher than that of the caring, task-involving group.

Motivational Climate Perceptions

Perceptions of the perceived motivational climates during the juggling session were validated using the Perceived Motivational Climate in Sport Questionnaire (PMCSQ; Seifriz, Duda, & Chi, 1992) and Caring Climate Scale (CCS; Newton, Fry, et al., 2007). Youth selected responses using a 5-point Likert-style scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), which were averaged for each respective scale (i.e., ego-involving, task-involving, and caring climate). The stem on each item read, *"*During the juggling session…", to better reflect the intervention.

Task- and ego-involving climates. The PMCSQ is a two-scale, 21-item measure that quantifies the extent to which individuals perceive task-involving and ego-involving features in a given setting. A sample task-involving item is, "…students were encouraged to work on weaknesses" and ego-involving "…only the 'top athletes' got noticed*"*. The PMCSQ has demonstrated adequate factorial validity and internal reliability, including with youth (Seifriz et al., 1992).

Caring climate. The CCS is a 13-item scale that measures the extent to which individuals feel cared for, valued, and respected, and was used to quantify perceptions of care during the juggling session. A sample item was, "…the instructors cared about the students". The CCS has demonstrated strong psychometric properties, and has been validated for use with youth populations (Newton, Fry, et al., 2007).

Psychological Questionnaires

Affect. Feelings and emotions that reflect positive and negative affect were assessed using the Positive Affect and Negative Affect Scale (PANAS; Watson et al., 1988), a two factor, 20-item scale that consists of 10 items measuring both positive and negative affect. Scores are summed for each respective subscale, with positive affect reflecting the more positive experiences of youth (e.g., "inspired"), and negative affect reflecting youth subjective distress during the intervention (e.g., "afraid"). Responses were rated using a 5-point Likert scale ranging from 1 (*not at all)* to 5 (*extremely).* The PANAS has been well validated and is a widely used measure of affect, including for use with adolescents (Chiang et al., 2015).

Enjoyment. The enjoyment subscale of Duda and Nicholls' (1992) Sport Satisfaction Scale was used to assess the degree of fun youth had during the motivational climate intervention. Youth responded to the five item measure using a 5-point scale with responses to items ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The Sport Satisfaction Scale has demonstrated strong reliability and validity, and has been used as a measure of enjoyment in physical activity settings with youth (Duda & Nicholls, 1992).

Effort. The Effort subscale of the Intrinsic Motivation Inventory (IMI; McAuley et al., 1989) was used as a subjective measure of effort during the intervention. Responses on this five-item scale range from 1 (*strongly disagree*) to 7 (*strongly agree*). This instrument has proven acceptable for use in physical activity settings with adolescents (McAuley et al., 1989).

State anxiety. The Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990) is comprised of three, nine-item subscales (i.e., state cognitive anxiety, somatic anxiety, and self-confidence) with responses ranging from 1 (*not at all*) to 4 (*very much so*). Sample items were, "During the juggling session, I was concerned about losing" (*cognitive*), "…, my body felt tense" (*somatic*), and "…, I was confident about performing well" (*self-confidence*).

The CSAI-2 has demonstrated adequate psychometric properties with youth (Martens et al., 1990).

Individual Items.

Stress-related experiences. Four individual items were used to measure stress related responses to the climate intervention that were not yet captured. These included rating on a 7-point Likert style scale ranging from 1 (*not at all*) to 7 (*very much so*) how judged youth felt by their peers and experiences of shame, humiliation, and self-consciousness while juggling.

Adaptive motivational responses. Three additional single item questions were used to assess adaptive responses. The single item MacArthur Subjective Social Status Scale (Adler, Epel, Castellazzo, & Ickovics, 2000) was used to assess social status during the intervention by asking youth to rate how esteemed and admired they felt in the juggling session using ladder rung selections ranging from 1 (*low*) to 10 (*high social status*). Two additional items were developed to assess how excited youth were to continue juggling and their interest in continuing to juggle using a 7-point Likert style scale ranging from 1 (*not at all*) to 7 (*very much so*).

Procedure

Experimental Manipulation.

Instructor training. Graduate and undergraduate students familiar with the motivational climate literature were recruited to be instructors. Each attended four 2.5 hr training sessions where they were introduced to the achievement goal theory literature, were carried through the instructional juggling session by the lead investigators, and led one another and volunteers in the juggling session activities. Instructors were encouraged to use their theoretical understanding of motivational climates when responding to participants during the juggling session.

Experimental protocol. With the exception of the climate manipulation and debriefing,

the experimental protocol was the same for each group. An informational packet with parental consent and health screening forms (i.e., chronic illness, psychological disorders, medication intake, and poor oral health) were sent home with students and emailed to parents by the students' Physical Education teacher. Participants were asked to follow pre-study instructions including no snack or non-water drinks after 12:00 p.m. (i.e., 2 hrs prior to the start of the juggling session), minimal caffeine prior to 11:30 a.m. (e.g., no more than one drink), no caffeine after 11:30 a.m., and no strenuous exercise 48 hrs prior to the study or on the day of the study. Participants were separated into groups by gender and then randomly assigned to either the caring, task-involving or ego-involving group, which took place after school on two consecutive Wednesday afternoons from 1:30 to 4:30 p.m., to help control for diurnal variations in cortisol (Pruessner et al., 1997). The conditions were counterbalanced in the following way: Males assigned to the first Wednesday were placed in a caring, task-involving juggling session in one gym, while the females were in an ego-involving juggling session in another gym. The following Wednesday, males were placed in an ego-involving session and females in a caring, task-involving session in separate gyms.

Assent was requested upon arrival. Students then completed a pre-study survey that assessed current health and adherence to pre-study instructions. Upon completion, youth were led to the gym where the juggling session took place and were taught how to provide oral specimens. This initial sample was considered the baseline measure (t = 0 min). The 30-min experimentally manipulated juggling session then took place (for Juggling Activities, see Hogue et al., 2013). Immediately following the juggling session, the first of three response samples was collected (t = +30 min). Participants were then led back to the classroom to complete post-questionnaires. Instructors left the room until the debriefing. Youth remained in a neutral

environment until all participants completed the questionnaires (i.e., no cell-phones or talking was allowed). During this time, the remainder of the response samples were collected (t = +45 and t = +60 min). After the post-questionnaires were completed and all samples had been collected, height and weight were measured in a private setting by a research assistant. All participants (i.e., males and females) were brought to a gym where they were debriefed as a group, and were then taken through a highly caring, task-involving instructional juggling practice along with the instructors and primary investigators. This caring, task-involving juggling session lasted approximately 30-45 minutes.

Climate manipulations. The juggling session activities were based off of the work of Solmon (1996) and follow the Hogue et al. (2013) intervention protocol. Activities for each session were balanced for time, physical exertion, and number of observers and instructors.

Caring/task-involving climate. In the caring, task-involving juggling sessions, instructors created a cooperative atmosphere, encouraged youth to work with and support one another, made a concerted effort to get to know each child, and treated mistakes as part of learning (e.g., strengths were acknowledged and built upon). Instructors also worked to create a supportive environment where youth were treated fair, with kindness and respect, and a sense of belonging among youth was fostered by asking questions that helped them get to know one another better. Similarly, cooperative teambuilding was incorporated into the juggling session activities. Prior to group work, instructors emphasized how each and every person in the group plays an important role in the group's collective success (e.g., observe and give constructive feedback). Instructors focused students on their own improvement, and not their relative performance, while also encouraging youth to support and encourage one another (i.e., pair "praise phrases" with technical feedback).

Ego-involving climate. Instructors in the ego-involving climate promoted rivalry among participants, ranked youth according to performance on a ladder that ranged from 1 (*best*) to 5 (*average*) to 10 (*worst*), and punished mistakes (e.g., take away a ball or rank participant lower on the performance ladder). Although instructors worked to spend an equal amount of time with each participant, they made an effort to get to know the best performers on a more personal level and also gave them more praise and recognition for their efforts. For example, instructional feedback was provided by comparing youths' skills to those of the best performers.

Data Analyses

A 2 (Condition: caring, task-involving climate group vs. ego-involving climate group) x 2 (Gender: male vs. female) between-subjects, factorial ANOVA was used to determine whether there were differences in background characteristics, while a 2 (Condition) x 2 (Gender) MANOVA examining group differences in the perception of a caring, task-, and ego-involving climate was run as a manipulation check. Once verified, all ANOVA's were conducted based on caring, task-involving or ego-involving climate group assignment (i.e., condition). In order to validate a stressful environment for participants in the ego-involving climate condition a 2 (Condition) x 2 (Gender) MANOVA examining group differences in ratings of stress and social evaluation during the juggling session was run.

To assess changes in salivary cortisol, a 2 (Condition) x 2 (Gender) x 4 (Time: *t* 0 vs. *t* +30 vs. *t* +45 vs. *t* +60) mixed design, repeated-measures ANOVA was conducted, with time of sample treated as the within-subjects variable and condition (i.e., climate assignment) and gender treated as the between subjects variables. For each of the psychological variables assessed post-juggling session, a 2 (Condition) x 2 (Gender) MANOVA was used. Condition and gender were treated as between-subjects factors.

All alpha levels were set at .05 and, when necessary, were adjusted with a Bonferroni correction. For the repeated measures cortisol assessments, when Mauchly's test of sphericity determined heterogeneity of covariance the results were assessed using Greenhouse-Geisser corrections. Investigations of single time point differences within groups were conducted using paired sample *t*-tests. There was < 3% missing data in the data set. The individual's average for each respective measure was used to replace a missing value, while the average of the two adjacent cortisol responses of a participant was used to replace a missing cortisol response. Partial eta-squared (η2) values and Cohen's *d* are reported for each of the psychological analyses. Cohen (1988) recommends interpreting the η2 values as small (.01), medium (.06), and large (.14) and Cohen's *d* as small (.2), medium, (.5), and large (.8), respectively.

Results

Background Characteristics

There were no significant differences in background characteristics (i.e., total sleep, BMI, menstrual cycle, and race) between the caring, task-involving and ego-involving groups.

Manipulation Check

Motivational climate. Analysis of climate perceptions revealed a significant main effect for condition, $F(3, 41) = 63.22$, $p < .001$, $\eta 2 = .822$. Climate assignment and climate perception were in agreement, with ego-involving groups perceiving a significantly more ego-involving and less caring, task-involving climate (*M*caring = 2.59 ± 0.74, *M*task = 3.52 ± 0.55, and *M*ego= 4.20 ± 0.38), and the caring, task-involving group perceiving a significantly more caring, task-involving climate and less ego-involving climate than the ego-involving group (*M*caring = 4.73 ± 0.47, *M*task = 4.42 ± 0.49, and *M*ego= 1.86 ± 0.69). Neither the main effect for gender, $F(3, 41)$

= 1.14, p = .344, η2 = .077, nor the Condition x Gender interaction were significant, $F(3, 41)$ = 0.55, p = .650, η2 = .039.

Stress. Analysis of stress and social-evaluation revealed a significant main effect for condition, $F(2, 42) = 31.46$, $p < .001$, η2 = .660, with the ego-involving climate group reporting experiencing significantly more stress (M_{dif} = 2.31) and social evaluation (M_{dif} = 3.25) during the intervention than the caring, task-involving group. Although the main effect for gender was not significant, $F(2, 42) = 1.28$, p = .288, η2 = .057, there was a significant Condition x Gender interaction, $F(2, 42) = 3.46$, p = .035 η2 = .141, with females in the ego-involving group rating their stress experiences higher than the males in the ego-involving group (M_{dif} = 1.34).

Post-Manipulation Results

Physiological responses. Salivary cortisol levels are displayed in Figure 2 by condition for each of the four time points (i.e., baseline, t = 0 min; and three response measures, t = +30, +45 and +60 min).

Salivary cortisol. As hypothesized, there was a significant Time x Condition interaction, $F(3, 41) = 5.71$, $p < .005$, η2 = .295, indicating that the salivary cortisol responses of youth in the caring, task-involving and ego-involving climates were significantly different over time. The post climate intervention levels of salivary cortisol were significantly higher in the ego-involving climate group, compared to the caring, task-involving group, for the response times t = +45 and t = +60 minutes, with 29.5% of the variance in salivary cortisol explained by climate ($M_{dif\ Response\ +45,\ +60\ min}$ = 3.95, 2.50 nmol/L). Results also included a non-significant 3-way interaction, $F(3, 41) = 2.12$, p = .112, and a non-significant Time x Gender interaction, $F(3, 41) = .765$, p = .520. There were no significant gender differences in the cortisol responses, $F(1, 43) = 3.61$, p = .064, η2 = .078. Follow-up analyses revealed salivary cortisol levels in the ego-involving group

increased significantly from baseline for both the second response, $t(1, 17) = 2.89$, $p = .010$ and third response samples, $t(1, 17) = 3.30$, $p = .004$.

Psychological variables. See Table 1 for correlations and Chronbach's alphas and Tables 2 and 3 for psychological responses, including stress ratings. When correlations were tested for significant condition differences (Preacher, 2002) we found the following: Among participants in the ego-involving condition, shame was significantly associated with perceptions of an ego-involving climate $r(16) = .620$, $p < .01$, but was not significantly associated with an ego-involving climate among participants in the caring, task-involving condition $r(27) = -.178$, $p = .355$. Similarly, self-consciousness was positively correlated with perceptions of an ego-involving climate among participants in the ego-involving condition, $r(16) = .753$, $p < .001$, but not the caring, task-involving condition, $r(27) = .197$, $p = .306$.

Affect. Examination of group differences in positive and negative affect immediately following the climate intervention yielded a significant main effect for condition, $F(2, 42) = 27.08$, $p < .001$, $\eta 2 = .563$, suggesting group differences in affect were in large part dependent on the motivational climate. The caring, task-involving group reported distinctly higher levels of positive affect ($M_{dif} = 12.31$) and notably lower negative affect ($M_{dif} = 13.77$) than the ego-involving group, with a climate $\eta 2$ for positive and negative affect of .460 and .423, respectively. The main effect for gender, $F(2, 42) = 1.28$, $p = .290$, and Condition x Gender interaction, $F(2, 42) = .103$, $p = .902$ were non-significant.

Effort and enjoyment. Analysis of group differences during the motivational climate intervention in self-reported effort and enjoyment revealed a significant main effect for condition, $F(2, 42) = 21.10$, $p < .001$, $\eta 2 = .501$, a non-significant main effect for gender, $F(2, 42) = .175$, $p = .840$, and a non-significant Condition x Gender interaction, $F(2, 42) = .621$, $p =$

.540. The condition η2 for enjoyment and effort were .502 and .142, respectively. In sum, the caring, task-involving climate group reported experiencing more enjoyment (M_{dif}= 1.48) and putting forth more effort (M_{dif}= .60) while juggling than the ego-involving group.

State anxiety. Analysis of group differences in cognitive anxiety, somatic anxiety, and self-confidence (i.e., CSAI-2 variables) during the motivational climate intervention yielded a significant multivariate main effect for condition, $F(3, 41) = 15.15$, $p < .001$, η2 = .526, a non-significant main effect for gender, $F(3, 41) = .771$, $p = .517$, and a non-significant Condition x Gender interaction, $F(3, 41) = .103$, $p = .958$. The ego-involving climate group reported higher cognitive and somatic anxiety and lower self-confidence during the juggling session, with a condition η2 for cognitive anxiety (M_{dif}= 1.02), somatic anxiety (M_{dif}= .99), and self-confidence (M_{dif}= 1.28) of .330, .365, and .512, respectively**.**

Individual items. Individual items examining feelings of shame, judgment from peers, humiliation, and self-consciousness were grouped as dependent variables in a MANOVA in order to assess stress-related responses. In order to assess more adaptive motivational responses, another MANOVA was run and included the dependent variables interest in and excitement to continue juggling in the future, as well as perceived social status during the juggling session.

Stress-related items. Examination of stress-related responses revealed a significant main effect for condition, $F(4, 40) = 32.82$, $p < .001$, η2 = .766, a significant main effect for gender, $F(4, 40) = 3.00$, $p < .05$, η2 = .230, and a significant Condition x Gender interaction, $F(4, 40) = 3.60$, $p < .05$, η2 = .265. As hypothesized, the ego-involving group reported experiencing significantly more shame (M_{dif} = 2.98; η2 = .513), peer judgment (M_{dif}= 3.62; η2 = .752), humiliation (M_{dif}= 2.94; η2 = .525), and self-consciousness (M_{dif}= 2.82; η2 = .496) than the caring, task-involving group. Females in the ego-involving condition reported experiencing

significantly more shame (M_{dif}= 2.2) and humiliation (M_{dif}= 1.78) during the climate intervention than males in the ego-involving group reported, while gender differences within the caring, task-involving group were minimal.

Motivational items. Examination of the motivational items, perceived social status and interest in and excitement to continue juggling, resulted in a significant main effect for condition, $F(3, 41) = 10.44$, $p < .001$, $\eta 2 = .433$, with the caring, task-involving climate group reporting higher perceived social status (M_{dif}= 3.50; $\eta 2 = .319$) during the juggling session, and greater interest in (M_{dif}= 1.28; $\eta 2 = .124$) and excitement to continue juggling (M_{dif}= 1.90; $\eta 2 = .280$), relative to the ego-involving climate group. The main effect for gender, $F(3, 41) = 1.08$, $p = .369$, and Condition x Gender interaction, $F(3, 41) = .121$, $p = .947$ were non-significant.

Discussion

The present study provides empirical evidence suggesting creating an ego-involving climate among adolescents in physical activity settings may not only elicit maladaptive cognitive and affective responses, but may also foster a threatening psychosocial context that triggers a coordinated and concerning stress response. These responses include marked elevations in cortisol and a concomitant rise in negative affect and feelings of humiliation, shame, and self-consciousness. In turn, creating a caring, task-involving climate may be protective for youth, as is suggested by markedly higher ratings of positive affect, self-confidence, effort, and enjoyment during the jugging session, relative to the ego-involving group. Our manipulation check verified climate assignment and climate perceptions were in agreement and that experiences of stress and social evaluation were significantly higher for the ego-involving group, providing support for our contention that the responses of participants to the ego-involving climate are indicative of a stress-inducing psychosocial context, while responses of the caring, task-involving group are not.

The current investigation adds to the achievement goal theory literature a physiological measure of psychological stress in response to the motivational climate that has yet to be explored in youth. The ego-involving climate evoked a distinct rise in the salivary cortisol levels of adolescents, a stress responsive hormone. This resulted in significantly higher cortisol levels than adolescents who experienced a caring, task-involving climate for the cortisol response measures, t = +45 and +60 min from the start of the 30 min instructional juggling session. Because there is a slight delay between an eliciting stressor and salivary cortisol elevations (i.e., cortisol peaks between 21-40 min post-stressor; Dickerson & Kemeny, 2004), the trajectory of the cortisol responses suggest participants in the ego-involving group were exposed to a socially evaluative environment and/or elements of uncontrollability during the juggling session, the two central conditions known to elicit a psychologically-induced rise in cortisol (Dickerson & Kemeny, 2004).

Collectively, the perception of social evaluation and feelings of uncontrollability during the juggling session, paired with the subsequent rise in cortisol and experiences of shame, humiliation, and self-consciousness experienced by adolescents in the ego-involving condition suggest ego-involving climates elicit a coordinated stress response compatible with Dickerson, Gruenewald, and Kemeny's (2004) social self preservation theory. Of particular significance is the marked rise in cortisol for the ego-involving condition following the notably higher ratings of social-evaluative threat during the juggling session – specifically, the near doubling of cortisol concentration (93% rise) in the ego-involving group from baseline, at t = +45 min, to levels nearly twice the peak cortisol response of the caring, task-involving group (i.e., 4.45 vs. 8.40 nmol/L). In contrast, the markedly different experience of youth in the caring, task-involving climate and more adaptive responses are compatible with the stress-buffering hypothesis (Cassel,

1976). These findings illustrate the magnitude of difference in the psychosocial experiences of individuals within each respective motivational climate, and suggest threats to the social self may be minimized in caring, task-involving climates but rampant throughout ego-involving climates.

According to social self preservation theory, when individuals perceive a threat to their social standing or "social self", this triggers a coordinated biological, emotional, and behavioral response that can compromise health and well-being (Gruenewald, Kemeny, & Aziz, 2006).

> In humans, social self threats encompass situations or factors that threaten one's social esteem or status, including social rejection, ostracism, exclusion, scorn, or contexts in which one's competencies, abilities, or characteristics upon which a positive social image is based are called into question (e.g., poor performance in social-evaluative contexts). (Gruenewald et al., 2006, p. 410)

Public threats or challenges to an individual's social standing and competencies have been linked to feelings of shame and humiliation, submissive behaviors (e.g., social avoidance), and heightened cortisol and inflammation (Dickerson, Gruenewald, et al., 2004).

When asked how esteemed and admired youth felt during the juggling session, there was a notable difference between the ego-involving and caring, task-involving groups in their responses, with youth in the caring, task-involving group reporting feeling much greater esteem and admiration from their peers. Seeing as esteem is thought to be central to buffering stress and promoting positive health outcomes (Cobb, 1976), this difference in experiences is important. It is worth repeating that caring climates, as operationally defined by Newton and colleagues (2007), embody the very characteristics known to both buffer stress and yield protective health benefits (e.g., having a sense of belonging and feeling valued and cared for; Cobb, 1976; Cohen & Pressman, 2004). This contention is supported by the negative correlation found in the current study between the perceptions of a caring climate and cortisol levels at 15 and 30 min post-jugging session (i.e., the amount of time it takes for psychosocial stress to manifest as salivary cortisol; Dickerson & Kemeny, 2004). However, because we grouped participants according to

climate assignment in our analyses, we did not quantify the unique impact of the task-involving climate versus the caring climate for our outcome variables. Future investigations may consider differentiating whether these climates do in fact elicit qualitatively distinct responses, as these findings and previous research would suggest; however, we feel it is important to emphasize that caring features compliment a task-involving climate, and fostering a highly caring *and* task-involving motivational climate, rather than an ego-involving climate, is our best directive for helping individuals have positive experiences in sport. Our results indicate that caring, task-involving climates help minimize social-evaluative threat, shame, and feelings of uncontrollability. Therefore, it may well be that when elements of both caring *and* task-involving climates come together youth benefit both physiologically and psychologically.

When our leaders took care to foster cooperative, caring interpersonal relationships and placed value on high effort and personal improvement, rather than relative ability and outperforming others, youth displayed adaptive motivational patterns, reported higher levels of self-confidence, and had a more positive experience, including notably high levels of positive affect. It is well understood that positive affect helps individuals better cope with psychological stress and overcome challenges (Khosla, 2006), and may, therefore, have helped the adolescents in our caring, task-involving group cope with performance related stress. Moreover, higher self-confidence enhances the ability to cope with situational stressors (Gaab et al., 2005), and may have helped minimize the stress of learning a new activity-based skill among peers. Given these connections, future research should explore whether positive affect or self-confidence mediate stress-related responses to the perceived motivational climate.

Anecdotal evidence from our leader reflections also illustrate that adolescents in the caring, task-involving climate exhibited enhanced performance and stronger indicators of well-

being, relative to the ego-involving group. Leaders noted how youth in the caring, task-involving group seemed to be having much more fun than the ego-involving group, connected with peers more easily, and also picked up the skill of juggling much quicker. Following the intervention, when youth from the ego-involving group were exposed to a caring, task-involving climate, they attempted more difficult skills (e.g., juggled three balls) and seemed less anxious than during the ego-involving session. This is consistent with findings from a similar intervention study conducted by Solmon (1996), where youth in an ego-involving climate attempted less difficult skills while juggling and attempted to juggle less often than youth learning to juggle in a task-involving climate.

Research has linked fluctuations in negative affect with concurrent fluctuations in cortisol (Buchanan, al'Absi, & Lovallo, 1999). Because negative affect also mediates the link between stressful life events and illness, and has been associated with poor psychological health and well-being, including greater stress and depression (Dua, 1993), it is important to gain a better understanding of whether negative affect resultant of an emersion in ego-involving climates is also associated with these and other indicators of well-being. Likewise, given our understanding that anticipatory stress appraisals explain much of the variability in cortisol elevations in response to psychosocial stress (Gaab et al., 2005), it would also be interesting to see if this translates into an anticipatory response for athletes on highly ego-involving teams/classes. Similarly, if youth are exposed to an ego-involving climate on a regular basis (e.g., on a sports team), it is vital to explore whether this too translates into dysfunction of the HPA axis and/or poor health and well-being, or whether youth become habituated to feeling shame and self-conscious in ego-involving performance settings.

In a similar vein, Cassel, a key contributor to the stress-buffering hypothesis has argued that of greatest importance to protecting one against stress may be "the strength of social supports provided by the primary groups of most importance to the individual" (Cassel, 1976 p. 7). Therefore, it would not be unfound to suggest that youth who are playing for teams where they have a more vested interest or are engaging in physical education class with youth they are socially invested in may yield a more pronounced protective response in caring, task-involving climates. Alternatively, it may also be that minimizing social supports among groups that are of great importance to adolescents (e.g., fostering intra-group rivalry) may yield a more pronounced stress response than what was found in response to our 30 min ego-involving session.

With respect to limitations, it should be noted that the decrease in salivary cortisol levels in the caring, task-involving group may have been due to natural diurnal variation. However, despite this possibility, the cortisol elevations in the ego-involving group were quite robust. Also important to note, puberty has been shown to affect basal cortisol levels in females (Netherton, Goodyer, Tamplin, & Herbert, 2004); there were, however, no significant group differences between females in pubertal maturation in the current study. Because the mere presence of an evaluative audience (e.g., camera or researchers) can evoke a rise in salivary cortisol, we were unable to assess performance in the experimental task. However, in line with previous climate interventions (Hogue, Fry, et al., 2013; Solmon, 1996), anecdotal evidence provided by the juggling instructors suggests youth in the ego-involving climate attempted less difficult skills (e.g., juggling two rather than three tennis balls) and gave up more easily than youth in the caring, task-involving climate. Although we did our best to replicate a physical education-type setting during the instructional juggling session, this was a laboratory investigation and cannot be generalized to real-life settings. Researchers should consider examining the impact of

motivational climate on the psychophysiological stress responses of adolescents in real-world sporting and physical education settings. An additional noteworthy limitation of the current study was the limited sample size (N = 47). Because smaller samples are more sensitive to chance variations, this can result in false positives, particularly in experimental investigations (Schweizer & Furley, 2016). Future investigations should consider including a greater number of subjects and/or planned missing data designs (Hogue, Pornprasertmanit, Fry, Rhemtulla, & Little, 2013), if limited funding constrains the number of participants that can be included in the analyses.

These findings replicate and extend our previous work by examining social-evaluative threats and stress-responsive hormone fluctuations in youth to a motivational climate experimental investigation. The collective response of youth in the caring, task-involving group indicate that creating a highly caring, task-involving climate yields more adaptive motivational and stress-related responses in physical activity settings, and may in fact elicit a protective response to stress in youth, as indicated by the markedly low ratings of humiliation, shame, and self-consciousness and high ratings of positive affect, esteem, and self-confidence. In contrast, ego-involving climates may put youth at a disadvantage, as elevated cortisol levels hinders muscle development, triggers poor diet and eating behaviors, and can have a deleterious impact on the cardiovascular and immune systems (McEwen & Stellar, 1993). Finally, and perhaps most concerning are indications that frequent, yet short-lived exposures to social threats can result in dysregulation of the HPA axis, a potentially detrimental consequence with wide-ranging health implications (Miller, Chen, & Cole, 2009).

In sum, ego-involving climates may serve as a catalyst for a disconcerting cascade of psychological and physiological responses due to rampant threats to the social self. Smith et al.,

(2007) and others (e.g., Passer, 1988) have argued it may be punishment, specifically, that evokes negative affect and fosters a threatening psychosocial context for youth in sport settings, in particular for children who fear failure and disapproval. We add that placing importance on winning and outperforming others will heighten insecurities and feelings of uncontrollability, and introduce a constant socially evaluative presence, thus offering little in the way of coping while compounding the stressful experiences of adolescents. As such, it may be that all ego-involving features collectively contribute to a threating psychosocial context that hinders the performance and the well-being of youth.

Conclusions

Results from this study suggest that leaders who create a caring and task-involving climate in physical activity settings, that focus youth on their personal effort and improvement and foster positive interactions with peers, play an important role in youth development. The youth in this study that experienced this positive climate in turn reported higher enjoyment, better moods, and lower overall stress responses. In contrast, adolescents in the ego-involving climate condition, where the focus was on outperforming others, reported lower enjoyment, more negative mood states, and much higher stress responses. This study was the first to examine adolescents' hormonal stress responses to the perceived motivational climate within a physical activity setting, and results provide strong evidence that a caring and task-involving climate may be key to buffering individuals' performance related stress and enhancing the motivational behavior and well-being of youth in physical activity settings.

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Table 1

Correlation Table Among Motivational Climates and Post-Intervention Variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Caring Climate	1																
2. Task Climate	.79*	1															
3. Ego Climate	-.91*	-.71*	1														
4. Cortisol *t=30 min*	-.22	-.18	.25	1													
5. Cortisol *t=45 min*	-.31*	-.21	.36*	.93*	1												
6. Cortisol *t=60 min*	-.34*	-.17	.34*	.77*	.79*	1											
7. Shame	-.78*	-.56*	(.62*/.36)	.31*	.37	.30	1										
8. Judged	-.78*	-.59*	.82*	.36*	.48*	.41*	.76*	1									
9. Humiliated	-.82*	-.58*	.73*	.29	.36*	.30	.92*	.77*	1								
10. Self-Conscious	-.82*	-.57*	(.75*/.31)	.36	.42*	.43*	.84*	.73*	.87*	1							
11. Cognitive Anxiety	-.73*	-.45*	.76*	.24	.27	.19	.71*	.60*	.77*	.81*	1						
12. Somatic Anxiety	-.78*	-.47*	.72*	.30*	.36	.27	.75*	.63*	.84*	.85*	.90*	1					
13. Self-Confidence	.82*	.73*	-.83*	-.23	-.28	-.19	-.66*	-.70*	-.74*	-.69*	-.76*	-.75*	1				
14. Effort	.30	.36*	-.38*	.01	-.07	-.03	-.27	-.47*	-.19	-.09	-.10	-.10	.46*	1			
15. Enjoyment	.70*	.68*	-.68*	-.20	-.27	-.16	-.73*	-.69	-.68*	-.62*	-.54*	-.55*	.76*	.60*	1		
16. Positive Affect	.70*	.67*	-.69*	-.35	-.41*	-.28	-.58*	-.71*	-.58*	-.48*	-.49*	-.53*	.81*	.64*	.72*	1	
17. Negative Affect	-.84*	-.58*	.74*	.20	.25	.17	.80*	.65*	.91*	.84*	.86*	.93*	-.77*	-.13	-.60*	-.56*	1
18. Subjective Social Status	.64*	.61*	-.72*	-.11	-.17	-.13	-.59*	-.68*	-.65*	-.61*	-.64*	-.59*	.75*	.44*	.72*	.60*	-.62*
Chronbach's alpha	.98	.85	.96	-	-	-	-	-	-	-	.91	.93	.92	.88	.91	.87	.95

Note. Correlation values that were significantly different by condition are presented as: (ego-involving condition correlation / caring, task-involving condition correlation).

*p <.01

Table 2

Means (SD) for Post-Climate Intervention Scores for PANAS, Enjoyment, Effort & CSAI-2 by Motivational Climate and Gender within Motivational Climate

Variable	Total C/TI	Total EI	Cohen's *d*	C/TI		EI	
				Female	Male	Female	Male
PANAS							
Positive Affect	41.31[a] (6.33)	29.00[a] (6.96)	1.85	41.80 (6.30)	40.79 (6.57)	28.91 (6.36)	29.14 (8.36)
Negative Affect	12.17[a] (2.99)	25.94[a] (12.15)	1.56	13.47 (3.64)	10.79 (.97)	27.73 (11.20)	23.14 (13.93)
Enjoyment	4.51[a] (0.57)	3.03[a] (0.92)	1.93	4.63 (0.42)	4.38 (0.70)	2.93 (1.04)	3.20 (0.73)
Effort	6.08[a] (0.65)	5.48[a] (0.89)	.77	6.05 (0.60)	6.11 (0.73)	5.40 (0.89)	5.60 (0.94)
CSAI-2							
Cognitive Anxiety	1.55[a] (0.59)	2.57[a] (0.85)	.62	1.67 (0.72)	1.43 (0.41)	2.70 (0.73)	2.37 (1.03)
Somatic Anxiety	1.27[a] (0.33)	2.26[a] (0.94)	1.41	1.34 (0.40)	1.20 (0.22)	2.31 (0.91)	2.18 (1.05)
Self Confidence	3.27[a] (0.64)	1.99[a] (0.55)	2.15	3.19 (0.74)	3.35 (0.52)	1.95 (0.59)	2.05 (0.53)

Note. Group means (*SD*) in each row that share subscripts differ significantly and are presented by motivational climate assignment, followed by gender within each climate. Higher scores reflect more extreme responses for the construct assessed. Scores reflect responses during the motivational climate intervention. C/TI = Caring, Task-Involving Climate; EI = Ego-Involving Climate; PANAS = Positive Affect, Negative Affect Scale; CSAI-2 = Cognitive State Anxiety Inventory-2

[a] $p < .01$, between C/TI and EI. [b] $p < .05$, between C/TI and EI. [c] $p < .01$, between males and females. [d] $p < .05$, between males and females.

Table 3

Means (SD) for Post-Climate Manipulation Scores for Individual Response Items by Motivational Climate and Gender within Motivational Climate

Variable	Total C/TI	Total EI	Cohen's *d*	C/TI		EI	
				Female	Male	Female	Male
Individual Items							
Manipulation Check							
Stressed	2.08[a] (1.69)	4.39[a] (2.38)	1.12	2.31 (1.60)	1.82 (1.83)	4.91[c] (2.30)	3.57[c] (2.44)
Evaluated	1.58[a] (1.44)	4.83[a] (1.65)	2.10	2.08 (1.84)	1.00 (0.00)	4.45 (1.50)	5.43 (1.81)
Stress-Related Responses							
Shame	1.08[a] (0.41)	4.06[a] (2.34)	1.77	1.00 (0.00)	1.18 (0.60)	4.91[d] (2.17)	2.71[d] (2.06)
Humiliation	1.00[a] (0.00)	3.94[a] (2.26)	1.84	1.00 (0.00)	1.00 (0.00)	4.64[d] (2.01)	2.86[d] (2.34)
Judged by Peers	1.21[a] (0.46)	4.83[a] (1.54)	3.19	1.29 (0.58)	1.12 (0.27)	4.91 (1.45)	4.71 (1.80)
Self-Consciousness	1.29[a] (0.75)	4.11[a] (2.05)	1.83	1.23 (0.60)	1.36 (0.92)	4.27 (1.95)	3.86 (2.34)
Adaptive Motivational Responses							
Perceived Social Status	8.00[a] (2.14)	4.50[a] (2.87)	1.38	7.93 (2.58)	8.07 (1.64)	4.09 (3.14)	5.14 (2.48)
Interest in Continuing to Juggle	5.67[b] (1.43)	4.39[b] (2.03)	.73	5.83 (1.25)	5.50 (1.64)	4.45 (2.34)	4.29 (1.60)
Excited to Continue Juggling	5.96[a] (1.27)	4.06[a] (1.95)	1.15	6.26 (0.71)	5.63 (1.64)	4.27 (2.00)	3.71 (1.98)

Note. Group means (*SD*) in each row that share subscripts differ significantly. C/TI = Caring, Task-Involving Climate; EI = Ego-Involving Climate

[a] $p < .01$, between C/TI and EI. [b] $p < .05$, between C/TI and EI. [c] $p < .01$, between males and females. [d] $p < .05$, between males and females.

Figure 1. Timeline of Study Activities and Saliva Sample Collection

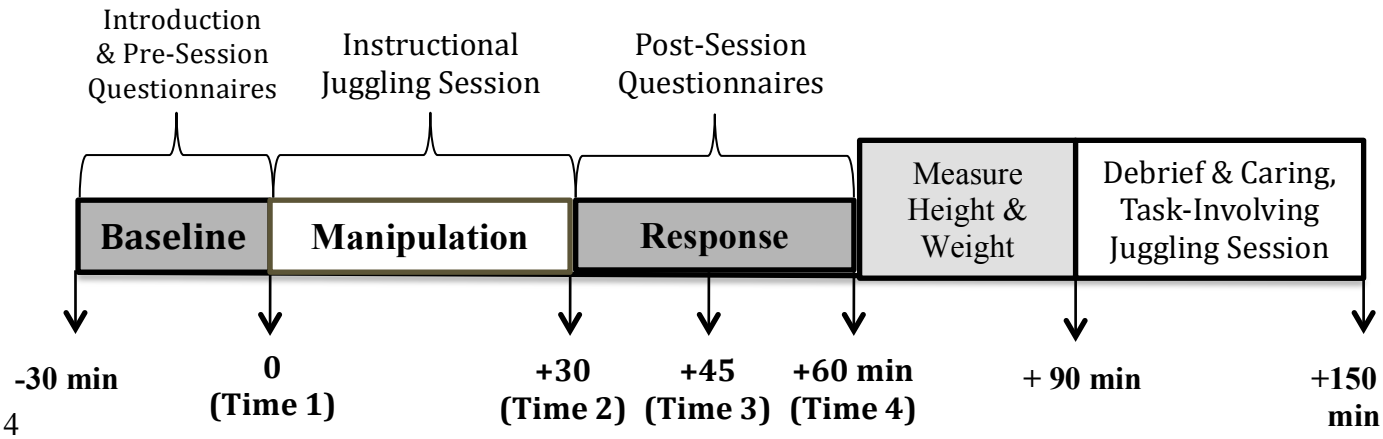

Figure 1. Salivary sample collection timeline (below) and research activities (above) relative to the beginning of the experimentally manipulated motivational climate intervention, *t = 0 min.*

Figure 2. Salivary Cortisol Responses Over Time by Motivational Climate

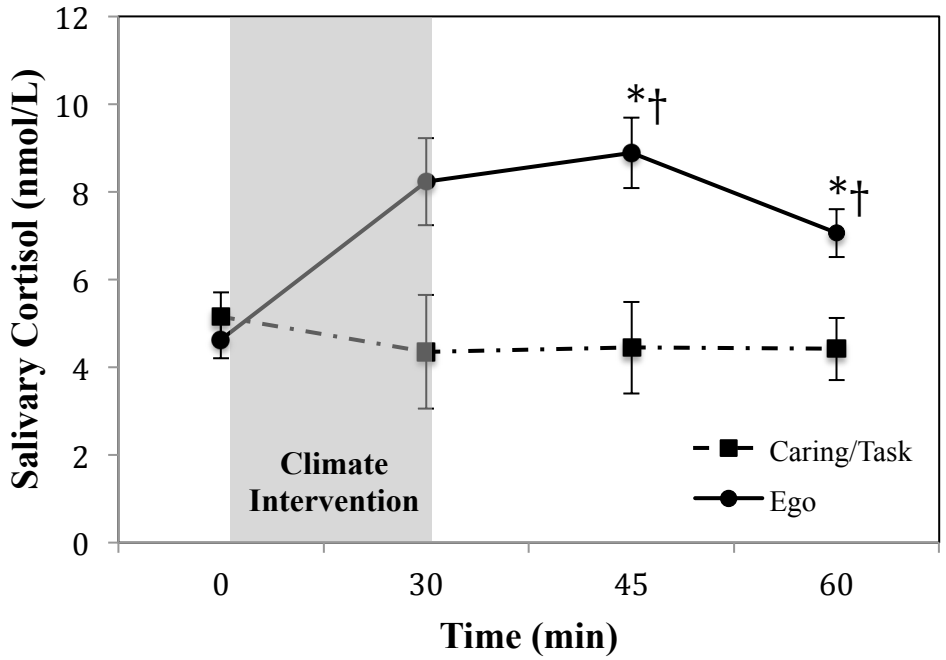

Figure 2. Mean salivary cortisol in nanomoles per liter at baseline ($t = 0$) and following the experimentally manipulated motivational climate intervention for the caring, task-involving and ego-involving groups. Vertical lines with cross bars represent ± standard error, while * indicates significant ($p < .05$) between group differences (i.e., caring, task-involving vs ego-involving) and † represents significant within group differences relative to baseline (i.e., ego-involving group cortisol rose significantly from baseline at $t = +45$ and + 60 min.)

Study 2

The Impact of the Perceived Motivational Climate in Physical Education Classes on Adolescent Greater Life Stress, Coping Appraisals, and Experience of Shame

Candace M. Hogue

Abstract

The current study examined associations between the perceived motivational climate (i.e., caring, task-, and ego-involving) in high school physical education classes and students' greater life stress (Cohen et al., 1983), state cognitive stress and coping appraisals (Gaab et al., 2005) and internalized shame (Cook, 1996), after controlling for depression. Students (N = 349; M_{age} = 15.69, SD = 1.29) completed questionnaires near the end of the semester. Structural equation modeling analysis revealed a positive and linear relationship between a task-involving climate and psychological coping appraisals (i.e., competence and control), with a .62 R^2 for the task-involving climate and 56% of coping variance accounted for. A positive and linear relationship between an ego-involving climate and greater life stress (R^2=.20) and shame (R^2=.23) emerged, with the final model accounting for 60% of variance in life stress and 42% of shame (χ^2/df = 209.59/168, p = .016, RMSEA = .027, CFI = .99, TLI = .99, SRMR = .03). Consistent with achievement goal theory (Nicholls, 1984, 1989), results link perceptions of a task-involving climate in physical education classes with adaptive psychological coping appraisals and perceptions of an ego-involving climate with internalized shame and greater life stress. As such, an ego-involving climate may undermine efforts to utilize physical education as a means to promote physical activity and may also have an adverse effect on youth that extends far beyond sporting contexts; Whereas a physical education setting with a caring, task-involving motivational climate seems a more promising vehicle in which to promote adolescent well-being and foster a greater interest in physical activity.

The Impact of the Perceived Motivational Climate in Physical Education Classes on Adolescent Greater Life Stress, Coping Appraisals, and Experience of Shame

Physical education can be instrumental in promoting physically active lifestyles and well-being among youth. Beyond the many health-related benefits of physical education is the opportunity to provide youth with an affirming, supportive experience that may help each student cope with the many life stressors that so often accompany adolescence. However, the physical, psychological, and social benefits that can be gained by engaging in group-based physical activities are not guaranteed, and often the very opposite occurs, with youth being subjected to psychosocial threats that can adversely impact their mental and physical well-being (Bean, Fortier, Post, & Chima, 2014; Larson, Hansen, & Moneta, 2006). Reports of abuse in sport-based physical education classes, of youth feeling demoralized and being physically threatened, and of discriminatory practices against students who display low levels of ability (Ennis, 1996) suggest participation can counter efforts to utilize physical education as a means to enhance well-being and promote healthier lifestyles among youth (Dietz, 2015). Importantly, the sport and exercise psychology literature has shown that the perceived motivational climate plays a key role in whether youth have a positive experience during physical activity and whether participation will help facilitate or hinder the aims of physical education.

For instance, research utilizing achievement goal theory (Nicholls, 1984, 1989) has revealed that controllable elements within the psychosocial context of physical education classes, including the manner in which educators structure activities (e.g., cooperative vs. rivalry-based) and the reward structure utilized (i.e., mastery-focused vs. winning-focused), reliably predict students' motivational responses, including whether youth have a positive experience that ultimately fosters a continued interest in sport and physical activity (Braithwaite et al., 2011; Harwood et al., 2015; Hellison, 1995; Hogue, Fry, & Fry, 2017; Lloyd & Fox, 1992; Marsh &

Peart, 1988; Petitpas et al., 2005). The psychological benefits and adaptive cognitive and behavioral responses of creating a caring, task-involving climate in youth-based physical activity settings are well documented. When leaders make an effort to foster positive relationships, recognize the value of each child's unique role, and reward high effort and improvement (e.g., skill mastery), youth have more fun, try harder, and report greater self-confidence in their skills and their ability to master new skills. In contrast, perceptions of an ego-involving climate in physical activity settings, where mistakes are punished, winning and out-performing peers are given high importance, and intra-group rivalry is fostered, tend to coincide with less adaptive, often troubling outcomes, including notably greater anxiety, feeling judged by peers, and having a fear of making mistakes (Braithwaite et al., 2011; Fry & Gano-Overway, 2010; Gano-Overway & Guivernau, 2014; Hogue et al., 2017; Pensgaard & Roberts, 2002). What is less understood is how the motivational climate fostered by leaders in achievement-based physical activity settings (e.g., physical education class) influence the stress responses of youth.

A review of the extant literature will reveal how achievement goal theory research is largely concentrated on adaptive psychological responses, with a sizeable portion of the more negative outcomes selectively focused on anxiety-based assessments rather than psychological stress (Braithwaite et al., 2011; Smith et al., 2007; Vosloo, Ostrow, & Watson, 2009). Psychological stress represents the perception that situational demands exceed one's ability to cope (Cohen, 1986), while state anxiety is reflective of transitional emotional and psychosomatic anticipatory responses, such as worry and elevated heart rate (Spielberger, 1970). However, because the constructs of anxiety and stress are related, this body of research supports the contention that an ego-involving climate may have a deleterious effect on adolescent stress, while also highlighting the need for research in this area, given the comparably large disparity

between anxiety and stress research in the achievement goal theory and larger sport and exercise psychology literature.

Psychological stress corresponds with appraisals of uncontrollability, unpredictability, and feeling as though perceived expectations outweigh coping resources (Cohen, 1986). When physical education teachers place high importance on winning and activities are structured in such a way that there is a clear winner and a clear loser (i.e., create an ego-involving climate), the pressure to win or simply perform well may incite psychological stress among students hoping to receive the teachers' and classmates' approval. Furthermore, when intra-group rivalry is fostered, mistakes are punished, and public recognition and praise are given to those who outperform others, it may well be that only the most capable of athletes in each class feel as though they have control over their own success, and, as a result, feel that they are equipped to cope with the demands placed upon them. In contrast, by giving praise to students when they are trying hard and improving, teachers utilize a reward structure that empowers youth by giving them greater control over whether they will be recognized for their achievements. Furthermore, nurturing positive interpersonal relationships and utilizing cooperative drills and games that focus youth on their collective efforts and improvement cultivates a socially supportive environment where youth are working together to reach common, attainable goals.

According to social self-preservation theory and the supporting literature (Dickerson, Gruenewald, et al., 2004; Kemeny, Gruenewald, & Dickerson, 2004), a coordinated and potentially health threatening psychophysiological stress response is elicited in social settings when an individual's competencies or abilities are called into question, they feel excluded or scorned, or their social self-esteem or social status are threatened. Importantly, at the foundation of this response is shame, followed by elevated cortisol and inflammation - both of which can

compromise mental and physical health and well-being, as well as athletic performance (Cohen et al., 2012; Lautenbach et al., 2014; Raison, Capuron, & Miller, 2006; Young, 2004). Of particular relevance, in achievement contexts the most reliable and robust triggers of cortisol, a stress-responsive hormone, are feeling socially evaluated or that despite an individuals' best efforts, they do not have control over their own success (Dickerson & Kemeny, 2004; Dickerson, Kemeny, et al., 2004; Kemeny et al., 2004). It is critical to note that in a recent experimental investigation, Hogue and colleagues (2017) found that youth who were taught a new activity-based skill (i.e., juggling) in an ego-involving climate reported experiencing two to three times as much self-reported stress, judgment from peers, and social-evaluation compared to peer counterparts who were taught to juggle in a caring, task-involving climate. It is important, then, to consider that the very characteristics which render youth vulnerable to psychosocial threats are not only causally linked to shame-related emotions and a concerning physiological response, but that they may also be rampant within an ego-involving climate.

In support of this contention, the Hogue et al. (2017) study causally linked an ego-involving climate to elevated salivary cortisol concentrations and shame-related emotions in adolescents during an experimentally manipulated motivational climate intervention. Moreover, the ego-involving group reported having significantly less self-confidence in their ability to master the skill of juggling. The results of this study suggest youth experienced both psychological stress (e.g., demands exceeded expectations) and psychosocial stress (e.g., social-evaluation) in the ego-involving climate. Given the absence of humiliation experienced by youth in the caring, task-involving group (i.e., average score of 1.00 on a 1-5 scale), coupled with the markedly low ratings of social evaluation and judgment from peers (i.e., < 1.5 on a 1-5 scale), it seems a caring, task-involving climate may safeguard youth against psychosocial stress in

performance focused physical activity contexts.

Furthermore, when intentional efforts are made to implement a mastery-focused, kinder approach to physical activity, by reinforcing caring and task-involving features, this helps to promote the positive development and achievement of each student (Braithwaite et al., 2011; Fry et al., 2012). What is less understood, however, is whether such an environment will help youth cope with the stress associated with performing physical activities amongst peers or the greater life stress youth bring to their physical education classes. There has also been little investigation into the impact the motivational climate has on the stress responses of youth while engaged in structured physical activities amongst peers.

Therefore, the purpose of the current study was to investigate the relationship between the perceived motivational climate in high school physical education classes and state cognitive stress and coping appraisals, internalized shame, and perceptions of greater life stress. It was hypothesized that students' perceptions of an ego-involving climate would correspond with lower coping resources, and greater life stress, cognitive stress appraisals, and internalized shame. Also in line with achievement goal theory, it was hypothesized that perceptions of a more caring and task-involving climate would positively correspond with perceptions of coping resources and negatively correspond with shame, greater life stress, and state cognitive stress appraisals.

Method

Participants and Procedure

Participants were high school students ($N = 349$; $M_{age} = 15.69$, $SD = 1.29$; $n = 182$ females and 162 males) enrolled in at least one physical education class (e.g., weights, yoga) in the United States Midwest. The response rate was 98.6%. Of the students who completed the

questionnaire, five did not report gender. Participants identified as Caucasian (78.5%), Hispanic/Latina (6.7%), African American (5.9%), Native American (4.3%), and Asian/Pacific Islander (3.2%).

After permission was gained from the school districts to survey physical education students, individual high school principals were contacted, followed by the physical education teachers in each respective school. The survey took approximately 15 minutes to complete and was administered during physical education classes near the end of the semester. Institutional Review Board approval was received prior to contacting the school districts.

Measures

Motivational climate perceptions. The Abbreviated Perceived Motivational Climate in Exercise Questionnaire (PMCEQ-A; Moore, Brown, & Fry, 2015) and Caring Climate Scale (CCS; Newton et al., 2007) were employed to assess perceptions of the motivational climate in students' physical education classes. The stem for each of item was changed to, "During PE class…", and responses to statements for both scales included a 5-point Likert-style scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The PMCEQ-A is a 12-item measure consisting of two subscales that quantify the extent to which participants perceive task- (6 items) and ego-involving (6 items) features to be emphasized in a physical activity-based setting. A sample task-involving item was, "During PE class, the teacher emphasizes always trying your best", while a sample ego-involving item was "…the teacher gives most of their attention to only a few students*"*. The PMCEQ-A has demonstrated acceptable factorial validity and internal reliability (Moore et al., 2015). Composite scores for each of the subscales (i.e., task- and ego-involving) are calculated by averaging the summed scores.

The 13-item CCS was used to quantify students' perceptions of elements of caring in their physical education classes, including feelings of support, respect, and belongingness. A sample caring item was, "…the teacher accepts students for who they are". Summed scores were averaged for a composite CCS score. The CCS has repeatedly demonstrated strong psychometric properties with youth populations (Gano-Overway et al., 2009; Newton, Fry, et al., 2007).

State cognitive stress. Students' state cognitive stress and coping appraisals during their physical education classes were assessed using the Primary Appraisal/Secondary Appraisal Scales (PASA; Gaab et al., 2005). This 16-item scale is comprised of two subscales with items evenly distributed between a Primary Scale (i.e., threat and challenge/importance; stress appraisals) and a Secondary Scale (i.e., self-concept of competence and control expectancy; coping appraisals). Primary appraisal reflects students' judgments of relevance, stress, and how uncontrollable a situation is believed to be, while secondary appraisal reflects students' beliefs about coping resources and options available to them in a given situation (e.g., "what might and can be done"; Gaab et al., 2005, p. 601).

A primary stress appraisal item (reverse scored) was, "I do not feel worried about PE class because it does not represent any threat for me", while a secondary coping appraisal item was, "I can protect myself against failure in PE through my behavior". Responses were rated using a 6-point Likert scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The PASA has displayed acceptable reliability and factorial validity, and has been validated for use with adolescent populations (Gaab et al., 2005; Slattery, Grieve, Ames, Armstrong, & Essex, 2013).

Internalized shame. The experience of internalized shame was measured using the "Inadequate and Deficient" subscale of the Internalized Shame Scale (ISS; Cook, 1996). This 10-item subscale was used to quantify students' shame-related feelings of inadequacy and

deficiency experienced during physical education class using a 4-point Likert scale ranging from 0 (*never*) to 4 (*almost always*). A sample item is, "During PE class, I feel intensely inadequate and full of self-doubt". The ISS has displayed adequate psychometric properties (Cook, 1996), and has been used with youth populations (Hsieh, 2013).

Life stress. The Perceived Stress Scale (PSS; Cohen & Hoberman, 1983; Cohen & Williamson, 1988) was employed to capture the degree to which students feel their lives are uncontrollable, unpredictable, and overloading. Students were asked to rate on a scale from 0 (*never*) to 4 (*very often*) how often they have felt a certain way in the last month. A sample item was, "In the last month, how often have you felt that you were unable to control the important things in your life?". The PSS is a widely used measure of stress with strong psychometric properties (Cohen & Williamson, 1988) that has been used with adolescent populations (Duckworth, Kim, & Tsukayama, 2012).

Depression. Depression was indexed using the Beck Depression Inventory-Primary Care (BDI-PC; Winter, Steer, Jones-Hicks, & Beck, 1999), with responses ranging from 0 (*not at all*) to 3 (*extremely*). Students were asked to select the item that best described themselves for "the past 2 weeks, including today." For the purposes of this study, a single item reflecting suicidal ideation was omitted from the survey. The BDI-PC has been validated for use with adolescents (Winter et al., 1999).

Analyses

Hypothesized Model

Structural equation modeling was used to assess our hypothesized model (see Figure 1). Controlling for depression, our predicted relationships with perceptions of both the caring and task-involving climates included positive linear relationships with secondary coping appraisals

(i.e., control and competence coping appraisals) and negative relationships with greater life stress, shame, and primary stress appraisals (i.e., threat and challenge appraisals). In contrast, predicted relationships with the perceived ego-involving climate included positive linear relationships with greater life stress, shame, and primary cognitive stress appraisals, as well as a negative relationship with secondary coping appraisals.

Measurement Model and Parceling

To begin the analysis, a measurement model of our hypothesized model was tested using maximum likelihood with Mplus version 7.4. The ego-involving item, "…students are excited when they do better than their peers" was removed because it did not meet the .30 loading criteria (Hoyle, 2000), nor did the challenge subscale of the PASA scale. This resulted in state cognitive stress appraisals reflecting perceptions of threat during class, exclusively. All remaining items met inclusion criteria, with skew values less than +/– 2.0. Prior to analyses all data were tested for normality. Once the aforementioned ego item and the challenge subscale were removed, the underlying factor structure of the primary appraisal subscale of the PASA was supported, with threat perceptions only, as were the coping subscale of the PASA, the ISS, PSS, BDI-PC, PMCEQ-A, and CCS ($\chi^2/df = 451.428/224$, $p < .001$, RMSEA = .053, CFI = .96, TLI = .95, SRMR = .147).

Items were then parceled according to recommendations by Little (2013). Because indicators were congeneric, the items were parceled by pairing items with the highest scale-correlations with items with the lowest scale-correlations, and so on, until all items had been assigned a parcel. All parcels correlated with factors at .50 or higher, and no two constructs had a covariance of .90 or greater (See Figure 2; Little, 2013). The variances between latent

variables were allowed to correlate, while the variance for each respective latent variance was fixed at 1.

In order to remove any variance due to depression, depression was included as a statistical control (i.e., covariate) in a full partial approach, as recommended by Little (2013). A full partial was warranted given that significant direct effects of depression on the outcome variables were found after having removed the influence of depression from the climate predictors, suggesting the indirect pathways did not control for the impact of depression on ratings of life stress, shame, and state cognitive stress and coping. We also analyzed a model for comparison that did not control for depression in order to examine whether the link from depression to shame, life stress, and state cognitive stress and coping influenced our model, as research and theory would suggest. Comparison of our final model (see Figure 5) and the model that did not control for depression (see Figure 3) support the inclusion of depression as a covariate. See Table 2 for a comparison of fit indices for each model.

All predicted relationships with primary stress appraisal (i.e., perceived threat) were non-significant in the initial model (See Figure 4), which led to pruning primary stress appraisal (i.e., threat appraisal) from the final model (See Figure 5). Inspection of the tolerance statistics (e.g., modification indices) did not suggest altering the final model in a way that was congruent with theory would improve model fit in any meaningful way. The following fit indices were used to evaluate the models: the comparative fit index (CFI); the root mean square error of approximation (RMSEA); the Tucker-Lewis index (TLI); the standardized root mean square residual (SRMR).

Results

In total there was < 5% missing data for each variable and < 5% overall missingness.

Internal consistency score reliabilities are reported in Table 1, along with correlations, means, and standard deviations. Parameter estimates can be found in Figures 2-5 for each respective model, whereas fit indices for each model are reported in Table 2. As expected, the loadings were generally high and residuals were low (see Figure 2). The results of the structural equation models indicate a strong model fit for each model, with the following indices falling within the parameters indexed by Little (2013), namely an RMSEA < .05, a CFI/TLI > .95, and an SRMR < .05. The fit indices for our final model were: $\chi^2/df = 209.586/168$, $p = .016$, RMSEA = .027, CFI = .992, TLI = .990, SRMR = .032. In sum, the final model is substantively meaningful, fits the observed data well, is parsimonious, and has a strong CFI and TLI suggesting close model fit.

The structural equation model analysis revealed a positive and linear relationship between the perception of a task-involving climate and coping appraisals (of competence and control), with 56% of the total variance in coping appraisals accounted for in the final model. Analyses also revealed a positive and linear relationship between the perception of an ego-involving climate and both greater life stress and internalized shame. The final model accounted for 60% of the variance in greater life stress and 42% of the variance in internalized shame. More specifically, the results revealed the perception of an ego-involving climate in physical education class was linked to adolescent greater life stress ($R^2 = .195$, $p < .001$), as well as internalized shame experienced by students during physical education class ($R^2 = .231$, $p < .001$). In contrast, the perception of a task-involving climate was positively associated with psychological coping appraisals of competence and control during physical education class ($R^2 = .620$, $p < .001$).

Although the perception of a caring climate was negatively linked to greater life stress

before controlling for depression (see Figure 3), this relationship did not hold after controlling for depression (see Figure 4) and was therefore omitted from the final model (see Figure 5). Likewise, the perception of an ego-involving climate was positively linked to cognitive stress (threat) appraisals prior to controlling for depression, but did not hold after controlling for depression and was therefore omitted in the final model.

Discussion

In line with achievement goal theory, results from the current study link perceptions of a task-involving climate during physical education class to greater coping appraisals of competence and control for high school students. This is important, as perceived competence and control are adaptive psychological resources that better enable students to cope with psychosocial stress in performance settings (Gaab et al., 2005). Moreover, self-determination theory and the supporting body of literature have identified competence as a central component of intrinsic motivation in physical activity contexts (Standage, Duda, & Ntoumanis, 2003a). Although the relationship between a caring climate in the current study and the outcome variables investigated did not remain significant after controlling for depression, caring and task-involving climates have been shown to compliment one another with respect to optimizing the experience and the motivation of youth in physical activity settings (Fry & Gano-Overway, 2010; Fry et al., 2012; Gano-Overway et al., 2009). Therefore, we argue intentional efforts to create a highly caring, task-involving climate during physical education class may facilitate efforts to utilize physical education as a means to foster a greater interest in sport and physical activity (Bryan, 2006; Deci, 1980), whereas fostering an ego-involving climate may undermine these efforts (Braithwaite et al., 2011; Harwood et al., 2015).

For instance, the current study linked perceptions of an ego-involving climate to greater life stress in high school students. Life stress is associated with burnout and sport devaluation (Raedeke & Smith, 2001), as well as poor health choices in adolescents (Cartwright et al., 2003). Moreover, the positive and significant association between an ego-involving climate and adolescent greater life stress links physical education classes with ego-involving climates to youth feeling more overwhelmed by life, that what happens in their life is unpredictable, and that they lack control over what happens in their own life. Whether this relationship is causal cannot be inferred given the limitations of the current study, however these findings and the relationship between greater life stress and adolescent depression certainly warrants further investigation.

The perception of an ego-involving climate was also positively and significantly linked to students feeling inadequate and deficient (i.e., experiencing internalized shame) in their physical education class. The implications of this finding are worth highlighting, as the experience of shame is believed to be central to the pathology of stress (Tangney & Dearing, 2002). For example, shame is a convincing indicator of psychosocial stress that reliably activates the HPA axis (Dickerson & Kemeny, 2004). Although this was a cross-sectional design, an experimental investigation conducted by Hogue et al. (2017) causally linked an ego-involving climate to marked elevations in shame and humiliation in adolescents, whereas a caring, task-involving climate minimized these emotions. It is also worth noting that perceptions of an ego-involving climate have also been linked to performance-related shame in a sporting context, whereas caring and task-involving climate perceptions were not (Fontana, Fry, & Cramer, 2017). These investigations suggest shame-related emotions may be averted in physical activity settings if leaders (e.g., coaches and educators) are intentional about fostering a more caring, task-involving climate among youth.

Emphasizing task-involving climate features may help abate social evaluative threats and feelings of uncontrollability (Hogue et al., 2017), while the social connections fostered in a caring, task-involving context may provide a psychological buffer against the many pathogenic effects of stress (Cohen & Pressman, 2004). For instance, when educators reward behaviors that are under the control of youth (e.g., high effort) and base praise and recognition on factors that are a direct result of such efforts (e.g., personal and group improvement), it follows that youth would experience greater competence and control, and subsequently less psychological stress. Moreover, Cohen & Pressman (2004) argue that social support may help distract from potential stressors, thus mitigating their impact. In the context of physical education, this may manifest as positive social interactions and task-oriented encouragement from peers (e.g., "good try!", high-five) distracting from performance related stress and any subsequent discomfort that may follow from pressure to perform. In essence, social support may serve as an adaptive cognitive distraction.

Moreover, Gaab et al. (2005) contend that the more competent and in control an individual feels in group-based achievement settings, the better they will be able to cope with psychosocial stress. Of relevant note, achievement goal theory research has shown that the motivational climate fostered by leaders can influence how an individual defines competence (i.e., their goal orientations) in performance settings; A highly task-involving climate cultivates a more mastery focused, attainable definition of success (e.g., I am competent if/when I give high effort and am improving), while a highly ego-involving climate can cultivate a more normative, less controllable definition of success (e.g., I am competent if/when I am winning; Boyce, Gano-Overway, & Campbell, 2009; Waldron & Krane, 2005), where achievement is within reach of only the most highly talented few. In one formidable example, Boyce, Gano-Overway, and

Campbell (2009) were able to show that perceptions of a task-involving climate coincided with a stronger task orientations and greater self-rated competence in youth over the course of a sporting season. This further supports the notion that in a task-involving climate youth are better empowered to meet the demands placed upon them (i.e., their coping resources meet or outweigh perceived expectations), thus helping protect youth from what could be maladaptive performance related stress. Future research may consider examining whether the association found between task-involving climates and greater psychological coping (i.e., competence and control) is in part due to the motivational climate fostered by leaders and the role goal orientations may play in this relationship.

With respect to limitations, because this was a cross-sectional investigation, the inferences that can be drawn from the findings are limited. Future investigations may consider examining the influence an ego-involving climate has on greater life stress and shame over time, and the impact this has on depression levels and health-related behaviors of youth (Chang, 2001). This is important, as adolescents are particularly vulnerable to stress (Romeo, 2010), which often leads to depression and coping through substance abuse (Wills, Vaccaro, & McNamara, 1992). Moreover, because social support can be a strong mediator of these relationships (Thorsteinsson, Ryan, & Sveinbjornsdottir, 2013), further exploration of the impact of a caring, task-involving climate is also warranted.

Some additional limitations with respect to state cognitive stress warrant both caution and further consideration. Although we anticipated that an ego-involving climate would contribute to state cognitive coping appraisals, the primary appraisal scale intended to quantify state cognitive stress during physical education class was not supported by the final model. It should be noted that the psychometric properties of the challenge subscale of the primary appraisal scale

were not strong enough to justify inclusion, and as a result, only the threat subscale of the primary appraisal scale was incorporated into the initial model. While the ego-involving climate was significantly and positively related to state cognitive threat appraisals prior to controlling for depression, all relationships between the motivational climate and state cognitive stress were non-significant after controlling for depression. As a result, cognitive stress was omitted from the final model. However, because life stress plays a significant role in depression, and depression has been shown to contribute to greater life stress (Chang, 2001; Hammen, 1991), a longitudinal study examining these relationships and the role of motivational climate is warranted. It may well be that the multitude of maladaptive responses triggered by ego-involving climates (e.g., elevated shame and cortisol) collectively contribute to depression.

In light of the study findings, it is critical to consider the consequences of creating an ego-involving climate on youth sport teams. Investment is likely much greater on sport teams than in physical education class, suggesting sport settings may elicit more emotionally charged, robust stress responses. Likewise, a more comprehensive view of adolescent stress responses to the perceived motivational climate in physical activity settings is needed, including a better understanding of the psychophysiological interplay between motivational climates, stress, and adolescent well-being. It would also be important to understand whether depressed students have a heightened sensitivity to shame-related responses, and whether mental skills training provides coping resources that help buffer the stress response for both depressed and non-depressed students.

In sum, a caring, task-involving climate may advance efforts to utilize physical education as a means to promote student health and interest in physical activity. Perceptions of competence (i.e., overall skill levels) and motor skill competence are strong predictors of

attitudes towards physical education and physical activity (Silverman, 2005) - when students have a positive attitude toward physical activity, they are less likely to be sedentary and more likely to engage in physical activity (Lowry, Lee, Fulton, Demissie, & Kann, 2013). In contrast, it is important to acknowledge that an ego-involving climate may have a lasting, less positive impact on youth. Perhaps the most important finding from the current study was the association between perceptions of an ego-involving climate in physical education classes and feelings of unpredictability, uncontrollability, and overwhelm in high school students' lives (i.e., their greater life stress). In light of the study findings and collective achievement goal theory literature, it is critical to consider that an ego-involving climate may undermine efforts to utilize physical education as a means to promote adolescent well-being and interest in leading more physically active lifestyles, and may also have an adverse effect on youth that extends far beyond sporting contexts.

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Table 1

Descriptive statistics

Variable	Basic Statistics					Correlations						
	Mean	SD	Min	Max	Alpha	1	2	3	4	5	6	7
1. Caring Climate	3.98	.67	1.15	5.00	.94							
2. Task-Involving Climate	4.04	.71	1.00	5.00	.86	.779**						
3. Ego-Involving Climate	2.92	.73	1.33	5.00	.75	-.397**	-.276**					
4. Life Stress	18.19	7.69	0.00	39.00	.86	-.330**	-.231**	.291**				
5. Shame	0.60	.91	0.00	4.00	.96	-.406**	-.314**	.340**	.430**			
6. Primary Stress Appraisal	4.03	.91	1.25	6.00	.67	-.029	.003	.029	.197**	.397**		
7. Secondary Coping Appraisal	4.64	.71	1.88	6.00	.73	.516**	.547**	-.114*	-.302**	-.393**	-.204**	
8. Depression	4.77	4.30	0.00	18.00	.85	-.337**	-.240**	.215**	.656**	.517**	.207**	-.291**

Note. ** Significant (p<.001)

Table 2

Selective fit indices

	χ^2/df	RMSEA	CFI	TLI	SRMR
Measurement model	451.428/224 (p<.001)	.053 [.046-.060]	.959	.950	.147
Model no control	281.461/168 (p<.001)	.044 [.035-.053]	.975	.969	.048
Initial model	343.761/119 (p<.001)	.039 [.031-.047]	.978	.973	.044
Final model pruned	209.586 /168 (p=.016)	.027 [.012-.038]	.992	.990	.032

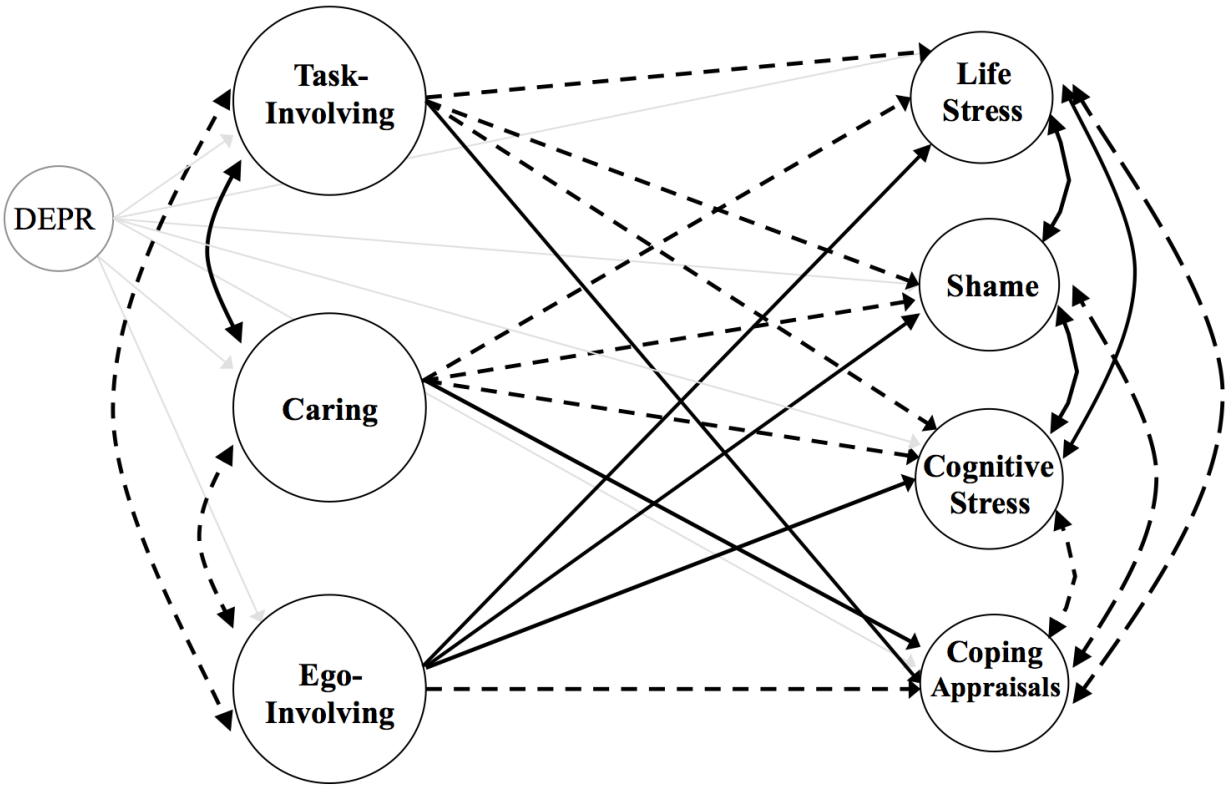

Figure 1. Hypothesized structural equation model. Solid lines represent hypothesized positive relationships, while dashed lines represent hypothesized negative relationships. Depr represent the latent variable, depression, that was controlled for.

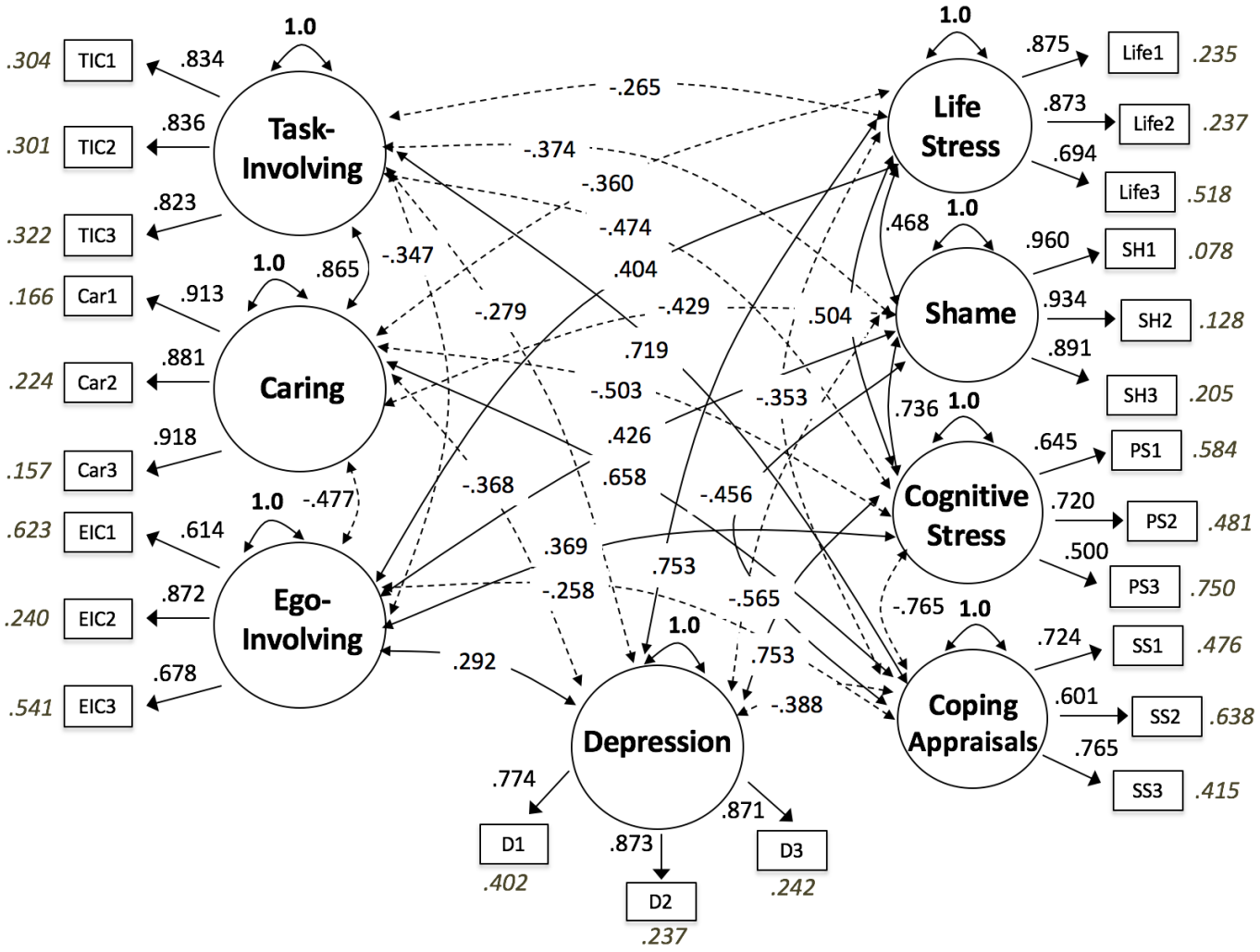

Figure 2. Measurement Model with Parcels. Model Fit: $\chi^2_{(224,\ n=349)} = 451.428$, $p < .001$; RMSEA = $.053_{(.046\text{-}.060)}$; CFI = .959; TLI= .950; SRMR = .147.

Note. Double headed arrows connecting constructs represent correlations between those psychological constructs.

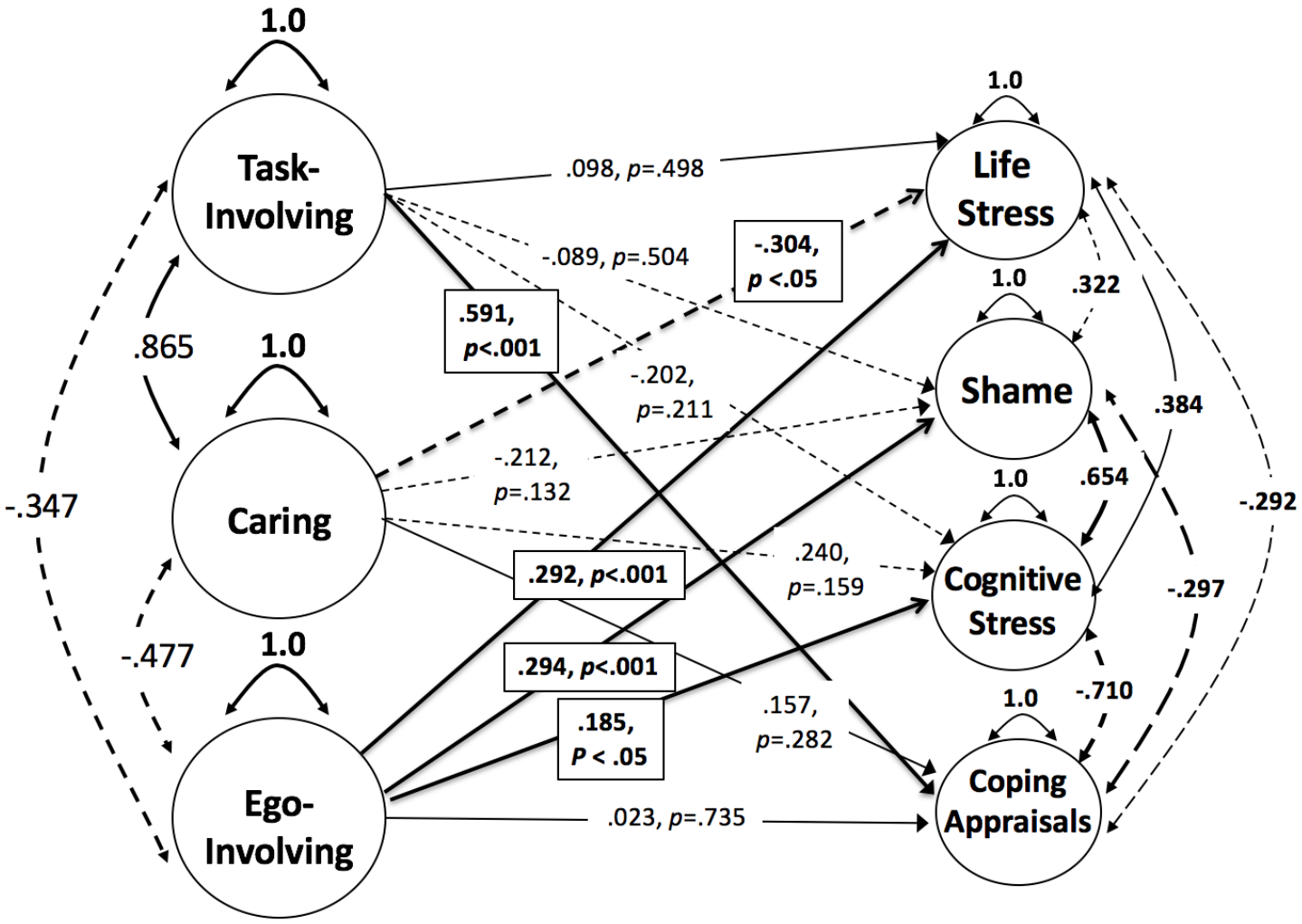

Figure 3. Structural Equation Model Without Controlling for Depression. Model Fit: $\chi^2_{(168,\ n=349)}$ = 281.461, p < .001; RMSEA = $.044_{(.035\text{-}.053)}$; CFI = .975; TLI= .969; SRMR = .048

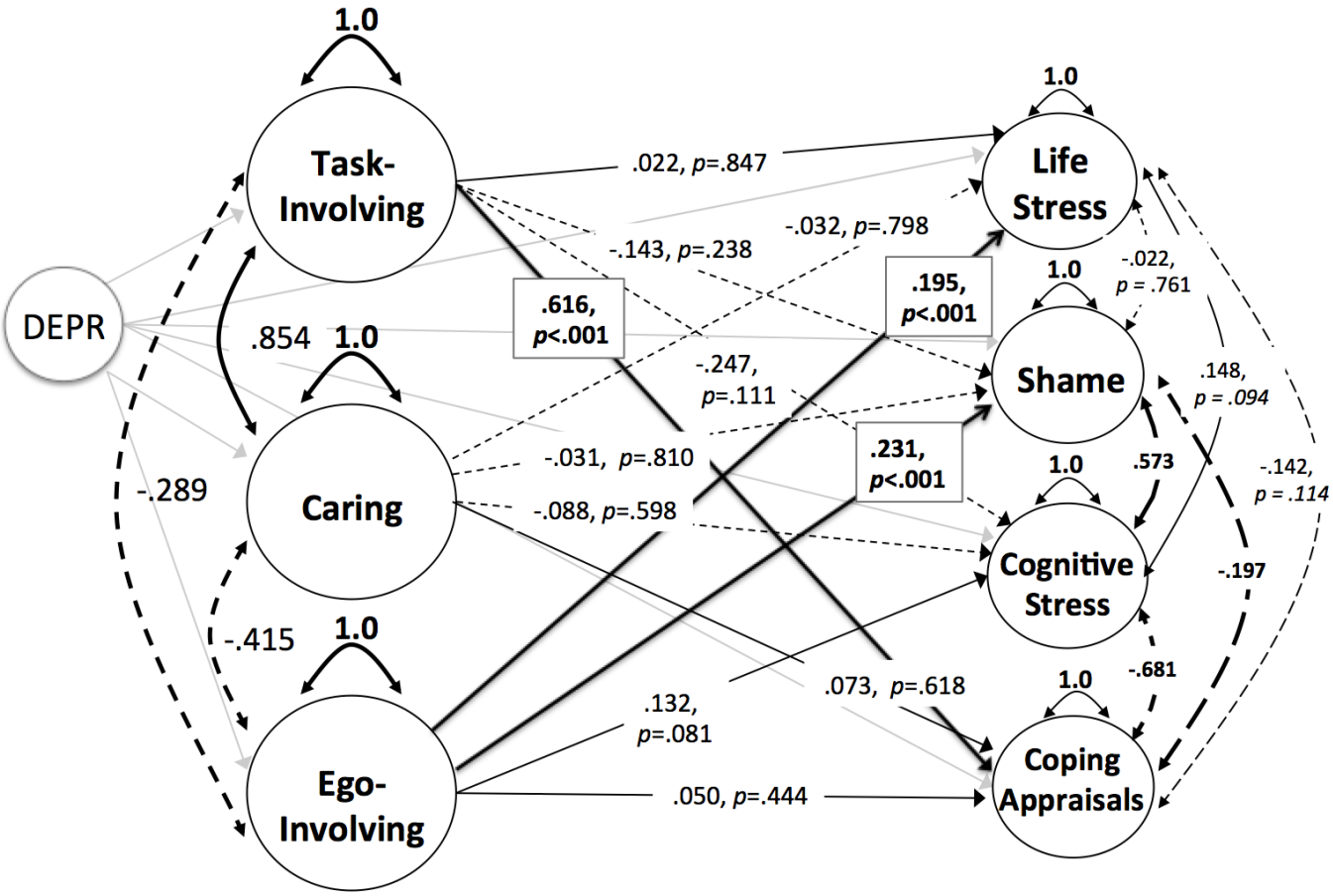

Figure 4. Initial Structural Equation Model. $\chi^2_{(119,\ n=349)} = 343.761$, $p < .001$; RMSEA = $.039_{(.031-.047)}$; CFI = .978; TLI= .973; SRMR = .044

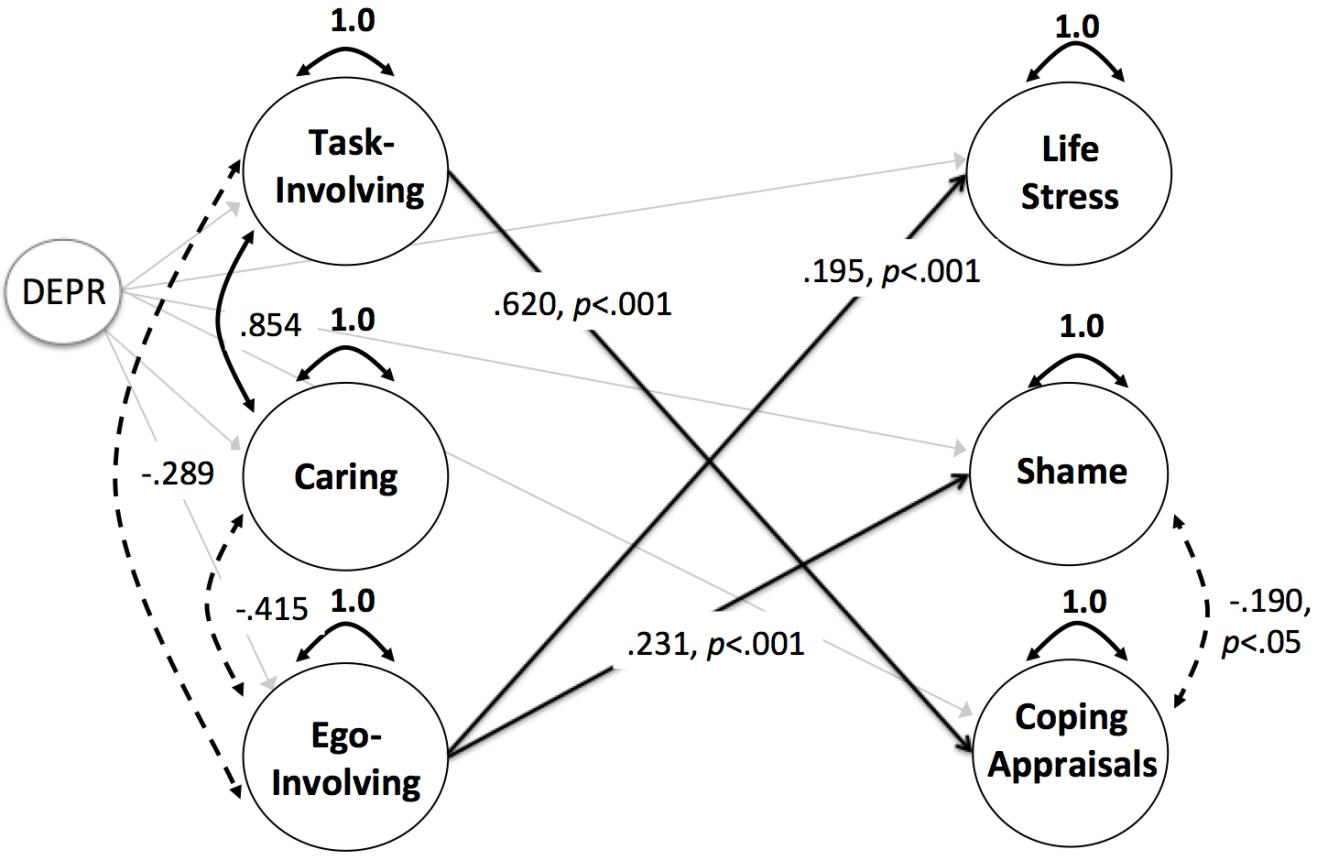

Figure 5. Final Structural Equation Model. Model Fit: $\chi^2_{(168,\ n=349)} = 209.586$, $p = .0162$; RMSEA = $.027_{(.012\text{-}.038)}$; CFI = .992; TLI= .992; SRMR = .032

Appendix A

Extended Literature Review

Extended Literature Review

This review begins with a brief overview of Nicholls' achievement goal theory (1984, 1989) and is followed by a thorough review of relevant motivational climate and psychosocial stress literature including Newton, Fry et al.'s (2007) caring climate research, Dickerson, Gruenewald, & Kemeny's (2004) social self preservation theory, and a brief discussion of Cassel (1976) and Cobb's (1976) stress buffering hypothesis. The extant literature is used to demonstrate how ego-involving motivational climates, as operationally defined, embody the very characteristics proven to elicit a coordinated and concerning stress response, including potentially threatening biochemical changes and psychological and behavioral responses that are particularly disconcerting in the context of youth development. This review will also illustrate how creating a task-involving motivational climate fosters an environment that helps minimize known triggers of the psychosocial stress response, and when accompanied by a highly caring environment, may buffer the psychological stress that can accompany group-based achievement settings, while also promoting advantageous outcomes in youth.

Achievement Goal Theory

In his seminal work developing achievement goal theory, Nicholls (1984, 1989) outlines a framework for achievement motivation that has evolved into one of the more influential theoretical frameworks of motivation with respect to the research and practice of sport and exercise psychology. Nicholls (1989) theorized that the reward structures and psychosocial environment cultivated by leaders in achievement settings will, in large part, predict the behavioral and motivational responses of participants. In support of achievement goal theory and Nicholls' contentions, decades of research strongly suggest there are controllable factors that can help leaders optimize participant performance, promote their well-being, and set youth up to

have a more positive experience during physical activity (for a review see Harwood et al., 2015). Given the value placed on performance and winning in American culture, as well as the number of youth who take part in sport and physical education, it is important that efforts are made to understand how to best optimize every child's experience in structured physical activity settings. In a similar vein, the myriad of physical and psychological benefits that can be gained from regularly engaging in physical activity also underscore the importance of understanding what controllable elements in physical activity settings facilitate youth engagement and foster a continued interest in physical activity.

Fortunately there is a comprehensive body of work illustrating how the leader-driven motivational climate reliably predicts an array of psychological and behavioral outcomes in physical activity settings, with caring, task-involving climates consistently associated with advantageous outcomes, and ego-involving climates more often linked to less adaptive outcomes (Braithwaite et al., 2011; Duda & Hall, 2001). As a result of these findings, leading motivation theorists have recommended physical activity-based interventions focus on helping leaders (i.e, teachers, coaches, peers, and parents) foster more caring, task-involving climates for youth (Fry, 2010; Gould, Flett, & Lauer, 2012; Hellison & Wright, 2003; Reinboth & Duda, 2006; Wallhead & Buckworth, 2004). Results from motivational climate interventions support these recommendations, with a wealth of empirical evidence illustrating how motivational climate interventions can affect the perceived motivational climate and, as a result, have a significant and positive impact on the cognitive, affective, and behavioral outcomes of youth in physical activity settings (Griffin, Meaney, & Hart, 2013; Newton, Watson, et al., 2007). In sum, research suggests that when leaders make a concerted effort to create more caring, task-involving

motivational climates in physical activity-based settings, this facilitates efforts to promote youth engagement in physical activity.

Achievement goal theory is a social-cognitive theory of motivation that began in education in an effort to better understand how to optimize both the motivation and the experience of youth. Specifically, Nicholls sought to develop a theory that allowed for a better understanding of how to sustain optimum motivation for the intellectual development of youth at all levels of ability, and to delineate which controllable factors in the environment will help ensure that every child will have a meaningful, competence affirming learning experience (Nicholls, 1989, pp. 3-4). In achievement goal theory research these social cognitive processes and their coupled behavioral and affective responses have been examined in achievement-based settings with youth, beginning in education and eventually expanding into the physical activity domain.

During the time of achievement goal theory's conception, theories of achievement were centered around various conceptualizations of competence (Maehr & Nicholls, 1980), a central tenant of achievement goal theory. Drawing from the early work of Csikszentmihalyi, education theorists, and his own research in education, Nicholls theorized that at any given moment in time competence can be construed in one of two ways; the achievement goal theory literature refers to these conceptualizations as goal perspectives, which at any given moment can be either task-involved or ego-involved. A task-goal perspective (i.e., to be task-involved) reflects the belief that giving high effort, trying your hardest, and mastering new skills are of greatest value, along with cooperating with others. In contrast, an ego-goal perspective (i.e., to be ego-involved) is driven by a focus on performance-based social standings and winning as the most relevant

parameters of success. In short, for individuals with an ego-involved goal perspective, the importance of winning is placed above skill acquisition.

Nicholls (1984) asserts that an individual's subjective experience and overt behaviors will vary in accordance with their goal perspective (Nicholls, 1984, p. 329). Ames (1992), a principal contributor to achievement goal theory literature, added that achievement goals influence an individual's approach to and engagement in achievement settings. Early research in achievement goal theory provides support for this assertion. To begin, while investigating students' motivational responses and goal orientations in an education setting, Ames (1983) revealed that youth participants who possessed a more task-involving goal perspective put forth greater effort, sought more difficult challenges, and persisted longer, even after controlling for ability. Also in line with achievement goal theory, the youth who were not the top performers in class but had a more ego-involving goal perspective were more likely to avoid challenges and give up more readily. These results suggest having a task-involving goal perspective may foster more advantageous responses in achievement settings for youth of all ranges of ability.

Nicholls proposed three factors collectively determine an individual's goal perspective at any given moment: 1) dispositional goal orientation 2) level of cognitive development, and 3) perceptions of the motivational climate.

Dispositional Goal Orientation

Achievement goal theory is based on the premise that a central aim of individuals in achievement-based settings is to achieve competence; Goal orientations refer to how individuals determine whether competence has been achieved. Put simply, goal orientations are defined as an individual's personal definition of success (Nicholls, 1984). Goal orientations are conceptualized in one of two ways, and are differentiated according to whether an individual

feels successful when putting forth high effort and is improving (i.e., a task-orientation) and/or whether they feel successful when outperforming others (i.e., an ego-orientation). More specifically, for high task-oriented individuals, success is gauged by effort exerted, as well as skill improvement relative to past performance(s). Therefore, individuals with a high task-orientation feel competent when skill mastery has increased through high effort, and can also feel successful when giving maximum effort, regardless of performance outcomes. Individuals who are highly ego-orientated feel competent when they are outperforming others, particularly if they do so while exerting little effort. Likewise, with an ego-orientation, the fewer number of individuals able to attain a particular level of expertise, the greater the perceived accomplishment.

It is important to highlight that the latter conceptualization, an ego-orientation, offers individuals little control over their own capacity to achieve competence, while the former, task-oriented conceptualization of ability, offers individuals full control over whether they achieve competence. For instance, individuals have little to no control over the ability of others, yet have complete control over personal effort, and in turn, personal improvement. In contrast, if competence is only possible for those who are outperforming others, success is then available to only the limited few with the highest abilities. If, however, competence is self-referenced and based on personal improvement and high effort, success is then available to all.

It is perhaps not surprising then, that adopting a high task-orientation while engaged in achievement behavior is linked to a multitude of adaptive outcomes conducive to facilitating a more positive experience and enhanced performance. In contrast a low task- but high ego-orientation fosters non-adaptive, even maladaptive cognitions and behaviors with respect to psychological and motivational responses, particularly when placed in a low task-involving

climate (Duda & Ntoumanis, 2003; Smith, Balaguer, & Duda, 2006; Standage & Treasure, 2002). In fact, it has been found that individuals who conceive of competence in a manner consistent with an ego-orientation perceive high effort as a means of compensating for low innate ability; competence is demonstrated when individuals put forth equal or lower effort as others, yet perform at an equal or greater level (Jagacinski & Nicholls, 1984, 1987). Achievement goal theory contends that in situations where highly ego-oriented individuals are faced with the possibility of losing, they will be more likely to avoid participation or to put forth low levels of effort when they do partake. In line with these contentions, Nicholls (1984) found that a high ego-orientation in youth led to task avoidance for those who felt they were not capable of performing better than their peers. Similarly, while examining achievement goals in the classroom, Ames and Archer (1988) found that students who were highly task-oriented but felt they had low relative ability reported trying harder than ego-oriented students with comparable ability perceptions.

In an earlier study, Ames (1983) examined the relationship between students' goal orientations, ability levels, and willingness to ask for help in an academic setting. He found that students who were highly task-orientated were more likely to seek assistance than highly ego-oriented students. Moreover, the highly task-oriented students reported a belief that the additional information they sought would allow them to gain a better understanding of the material and to perform better in the future, while highly ego-oriented individuals tended to avoid asking for assistance. Ames proposed this avoidance behavior may be a result of the belief held by highly ego-oriented individuals that asking for help reflects a lack of ability (Ames, 1983). Nicholls argued this behavioral difference may be due to the ego-oriented belief that failing to outperform others implies low capacity, even more so than complete avoidance of the

activity would. He also maintained that for highly ego-involved individuals, the greater the differentiation between perceived competence and skill level, the less likely youth are to actively engage in a task (Nicholls, 1984). Put into perspective regarding stress, it could be argued that Nicholls is suggesting that the demands of this particular type of situation outweigh perceived capability for highly ego-oriented individuals, which leads to avoidance behavior as a result of anticipated psychological stress.

Jagacinski and Nicholls (1984) were the first to systematically examine how individuals employ different conceptions of ability while placed in contrasting psychosocial environments. Participants in this study reported believing that effort facilitates skill mastery, however only the participants who were in a more ego-involving environment rated their own ability lower the harder they tried (Jagacinski & Nicholls, 1984). This suggests that ego-involving climates may discourage putting forth high effort in achievement settings, when youth do choose to or are forced to participate.

To allow for the assessment of goal orientation in sport settings, the Task and Ego Orientation in Sport Questionnaire (TEOSQ; Duda & Nicholls, 1992) was developed. The TEOSQ is a 13-item measure that consists of 7 task-items and 6 ego-items that examine what personal factors contribute to respondents feeling successful while engaged in a physical activity. Responses are rated on a 5-point Likert-type scale 1 (*strongly disagree*) to 5 (*strongly agree*), and include the stem, "I feel most successful [in physical activity] when. . .". A sample question reflecting a task-orientation is, ". . . I learn a new skill and it makes me want to practice more", while an example ego-orientation item is, ". . . I'm the only one who can do the play or skill". The TEOSQ has demonstrated adequate psychometric properties (Duda & Whitehead, 1998),

and has been used widely throughout sport psychology research (Balaguer, Duda, & Crespo, 1999; Duda, 1993; Duda, Chi, Newton, Walling, & Catley, 1995).

Whether a child seeks to demonstrate competence by outperforming peers or possesses a self-referenced conceptualization of competence is largely dependent on the psychosocial environment cultivated by leaders in achievement settings. When outperforming others is highly valued, star players are given the majority of the recognition, and intra-group rivalry is fostered, youth are more likely to maintain a high ego-orientation. In contrast, when leaders make known that everyone has an important role to play, praise and recognize high effort, and take care to reward personal improvements, youth tend to be more task-oriented (Smith, Smoll, & Cumming, 2009; Standage, Duda, & Ntoumanis, 2003b; Treasure & Roberts, 1998).

This research supports Nicholls' assertions that the type of environment created in an achievement-based setting can strongly predict whether participants' motivational responses and associated behaviors are adaptive or prove maladaptive (Nicholls, 1984). Nicholls proposed there are two markedly different motivational climates created by leaders that influence an individual's goal perspective at any given moment: a mastery based motivational climate (later termed task-involving motivational climate) and a performance-based motivational climate (later termed ego-involving motivational climate). In fact, the motivational climate fostered by leaders in each unique setting has been found to greatly impact the cognitive, affective and behavioral responses of participants, independent of their dispositional goal orientations (Balaguer et al., 1999; Dweck & Leggett, 1988; Nicholls, 1989; Ntoumanis & Biddle, 1999).

Goal orientations are orthogonal in nature (Nicholls, 1984, 1989), and as such an individual can have a high or low task-orientation (i.e., feel competent when they exert high effort and gain new skills) and simultaneously possess a high or low ego-orientation (i.e., feel

competent when they outperform others), or any combination of the two (e.g., high ego-, low task-orientation). It is important to note that the only combination of goal orientations consistently linked to less favorable outcomes is a high ego-, low task-orientation (Roberts & Papaioannou, 2014), therefore promoting a high task-orientation may prove advantageous.

Level of Cognitive Ability

Nicholls also contends that in order to optimize motivation, the various conceptualizations of competence and how and when these conceptualizations are acquired must be understood. As such, developmental changes in cognitive functioning should be considered (Nicholls, 1989). Of particular relevance, Nicholls argued, are the changes in conceptualizations of competence that occur during the elementary years as cognitive development progresses.

Nicholls and Jagacinski investigated how youth at various ages conceptualize ability, and in doing so, provided a better understanding of how the various conceptualizations of competence are developed and their relationship to achievement motivation. For instance, Jagacinski and Nicholls (1984) provided strong support for their assertion that cognitive development affects an individual's understanding of effort and ability, and discovered that as the cognitive understanding of effort and ability evolves, so too does the motivation to achieve (Jagacinski & Nicholls, 1984). Between the age of two and four youth begin to develop the capacity to compare themselves to others. However, it is important to note that this newly acquired capability does not become the dominating perspective for children at this stage of cognitive development (Nicholls, 1989).

Nicholls posits there are three aspects that shape an individual's conceptualization of ability: "1. The assumption that ability is a concept that pertains to skill and not to luck or guessing; 2. The role of social comparison in judging ability and task difficulty; 3. The notion of

capacity as distinct from effort" (Nicholls, 1989, p. 20). Nicholls discovered that the developmental changes that occur around the age of 11 lead to a differentiation between luck and ability. Children at this age are able to distinguish between effort and ability and are newly capable of evaluating task difficulty based on the number of people who are able to complete a task. These newfound capabilities allow youth to accurately determine how they rank relative to their peers.

To my knowledge, researchers had not yet considered whether youth and adults had comparable conceptualizations of effort and ability prior to achievement goal theory. It is believed that semantic complexities associated with achievement research led to variable findings prior to the development of achievement goal theory's conception (Jagacinski & Nicholls, 1984; Nicholls, 1984). This distinction is vital to understanding personal motives and behavioral correlates in achievement settings.

Motivational Climate

Nicholls contends that achievement settings typically reflect one of two contrasting psychosocial environments, namely task- or ego-involving motivational climates. Motivational climates are defined by features that are perceived to be emphasized in a particular setting (e.g., winning focused vs. mastery focused), as well as how the activities are structured (i.e., competitive vs. cooperative). When leaders foster a cooperative environment, where personal improvement with regard to skill mastery is the focus, these settings reflect a mastery climate (i.e., are task-involving). Nicholls theorized mastery climates would be associated with a predictable set of positive psychological, cognitive, and behavioral outcomes. In contrast, Nicholls theorized that when leaders pit students against one another as a means to foster motivation, punish mistakes or losing, and place high importance on winning and outperforming

others, this reflects a performance climate (i.e., is ego-involving), which will foster less adaptive responses in youth.

Nicholls discourages leaders from placing too much value on winning, punishing youth when they make mistakes, and using normative standards of comparison with youth (i.e., de-emphasize ego-involving features), and goes on to note that if the aim is to optimize the motivation and the experience of *all* children, leaders would do well to emphasize the importance of each child's role, to reward high effort and personal improvement, and to treat mistakes as part of the learning process (i.e., create task-involving climates). Ames (1992) and others (Ames & Archer, 1988; Epstein, 1989; Newton, Fry, et al., 2007) have contributed to our understanding of the motivational climate by adding that not only is the motivational climate manifested by making salient either a self-referenced view of competence (i.e., a task-involving climate) or utilizing normative-based standards of comparisons (i.e., an ego-involving climate), but also by the very design of the activities (e.g., cooperative vs. competitive), as well as the interpersonal relations that take part among group members and leaders during this process.

Early researchers of achievement goal theory began to outline which of the controllable factors in achievement settings impact students' motivational processes. Ames and Archer (1988) began to delineate which dimensions of a mastery-focused versus a performance-focused environment fostered differential responses. This helped elucidate whether perceived ability and the saliency of mastery (i.e., task-involving) versus performance (i.e., ego-involving) characteristics of the classroom climate had an impact on students. Mastery and performance-based differences for both teacher-centered and student-centered dimensions were used to characterize high versus low levels of mastery and performance climates in the classrooms with academically advanced adolescents in this study.

Teacher-centered dimensions included: 1) how success was defined 2) what value was placed on 3) teacher's orientation toward learning, and 4) evaluation criteria. A mastery climate reflected a classroom where the teacher considered improvement and progress as markers of success, placed value on effort and mastery, had an orientation toward learning, and evaluated students based on progress. A performance climate reflected a classroom where the teacher defined success as having high grades and performing better than fellow peers, placed value on having higher ability than peers, was oriented toward students' performance, and used normative standards of comparison to evaluate students.

Student-centered dimensions included students': 1) reasons for satisfaction 2) view of errors/mistakes 3) focus of attention, and 4) reasons for effort. A mastery climate reflected a classroom where students reported being more satisfied when they were challenged and worked hard, viewed mistakes as part of the learning process, focused their attention on the learning process, and put forth high effort in order to learn something new. A performance climate reflected a classroom where students reported being more satisfied when they were doing better than others, reported making mistakes elicited feelings of anxiety, focused their attention on their own performance relative to others, and tried hard to earn high grades and perform better than their peers.

It should be noted that a limitation of this work was in combining student-centered and teacher-centered items in the same climate questionnaire. In doing so, student goal orientations influenced whether classroom climate was categorized as mastery or performance. For instance, inquiring as to whether students feel satisfied when they outperform others reflects an ego-orientation. Although the motivational climate has been shown to influence motivational outcomes, irrespective of goal-orientation (Smith et al., 2009; Standage et al., 2003b; Treasure &

Roberts, 1998), this practice likely confounded the climate characterization in this early study. It is also important, however, to note that a great contribution to the achievement goal theory literature was made by C. Ames, R. Ames, and Archer in that they helped distinguish which controllable elements of the environment led to perceptions of either a task-involving and an ego-involving climate in an achievement setting.

Ames (1992a) furthered our understanding of how teachers promote a particular goal perspective in the classroom (e.g., the design of activities, how one was evaluated and rewarded, and authority distribution in the classroom). Ames found that when teachers utilized self-referenced feedback and rewards are given for high effort (i.e., create a task-involving motivational climate), students are more likely to be task-involved (termed mastery-focused at the time).

In order to help guide practitioners in creating mastery-focused climates, C. Ames (1992) and Epstein (1989) developed the TARGET framework. The TARGET acronym reflects features that are typically under the control of leaders in achievement settings, including: the type of activity chosen, such as cooperative games/activities versus competitive activities, where there is a clear winner (T; task); allowing group members to have a voice in decision making (A; authority); utilizing self-referenced reward structures (R; reward); grouping members by varying the ability levels within groups (G; grouping); evaluating members with self-referenced/individualized criteria rather than using normative-based comparisons (E; evaluation); and varying the pace of learning to each member rather than standardizing the time it takes to master a skill (T; time). The TARGET framework has helped facilitate the creation of a task-involving motivational climate in achievement settings, and is still utilized to this day (Haji Hassan, Morgan, Cumming, & Horn, 2015; Lubans et al., 2017).

In addition to identifying the characteristics of the climate, it has been critical to develop tools to measure individuals' perceptions of the climate. There are a number of measures that quantify motivational climate perceptions in achievement settings. To begin, Seifriz and colleagues (1992) developed the Perceived Motivation Climate in Sport Questionnaire (PMCSQ; Seifriz et al., 1992) based on the work of Nicholls (1984, 1989). The PMCSQ was derived from Ames and Archer's Achievement Goals Questionnaire (1988) designed to assess motivational climate perceptions in the classroom. The PMCSQ is a 21item questionnaire that contains nine task items and 12 ego items designed to capture a participant's perceptions of the dominating motivational climate in a physical activity-based setting. Responses are rated on a 5-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*). A sample task-involving item is, "In my physical education class, trying hard is rewarded", while an example ego item is, "In my physical education class, rivalry is encouraged". The PMCSQ has demonstrated adequate psychometric properties including factorial validity and internal reliability (Seifriz et al., 1992; Walling, Duda, & Chi, 1993).

Development of the PMCSQ led to a better understanding of the motivational and behavioral outcomes associated with each respective motivational climate in activity-based settings. The psychometrics of the PMCSQ were supported for both the task and ego subscales (Seifriz et al., 1992). In order to validate the psychometric properties of the PMCSQ, Seifriz, Duda, and Chi (1992) surveyed 105 male varsity basketball players, and linked perceptions of a task-involving motivational climate to be associated with greater levels of enjoyment and the belief that effort plays a central role in achievement. Alternatively, perceptions of an ego-involving motivational climate were associated with the belief that having superior ability is the primary cause of success.

A PMCSQ-2 was developed to allow for the examination of specific aspects of the motivational climate and includes the following subscales: effort/improvement, role importance, and cooperative learning reflecting task-involving climates, and unequal recognition, punishing mistakes, and intra-team rivalry for ego-involving climates (Newton, Duda, & Yin, 2000). More recently, a 23 item version was created in order to assess perceptions of the motivational climate in exercise settings, and is referred to as the Perceived Motivational Climate in Exercise Questionnaire (PMCEQ; Huddleston, Fry, & Brown, 2012). An abbreviated version of the PMCEQ was recently validated with 12-items (PMCEQ-A; Moore et al., 2015).

As research in achievement motivation progressed, it became clear that motivational climates are made up of more than task- and ego-involving features (Newton, Watson, et al., 2007; Pensgaard & Roberts, 2002). Advocates of achievement goal theory expanded Nicholls' theory by incorporating a yet to be examined interpersonal, relationship component of motivational climates (i.e., Caring Climates; Newton, et al, 2007). Newton and colleagues (2007) propose that creating highly caring and task-involving climates will do more to optimize participants' motivation and experience. There is a wealth of literature supporting these contentions (Chamberlin, Fry, & Iwasaki, 2017; Fry & Gano-Overway, 2010; Fry et al., 2012; Gould et al., 2012; Hogue, Fry, et al., 2013; Moore, 2010; Newton, Fry, et al., 2007). Drawing from the field of education and the sport psychology literature, Newton, Fry and colleagues (2007) developed a scale that assessed interpersonal relations within a physical activity setting, including, "the extent to which individuals perceive a particular setting to be interpersonally inviting, safe, supportive, and able to provide the experience of being valued and respected" (Newton, Fry, et al., 2007, p. 70).

The Caring Climate Scale (CCS; Newton, Fry, et al., 2007) was incorporated into achievement goal theory literature in 2007, and has since generated compelling evidence that not only do highly caring climates positively influence motivational outcomes in achievement settings, but creating a caring environment seems to be beneficial for the overall well-being of youth. In examining the psychometrics of the CCS, Newton and colleagues (2007) hypothesized that coaches who emphasize task-involving features will likely create a more caring climate, and will thus be positively correlated with such characteristics. Moreover, they argued, it is less probable that a caring climate would be nurtured by coaches who emphasized ego-involving features (e.g., coaches who promote intra-team rivalry and opt to punish mistakes rather than treat them as part of learning). In line with these hypotheses, results supported both the convergent validity and discriminant validity with respect to task- and ego-involving climate perceptions, respectively (Newton, Fry, et al., 2007). In establishing the discriminant and convergent validity of the caring climate in such a way, Newton and colleagues provide support for their contention that the CCS captures a unique part of performance climates that is not assessed by task- and ego-involving motivational climate scales. The caring climate was found to be predictably correlated with but conceptually distinct from task- and ego-involving motivational climates. The CCS was also found to produce acceptable internal validity, with a Chronbach's alpha of .92.

Research in achievement motivation has provided practitioners and researchers alike with insight into behavioral responses associated with these markedly different environments in a wide range of education, exercise, and sport settings (Ames, 1992; Balaguer et al., 1999; Kavussanu & Roberts, 1996). The response variation associated with caring, task- and ego-involving motivational climates has resulted in a better understanding of what controllable

factors can intentionally be put into practice in order to promote positive development and skill mastery of youth in physical activity contexts. Likewise, achievement goal theory research also provides practitioners and researchers alike with a better understanding of what controllable factors are likely to have a negative impact on youth (Duda & Chi, 1989; Fry & Gano-Overway, 2010; Gould et al., 2012; Ntoumanis & Biddle, 1999).

Ames and Archer (1988) were the first to look at the relationship between students' perceptions of the motivational climate and students' learning strategies, task choices, attitudes, and causal attributions. Perceptions of a task-involving motivational climate were associated with the use of more effective learning strategies, a preference for more challenging tasks and the belief that high effort facilitates success. In contrast, perceptions of an ego-involving motivational climate were associated with a narrowed focus on ability, the belief that ability determines success, and more negative judgments of one's own ability. Moreover, students of highly mastery-focused classrooms had more favorable opinions of peers, and also associated learning with high effort, while students in the performance climates attributed personal failure to the teacher, had less favorable attitudes toward the class and teacher, preferred less challenging tasks, put forth lower effort, and utilized less effective strategies for learning (Ames & Archer, 1988).

Achievement goal theory received considerable support from a body of research conducted by C. Ames early on. Ames began her work by investigating how classroom structure and teacher feedback influenced the perception of mastery versus performance climates. Specifically, Ames sought to understand what characteristics under the control of the teacher would lead to the perception of each climate, including how students are evaluated in the classroom, how authority is approached, and the design of classroom activities (Ames, 1992).

When teachers created a mastery (i.e., task-involving) environment, where the focus was on self-referenced feedback and rewards were given high effort, students adopted a more mastery focus and reported greater intrinsic motivation, when compared to students in the ego-involving environment.

An earlier meta-analysis of achievement motivation research in physical activity settings, Ntoumanis & Biddle (1999) found that task-involving motivational climates in a range of physical activity settings consistently correlate with greater effort, more interest in personal improvement, heightened intrinsic motivation regardless of skill level, decreased anxiety, and a greater likelihood to both persist in the face of failure as well as to select more challenging activities. Research has also linked perceptions of a task-involving climate with increased intrinsic motivation, enjoyment, as well as peer and teacher/coach satisfaction in physical activity settings (Chamberlin et al., 2017; Duda & Nicholls, 1992; Orgell & Duda, 1990; Theeboom, De Knop, & Weiss, 1995). Moreover, vulnerable youth respond more favorably to caring, task-involving climates in sporting contexts, with caring, task-involving climates predicting adaptive responses related to personal initiative, basic skill acquisition, interpersonal relationships, teamwork, and general social skills in underserved youth (Gould et al., 2012). While this is not an exhaustive list, the achievement goal theory literature suggests youth will have a more positive experience and will feel more equip to meet the demands asked of them in physical activity settings when placed in a more caring, task-involving climate.

Likewise, Nicholls' contention that ego-involving climates will yield less adaptive motivational responses in achievement settings has also received much support. In physical education settings, when teachers create an ego-involving climate, the responses of youth are problematic and can be maladaptive with respect to learning/skill mastery, in particular for youth

who feel they are less skilled than their peers (Duda & Chi, 1989; Parish & Treasure, 2003; Standage et al., 2003a). For example, walling and colleagues (1993) found that while youth who perceived a task-involving climate experienced lower levels of performance worry andgreater satisfaction, youth who perceived their climate to be ego-involving reported worrying more about their performance and being less satisfied with their peers (Walling et al., 1993). Moreover, perceptions of ego-involving features in a range of activity-based settings has proven to hinder motivation in adolescent females, including all three dimensions of intrinsic motivation: competence, autonomy, and relatedness (Kipp & Amorose, 2008). Similarly, ego-involving motivational climates have consistently led to more troubling outcomes including self-reported and physiological assessments of anxiety (Braithwaite et al., 2011; Ntoumanis & Biddle, 1999; Orgell & Duda, 1990) and heightened psychological and physiological stress responses (Hogue, Fry, et al., 2013; Kim, Chung, Park, & Shin, 2009).

In contrast, caring, task-involving climates may help buffer the stress that can accompany group-based achievement settings. In the Hogue, Fry, Fry, and Pressman (2013) study, students who were taught how to juggle in a 30-minute instructional juggling session that was manipulated to reflect an ego-involving climate responded with a significant cortisol increase relative to their baseline levels, while students in a caring, task-involving climate responded with a significant decrease in their cortisol levels, as well as lower levels of stress, shame, and self-consciousness. In an international study with Korean athletes, perceived controllability over psychological stress was greatest among athletes in task-involving climates, while ego-involving climates positively predicted psychological difficulties (Kim, Duda, & Gano-Overway, 2011). Even with highly skilled, career athletes, performance climates have been found to predict cognitive distress. Mastery climates, in contrast, were negatively associated with distress, as well

as perceptions that the coach or teammates were a source of distress (Pensgaard & Roberts, 2002).

The psychological benefits and positive motivational responses of creating a task-involving climate are well documented (Braithwaite et al., 2011; Harwood et al., 2015; Ntoumanis & Biddle, 1999). In a motivational climate intervention during a physical education class, youth in task-involving climates displayed higher levels of effort, persistence, and decreased anxiety, when compared to youth placed in an ego-involving climate (Solmon, 1996). Solmon (1996) found participants juggling in an ego-involving climate to attempt less trials at lower difficulty levels than students placed in a task-involving climate. Moreover, emphasizing task-involving features including feeling as though one has an important role and that effort and improvement are valued have, specifically, been linked to self-determined motivation with female adolescents, including all three of Deci and Ryan's basic psychological needs: competence, autonomy, and relatedness (Kipp & Amorose, 2008).

This is important because perceptions of competence (i.e., overall skill levels) and motor skill competence are strong predictors of attitudes towards physical education and physical activity (Silverman, 2005). When students have a positive attitude toward physical activity, they are less likely to be sedentary and more likely to engage in physical activity (Lowry et al., 2013).

There have been a number of studies that illustrate how highly caring climates can also promote important adaptive outcomes related to psychosocial development, well-being, and skill mastery. Such positive outcomes include greater commitment to physical activity, better sportspersonship behaviors, increased ability to regulate emotions, and more favorable perceptions of both teachers and peers (Fry & Gano-Overway, 2010; Fry et al., 2012; Newton, Fry, et al., 2007).

The strength of Nicholls' theory lies not only in the wide array of supporting literature, but in its ease of applicability. Even relatively brief climate interventions with leaders in physical activity contexts have proven to be successful in fostering more caring, task-involving environments for youth and lower perceptions of ego-involving climates. This has resulted in eliciting more adaptive outcomes in participating youth, including greater empathetic concern and future expected participation (Newton, Watson, et al., 2007). Similarly, Fry and Gano-Overway (2010) found linked athlete perceptions of a caring climate with greater enjoyment, more positive attitudes and caring behaviors toward coaches and fellow teammates, and an increased likelihood they will participate in soccer in the future (Fry & Gano-Overway, 2010). Similarly, caring climates have been shown to elicit pro-social behaviors among youngsters participating in a sport camp. For example, youngsters who perceived their summer sport climates as less caring not only engaged in fewer pro-social behaviors, they also displayed a greater number of anti-social sportspersonship behaviors (Gano-Overway et al., 2009).

Comparable associations to those found with the NYSP studies were also found in a sport-based context with a similar population of youth (Gano-Overway et al., 2009). Perceptions of a more caring climate were found to positively predict affective self-regulatory efficacy and empathic self-efficacy, which in turn, were positively linked to more prosocial behaviors. Participants in this study were mostly minority youth between the ages of 9-16 years old. Affective self-regulatory efficacy refers to how capable individuals feel they can control their positive and negative emotional experiences. Examples of positive affective self-regulatory efficacy includes the belief that individuals have the ability to express joy and liking of others and to feel satisfied with their accomplishments.

This study also found increased self-efficacy prompted by caring behaviors negatively predicted antisocial behavior, including harassing others, speaking badly of others, and intimidating and ostracizing others (Gano-Overway et al., 2009). It follows that empathic self-efficacy, or how confident individuals are that they can empathize with others, would also be predicted by a more caring climate, and that these would lead to more prosocial behaviors as indicated by willingness to cooperate, share resources, and help others. Fry and Gano-Overway (2010) later explored the relationship between a caring climate and sport enjoyment, commitment to sport, and relationships within a team for youth soccer teams. Community soccer players (N = 194) in both middle and high school (M_{age} = 13 y.o.) ranging in age from 10-17 years old, reported greater enjoyment playing soccer and higher commitment to the sport when playing for more caring teams. Furthermore, when asked about their own engagement in caring behaviors (e.g., "I treat my teammates and coaches with kindness"), youth reported engaging in more caring behaviors when playing for teams with a more caring climate overall, as indexed by Newton et al.'s (2007) Caring Climate Scale (Fry & Gano-Overway, 2010). Similar results have also been found with youth basketball players, with greater perceptions of caring, task-involving climates linked to athlete caring behaviors (Iwasaki & Fry, 2013).

Leading youth development researchers have recognized the need to assess which outcomes that facilitate positive development in youth (Larson, 2000). In an effort to provide meaningful insight into such outcomes, a follow-up to the NYSP studies was published by Fry and colleagues in 2012 which explored more broad associations of emotional regulation and psychological well-being of youth with respect to perceptions of a caring climate (Fry et al., 2012). Emotional measures of psychological well-being included assessments of depression, hope, sadness, and happiness; whereas emotional regulation of youth was determined by

responses to the Affective Self-Regulatory Efficacy Measure used in the aforementioned Gano-Overway et al. (2009) study. The Children's Hope Scale (Snyder et al., 1997) was used to assess youth participants' feelings of hope about their lives in general (e.g., "I think I am doing pretty well"), while Lyubomirsky & Lepper's (1999) Subjective Happiness Scale was used to investigate youth perceptions of global happiness. Four indicators of depression comprised the Center for Epidemiologic Studies Depression Scale used as a measure of youth depression in this study. Specifically, subscales assessed depressive affect, positive affect, somatic and retarded activity, and interpersonal difficulties. Finally, youth levels of the emotion, sadness, was determined using the Differential Emotions Scale IV (Izard, Libero, Putnam, & Haynes, 1993).

In sum, youth reported higher levels of hope and happiness and lower levels of depression and sadness. In line with the Gano-Overway findings, affective self-regulatory efficacy, both positive and negative, mediated the relationship between perceptions of a caring climate and the mental well-being of youth, as indicated by the positive relationships with hope and happiness and the inverse relationships with more concerning outcomes (e.g., depression and sadness). Given the many links between hope and happiness and a breadth of positive outcomes, as well the multitude of threatening outcomes linked to depression and negative emotional states (e.g., sadness), these findings strongly support the researchers' contentions that being intentional about creating a highly caring climate in an achievement setting will do much to foster positive development in youth.

In order to further explore the impact of caring behaviors and motivational climate on positive youth development for underserved youth, Gould, Flett, & Lauer (2012) surveyed middle and high school baseball and softball players. Perceptions of a caring climate was the greatest predictor of a positive experience (B = .251) as measured by Hansen and Larson's

(2005) Youth Experiences Survey-2.0 (i.e., YES-2). The YES-2 is comprised of seven major scales that were created in an effort to assess developmental experiences of youth influenced by youth participation in organized activities. Assessments of identity work, initiative, basic skills (e.g., emotional regulation, cognitive and physical skills), teamwork and social skills, interpersonal relations, adult networks, and negative experiences such as stress and social exclusion are included in the YES-2 battery of questionnaires. In contrast to the positive outcomes associated with more caring climates, perception of ego-involving team climates were the greatest and only significant predictor of negative experiences with a significant Beta of .617.

Of particular relevance, researchers have also linked supportive coaching behaviors and task-involving motivational climates to greater mental toughness in athletes, including the ability to manage internal and external pressures (Nicholls, Morley, & Perry, 2016), suggesting coping resources may be enhanced by caring, task-involving climates. In sum, the collective literature supports achievement goal theory and suggests that creating highly caring, task-involving climates can facilitate the positive development and motivation of youth, while perceptions of an ego-involving climate is more likely to counter such efforts, and may even prove to be maladaptive.

Social Self Preservation Theory

Social self preservation theory (Dickerson, Gruenewald, et al., 2004, 2009) provides an important context for understanding the potential repercussions of enhancing the social evaluative nature of youth-based performance settings. A key assumption of social self preservation theory is when individuals perceive a threat to their social standing or social self, this will trigger a coordinated reaction analogous to the “fight or flight” response, including what is believed to be an evolutionarily based biochemical, emotional, and behavioral response.

Importantly, the psychosocial triggers that were once believed to be a rare occurrence are now more commonplace, and this coordinated, once protective response compromises mental and physical health and well-being now that it is more consistently triggered (Sapolsky, 1994).

According to social self preservation theory, these immunological, endocrine, and behavioral responses are initiated under a variety of circumstances; all of which pose a threat to one's social self:

> *In humans, social self threats encompass situations or factors that threaten one's social esteem or status, including social rejection, ostracism, exclusion, scorn, or contexts in which one's competencies, abilities, or characteristics upon which a positive social image is based are called into question (e.g., poor performance in social-evaluative contexts; Gruenewald et al., 2006, p. 410).*

Additional examples include when self-esteem regarding one's ability to connect or adapt socially is diminished, social status or reputation is damaged, or the potential to be socially accepted by a person or a group of people is threatened. There is also research linking public threats to, or challenges of, an individual's social standing and competencies (i.e., ability) to a specific set of psychological and physiological responses in support of social self preservation theory. These include feelings of shame and humiliation, engagement in submissive behavior including social avoidance, as well as heightened cortisol and inflammation.

More specifically, research has demonstrated that shame-related emotions experienced under social evaluative threat precede HPA activation. This activation subsequently leads to a rise in cortisol, and as research is beginning to reveal, possibly a concomitant rise in inflammation. Recently described by Dickerson, Gruenewald & Kemeny (2004), these biochemical changes are followed by sickness behaviors including social avoidance and withdrawl. It is believed that such responses evolved as protective responses, with cortisol and inflammation mobilized in order to prepare the body for physical conflict; Elevated cortisol helps

prepare the body to either engage (e.g., fight) or run from a potential threat, while inflammation helps prepare the body for wound healing. Shame-related emotions and sickness behaviors are believed to be a means to effect more submissive, cooperative behaviors for anyone whose social status has been publically challenged by a potentially higher ranking member of the group. Sickness behaviors can manifest as a diminished interest in social activities or social withdrawal, an increase in depression or submissive behaviors, a decrease in food and water intake, or immobility and locomotor retardation. It is theorized that each of these sickness behaviors may aid in the survival of individuals in subordinate positions (i.e., those with relatively lower social rankings) by minimizing the incidence of threats or challenges from other group members.

Cortisol is a stress responsive hormone that can be accurately and economically indexed through saliva (Segerstrom & Miller, 2004). Cortisol is a hormone, and as such helps regulate a range of biological activities by travelling through the circulation to a target site other than where it was initially secreted (i.e., the adrenal cortex). As part of its regulatory functions, cortisol aids in the body's physiological response to psychological stress (Dickerson & Kemeny, 2004; Nicolson, 2008). When a stressor is perceived (e.g., a social evaluative threat), the HPA axis is activated, resulting in cortisol release into the bloodstream by the adrenal glands. More specifically, when an eliciting psychological stressor is experienced, the hypothalamus secretes corticotrophin-releasing hormone, which then triggers the release of adrenocorticotropic hormone by the adrenal cortex. This results in the production and release of cortisol, which can be measured by indexing cortisol concentration in saliva beginning approximately 15 minutes following the psychological stimuli (Dickerson & Kemeny, 2004).

The human cortisol response to acute psychological stress has been subject to hundreds of studies (Dickerson, Gruenewald, et al., 2009; Dickerson & Kemeny, 2004; Gruenewald et al.,

2004; Rohleder, Chen, Wolf, & Miller, 2008). This research has helped delineate two very specific conditions, namely social-evaluation and uncontrollability, that reliably elicit a psychological stress response found to trigger a rise in cortisol. For instance, a meta-analysis of laboratory-based studies investigating the effects of acute psychosocial stress found that the experience of being socially evaluated and feeling as though your behavior can not influence the outcome in an achievement setting (i.e., "uncontrollability") each independently trigger elevations in cortisol. Moreover, when both of these features are present, elevations in cortisol are greater than the additive effects, suggesting social-evaluation and uncontrollability are central drivers of the endocrine response to acute psychosocial stressors (for a review see Dickerson & Kemeny, 2004).

These particular environmental conditions may also help explain the immune response to psychological stress. For instance, social-evaluative threats have been found to trigger increased TNF-α production, a pro-inflammatory cytokine considered to be a marker of both inflammation and psychological stress (Dickerson & Kemeny, 2004). Moreover, stronger perceptions of social evaluation coincide with more robust elevations of TNF-α (Dickerson, Gable, Irwin, Aziz, & Kemeny, 2009). TNF-α is involved in both the initiation of an inflammatory cascade and the maintenance of the inflammatory response, and is therefore an important marker of inflammation.

Research has also demonstrated that threats to the social self affect the regulation of the inflammatory response, with biochemical processes functioning differentially based on whether a socially evaluative audience is present under conditions of psychological stress. For instance, under normal functioning cortisol will down-regulate pro-inflammatory cytokines, however this mechanism attenuates under psychosocial duress (Dickerson & Kemeny, 2004; Miller et al.,

2009). Moreover, both glucocorticoid and catecholamine resistance have been linked to psychosocial threats (Miller, Cohen, & Ritchey, 2002), which can yield a simultaneous rise in cortisol and TNF-α (Dickerson, Gable, Irwin, Aziz, & Kemeny, 2009; Strahler, Rohleder, & Wolf, 2015). Glucocorticoid receptor resistance occurs when immune sensitivity to glucocorticoids that regulate inflammation (e.g., cortisol) is diminished (Dickerson, Gruenewald, et al., 2009). These are alarming conditions associated with a range of adverse health outcomes (Cohen et al., 2012), which collectively highlight the importance of understanding which environmental conditions instantiate inflammatory dysregulation.

In one noteworthy study with college-aged females, participants who were presented with an evaluative audience while exposed to the Trier Social Stress Test (TSST) responded with significantly higher TNF-α activity than the non-evaluated control group, and also showed a limited capacity for glucocorticoid regulation of TNF-α (Barnes & Adcock, 2009). A similar diminished capacity for catecholamine (i.e., norepinephrine and epinephrine) to inhibition of TNF-α has also been found in males in response to a socially evaluative presence during the TSST (Dickerson, Gable, et al., 2009).

TNF-α is a pro-inflammatory cytokine that when properly regulated assists in a number of protective and regulatory processes. For instance, TNF-α regulates the expression of IL-6 in skeletal muscle cells, which assists in protein metabolism and muscle repair (Strahler et al., 2015). However, when stress-related spikes in TNF-α are elevated above normal levels, this excess inflammation can delay wound healing (Febbraio & Pedersen, 2002), may contribute to psychological burnout (Glaser et al., 1999), and is causally linked to depression and negative mood states (von Känel, Bellingrath, & Kudielka, 2008). Similarly, TNF-α also plays a role in bronchoconstriction (Raison et al., 2006), accelerated pain due to injury (Schnyder-Candrian et

al., 2005), and has a fundamental role in a number of pain models, many of which limit flexibility and mobility of the joint due to the exacerbated muscle and joint pain (Takahashi et al., 1996). Thus elevated levels can compromise immunity, hinder performance and recovery, and can have a negative impact on mental and physical health and well-being. Moreover, simultaneous elevations in cortisol and TNF-α, a byproduct of glucocorticoid resistance, can amplify the negative effects associated with a unilateral rise in either inflammation or cortisol, including higher levels of tension, depression, and perceptions of pain (Zhang & An, 2007).

Although activation of the HPA axis and associated cortisol release is a protective response, the effects of a unilateral rise in cortisol can also be deleterious. The physiological implications of elevated cortisol and stress have been found to be positively correlated with illnesses duration, higher risk of cardiovascular disease, diabetes, peptic ulcers, and accelerated neural degeneration during aging (Filaire, Bernain, Sagnol, & Lac, 2001; Raison et al., 2006). Exposure to an acute stressor results in a peaking of cortisol levels, however a flattened pattern is found in individuals chronically exposed to such stressors (Cohen, Tyrrell, & Smith, 1993), which can lead to stress related disorders (Miller & O'Callaghan, 2002).

In summary, a body of literature has helped delineate the cortisol response to psychosocial threats, and researchers have begun to examine the inflammatory responses to psychosocial threats in the environment. This is important given that inflammatory processes, including elevated circulating proinflammatory cytokines (e.g., TNF-α), mediate the link between psychosocial stressors and morbidity and mortality (Dickerson, Gruenewald, et al., 2004), as well as the link between social support and better health outcomes (for a review see Miller et al., 2009).

Measuring TNF-α directly can be invasive, which can limit the type of research that can be conducted. Thus, many researchers have chosen to utilize a soluble receptor of TNF-α (i.e., sTNFαRII), which can be measured orally (Cohen & Pressman, 2004), as an indicator of proinflammatory cytokine levels (Nishanian, Aziz, Chung, Detels, & Fahey, 1998). sTNFαRII correlates with TNFα levels (Dickerson, Kemeny, et al., 2004), but has the advantage of being more stable and less invasive than measuring TNFα directly via plasma (Aukrust, Liabakk, Lien, Espevik, & Frøland, 1994). This methodology has resulted in a broader array of studies investigating the link between psychological stress and emotional states with the immune response.

For instance, feelings of self-blame, shame, and guilt have been found to positively correlate with sTNFαRII activity (Diez-Ruiz et al., 1995). Also in support of social self preservation theory, self-reported feelings of social stress have been found to positively correlate with markers of TNF-α (Dickerson, Gruenewald, et al., 2004; Watkins, Nguyen, Lee, & Maier, 1999), as do negative and competitive social interactions (Dickerson, Kemeny, et al., 2004), also forms of social threats. Additional support for social self preservation theory and Cobb and Cohen's Stress Buffering Hypothesis was found in a recent study investigating how the psychosocial environment fostered by leaders in a physical activity-based achievement settings influences college students' salivary cortisol responses, as well a emotional and motivational responses (Hogue, Fry, et al., 2013). Specifically, college students (N = 108) were taught to juggle in either a caring, task-involving climate or an ego-involving climate and measured pre- (t = -20 min and 0 min) and post- (t = +30, +45, +60, +75, +90) cortisol levels. The first environment, hypothesized to trigger a coordinated response to psychosocial threats, was the ego-involving condition, while the second environment, hypothesized to buffer any stress

associated with the achievement-based activity, was the caring, task-involving condition.

Findings were in agreement with the study hypotheses. The ego-involving condition reported feeling socially-evaluated and as though they did not have control over their own success, thus confirming that the social stressors as described by Dickerson and colleagues (2004) were present. Responses were also in agreement with previous social self preservation theory research. The ego-involving group reported significantly greater stress, shame, and self-consciousness during the juggling session, as well as markedly higher concentrations of salivary cortisol, when compared to both the caring, task-involving group and their own baseline levels. This suggests that the ego-involving condition elicited a significant rise in salivary cortisol. Conversely, the caring, task-involving group responded with a significant decrease in cortisol concentrations, relative to baseline, and also reported higher levels of enjoyment, effort, self-confidence, and interest and excitement regarding future juggling (Hogue, Fry, et al., 2013). It may be that the decrease in cortisol is a protective biochemical response propagated by social support in highly caring, task-involving climates.

A more recent study utilizing a similar protocol with college students investigated cortisol, sTNFαRII, psychological coping, and state self-esteem responses to a motivational climate intervention (unpublished work by Hogue, Fry, Fry, 2017). In line with our hypotheses and in support of the social self preservation theory, the ego-involving climate triggered significantly higher levels of salivary cortisol and feelings of humiliation, shame, embarrassment, and social evaluation during the intervention, relative to the caring, task-involving climate. Moreover, the caring, task-involving group responded with a significant decrease in salivary cortisol a marked rise in sTNFαRII concentration to levels which suggest the climate had an anti-inflammatory effect.

For instance, the sTNFαRII levels may reflect a decrease in TNF-α availability, a mechanism for which inflammation is controlled. The Quantikine ® Human sTNFαRII /TNFRSF1B Immunoassay used in this study does not differentiate between sTNFαRII bound to TNF-α and unbound sTNFαRII. As a result, the higher levels of sTNFαRII either reflects elevations in TNF-α or is representative of increased production and availability of soluble TNF-α receptors. Given the collective findings, it is unlikely the rise in TNF-α levels is part of a coordinated stress response. Therefore the results likely reflect an inhibitory effect on TNF-α activity (i.e., counteract inflammation). More specifically, soluble TNF-α receptors initiate a range of signal transduction pathways that result in a variety of cellular responses, including contradictory regulatory roles such as obstructing TNF-α bioactivity on multiple fronts (Bradley, 2008) and augmenting TNF-α bioactivity (Engelmann, Novick, & Wallach, 1990; Wang et al., 2003). Soluble TNF-α receptors originate from the shedding of membrane-bound receptors, and can compete with membrane-bound receptors for TNF-α, thus neutralizing the primary mechanism for TNF-α bioactivity (Aderka, Engelmann, Maor, Brakebusch, & Wallach, 1992) It is at higher concentrations of sTNFαRII (i.e., around 50 ng/ml), similar to those found in the caring, task-involving group in this study, where the biological activities of TNF-α begin to decline exponentially (Rose-John & Heinrich, 1994). The mechanisms by which social support buffers the inflammatory response to acute stress is not yet fully understood, however the links between social support and stronger immunity, health, and well being are well documented (Cohen & Pressman, 2004).

There are many links between ego-involving climates and psychosocial stressors found to elicit physiological responses that compel investigation. Ego-involving climates are rampant with socially-evaluative threats, as they are defined by an emphasis on social standing and

outperforming others. Moreover, in ego-involving climates the majority of participants do not have control over their success (i.e., winning), and are constantly pitted against one another and punished for mistakes. Finally, research has linked correlates of physiological stress to ego-involving climates, including shame (Fontana et al., 2017; Hogue, Fry, et al., 2013; Hogue et al., 2017), argued to be the most relevant emotion with respect to Dickerson et al.'s (2004) social self preservation theory.

In contrast, not only do task-involving climates help minimize contextual triggers of a coordinated stress response (e.g., social-evaluation and uncontrollability), but caring climates mirror the very characteristics found to promote adaptive health outcomes and buffer physiological stress responses (Uchino, 2006). For instance, Cassel (1976) and Cobb (1976) propose that stress buffering occurs in achievement settings when individuals take part in open communication and receive appropriate rewards and feedback (Cassel, 1976; Cobb, 1976). Likewise, leading stress researchers have argued feeling valued and having a sense of belonging buffer the stress response (Cohen & Pressman, 2004). In sum, perceiving a highly caring and task-involving climate is more likely to minimize psychophysiological stress in performance settings, whereas ego-involving climates reinforce conditions known to elicit a stress response.

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Appendix B

IRB Approval - Study 1

KU THE UNIVERSITY OF KANSAS Research

APPROVAL OF PROTOCOL

January 14, 2016

Candace Hogue
cmhogue@ku.edu

Dear Candace Hogue:

On 1/14/2016, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Adolescent Physiological and Psychological Responses to an Instructional Juggling Motivational Climate Intervention
Investigator:	Candace Hogue
IRB ID:	STUDY00003494
Funding:	None
Grant ID:	None
Documents Reviewed:	• Informed Consent track changes, • HogueFry_IRB2015_InformedConsent.docx, • Informed Consent clean, • Correspondence_for_STUDY00003494.doc, • HogueFry HSCL_Initial_Submission_Form.pdf, • HogueFry_IRB2015_LetterToParents.docx, • HogueFry_IRB2015_Questionnaires.docx, • HogueFry_IRB2015_JugglingStudyAssent.docx, • HogueFry_IRB2015_PreStudyInstructions.docx, • HogueFry_IRB2015_ ParentDebriefingStatement.docx, • Debriefing Statement track changes, • HogueFry_IRB2015_JugglingStudyTimeline.docx, • Debriefing Statement clean version, • Assent form clean version, • HogueFry_IRB2015_JugglingSessionActivities.docx, • HogueFry_IRB2015_ DebriefingStatement.docx, • Assent form track changes, • Submit Changes Form_Reply to board, • Screening Questionnaire track changes, • Screening Questionnaire clean version, • HogueFry_IRB2015_ScreeningQuestionnaire.docx

The IRB approved the submission from 1/7/2016 to 1/6/2017.

1. Before 1/6/2017 submit a Continuing Review request and required attachments to request

THE UNIVERSITY OF KANSAS
Research

continuing approval or closure.

2. Any significant change to the protocol requires a modification approval prior to altering the project.
3. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at https://rgs.drupal.ku.edu/human_subjects_compliance_training.
4. Any injury to a subject because of the research procedure must be reported immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.

If continuing review approval is not granted before the expiration date of 1/6/2017 approval of this protocol expires on that date.

Please note university data security and handling requirements for your project: https://documents.ku.edu/policies/IT/DataClassificationandHandlingProceduresGuide.htm

You must use the final, watermarked version of the consent form, available under the "Documents" tab in eCompliance.

Sincerely,

Stephanie Dyson Elms, MPA
IRB Administrator, KU Lawrence Campus

Appendix C

Parental Consent – Study 1

Dear Parent of a (*Name of School*) student,

Thank you for considering enrolling your student in a research project through the Sport & Exercise Psychology Lab at the University of Kansas! We have shared the details of the study below, so that you have an idea of what our study is about. If your child is interested in participating and you approve, please sign this form and return it to the office at [*insert child's school*]. If your child is eligible for the study, we'll send you an email with the details, and they will be free to withdraw at any time. Please feel free to ask any questions. The researchers contact information can be found below.

We would also like you to know that this research is being funded by the Society of Health and Physical Educators, The University of Kansas School of Education, and The University of Kansas Department of Health, Sport & Exercise Sciences.

Purpose Of The Study

The purpose of this study is to gain a better understanding of how adolescents respond to learning a new physical skill when in a group setting. We will be including 30 male and 30 female students in the study. During the study, groups will consist of roughly 15 students, and will be made up of either all males or all females. The skill of juggling will be introduced to each group and each student will be given time to practice the skill. Prior to, during, and following the skills session, two types of non-invasive saliva samples will be collected. The collection process is very simple and takes two minutes per collection. Saliva sampling includes placing a small cotton roll under the tongue to assess cortisol, and gently rubbing a small cotton-tipped swab between the lower lip and gum to collect saliva that will allow us to examine levels of inflammation.

Basis For Participant Selection

Middle school students are being recruited for participation. There are some health conditions and behaviors that impact cortisol and inflammation, and so we will be selecting students who are free of these conditions and behaviors. Therefore, selection will be determined by the attached Health History Questionnaire, which should only take about 10 minutes to complete.

Confidentiality

Your responses to the health history questionnaire and your child's responses to the surveys will be treated in strict confidence. Your child will be given a number to identify them as a potential participant, separate from any identifiable personal information. Responses will be stored securely in a locked room and separately from any information that may identify you or your child and will only be accessible by the researchers listed below. If your child isn't selected for the study or decides not to participate, their documents will be shredded.

Confidentiality Continued:

If your child is selected for the study, information will be obtained from their surveys asking their opinion about their PE classes and the juggling session, in addition to their saliva samples**.** Your child's name will not be associated in any way with the information collected from them or with the research findings from this study. The researchers will use their

anonymous identification number in place of their name. Any data stored electronically will be stored on a password protected flash drive via an encrypted electric document. Any paperwork associated with you or your child will be stored in a locked file cabinet secured in the Sport and Exercise Psychology Laboratory. All saliva samples will be labeled by participant number, and stored securely in the Applied Physiology Laboratory where they will be locked until they are disposed. By signing this form you give permission for the use and disclosure of this non-identifiable information for the purposes of this study at any time in the future.

Procedures

A timeline of saliva sample collection is presented below, along with an overview of the information collected from your child during the study. The study will take place at your child's school and will be supervised by trained personnel. The session will last approximately 2.5 hours.

Timeline of Procedures for Control and Experimental Groups:

1) Cortisol & Inflammation – Saliva samples will be collected at four different times: 1 baseline (0 minutes relative to the start of the juggling session), 3 response measures following juggling training session (+30, +45, & +60 min. post-baseline).

2) Questionnaires – Your child will be asked to complete two surveys that will each take approximately 20-25 minutes to complete. The first will ask questions about your child's motivational responses to their PE class, perceptions of the environment in PE class, as well as a variety of quality of life indicators, such as mood and stress. The post juggling session questionnaire will also include quality of life questions as well as questions about the environment during their juggling session and their motivational responses to it.

3) Caffeine, food and nicotine intake – Your child will be asked to tell us about any caffeine and food intake for the 24-48 hours prior to participating in the study, and will be asked to follow these instructions:

- No caffeine 2 hours prior to arrival – (so NO caffeine after 12:00 & minimize caffeine before noon on [*insert day of the study*].
- No exercising the day of the study. (so NO exercising on [*insert day of the study*]).
- No consuming **food** for 2 hours prior to participation (NO eating after noon on [*insert day of the study*]).
- No consuming **dairy** for 1 hour prior to participation (NO milk after 1:00 PM on [*insert day of the study*])

Risks

Participation in this study involves your child practicing juggling with tennis balls while in groups of approximately 15. This requires a minimal level of physical activity. Participation in the study brings no foreseeable risks beyond those of daily life.

Benefits

Your child will be provided instruction and feedback on how to juggle during a 30-minute instructional juggling session, and will take part in a cooperative team-building activity while engaging in low-level physical activity. Information about sport psychology, leadership and motivation will be shared with your child during the session as well.

Payment To Participants

Your child will receive a $10 gift card upon completion of the study. Investigators may

ask for your social security number in order to comply with federal and state tax and accounting regulations.

Refusal To Sign Consent And Authorization

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your child's right to any services he/she is receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, your child cannot participate in this particular study.

Cancelling This Consent And Authorization

You may withdraw your consent for your child to participate in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about you, in writing, at any time, by sending your written request to: Mary Fry, Ph.D., University of Kansas, 1301 Sunnyside Avenue, Robinson 161, Lawrence, Kansas 66045. If you cancel permission to use your information, the researchers will stop collecting additional information about your child. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

Participant Certification

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding my child's study. I understand that if I have any additional questions about this study I may call Mary Fry (785-864-1862) or e-mail: mfry@ku.edu, Candace Hogue, cmhogue@ku.edu.

I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385, write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

I agree for my child to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old, am the child's legal guardian, and that I have received a copy of this Consent and Authorization form.

_____ _____

Print Participant's Name Date

_____ _____

Print Guardian's Name Signature of Guardian

RESEARCHER CONTACT INFORMATION

Mary Fry, PhD
Associate Professor
Health, Sport & Exercise Sciences
University of Kansas
1301 Sunnyside Avenue
Robinson, Room 161
Lawrence, KS 66045-7535
785-864-1862; mfry@ku.edu

Candace M. Hogue
PhD Student
Health, Sport & Exercise Sciences
University of Kansas
1301 Sunnyside Avenue
Robinson, Room 125
Lawrence, KS 66045-7535
785-864-1445; cmhogue@ku.edu

Appendix D

Health History Screening Questionnaire – Study 1

Please answer the questions below based on the health history of the child interested in participating in the juggling study. These answers will remain anonymous. Once eligibility has been determined, these documents will be destroyed.

Your name: _____

Your child's name:_____

Your Email: _____ Your Phone:_____

We are looking for a specific subset of the population, so please answer honestly.

1. Please indicate if your child has EVER been diagnosed with or currently have any of the following:

a. Asthma	YES	NO
b. Hepatitis, Rheumatoid arthritis, Multiple Sclerosis, HIV, or any other autoimmune disease	YES	NO
c. Thyroid disease, Adrenal Disease or a condition resulting from steroid use?	YES	NO
d. A psychological disorder (e.g., depression, schizophrenia, bipolar disorder)	YES	NO
e. Diabetes	YES	NO
f. Chronic sinusitis	YES	NO
g. Bronchitis	YES	NO
h. Cardiovascular disease (e.g., a heart condition)	YES	NO
i. Any other chronic illness*	YES	NO

(*if yes, please specify_____)

2. Is your child currently taking <u>any</u> prescription medications? YES NO

3. Please list in the space below any over the counter medications your child takes on a regular basis and/or is currently taking.

Name of Medication	Dosage or Mg

4. Is English your child's first language? * YES NO

*If no, how many years has she/he spoken English? _____ years

5. Does your child currently have any of the following?

a. Flu* YES NO

i. *if YES: is his/her current fever above 100F? YES NO

b. Cold YES NO

c. Allergies YES NO

6. Is your child currently able to juggle (i.e., able to juggle 3 tennis balls at the same time)?

YES NO

7. Please list your child's current weight (pounds) _____

8. Please list your child's current height (feet, inches) _____

9. Is your child in good oral health (NO gingivitis, periodontal disease, etc.)? YES NO

10. FOR *FEMALE PARTICIPANTS* ONLY:

b. (If applicable) - What was the *start date* of your daughter's most recent menstrual cycle?

_____

Appendix E

Pre-study Instructions – Study 1

Dear Participant,

Thank you for helping with our study! We are so excited to help you and your peers learn to juggle. Because we will be collecting your saliva (yuck!) so that we can look at different chemicals in your body, it is really important that you follow these instructions prior to the start of the study:

- ✓ No caffeine 2 hours prior to arrival – (so NO caffeine after 12:00 & minimize caffeine before noon on [*insert day of the study*].
- ✓ No strenuous exercise 48 hours prior to the start of the study. (so NO exercising on [*insert day before and day of the study*]).
- ✓ No exercise day of the study (so NO exercising on [*insert day of the study*]).
- ✓ No consuming **food** for 2 hours prior to participation (NO eating after noon on [*insert day of the study*]).
- ✓ No consuming **dairy** for 1 hour prior to participation (NO milk after 1:00 PM on [*insert day of the study*])

Please contact Candace Hogue (cmhogue@ku.edu) if you have any questions.

Appendix F

Assent – Study 1

"My name is (Candace Hogue/Mary Fry) and I am a (graduate student/professor) at KU. I am here because I am really interested in learning about the opinions of adolescents, like you, and to see if you and some of your classmates want to participate in our study where we teach people how to juggle. The study will last 2 1/2 hours and in addition to juggling, we'll ask you to fill out a couple questionnaires, one before the juggling session, and one after. The questionnaires will ask about your experiences in your PE class and also about your experience during the juggling session. We'll also be playing some games where you get to know the people in the study and the instructors, and will ask you to provide some saliva samples. Also, a $10 gift card will be given to each participant.

If you would like to participate in our study, and we hope that you do, we'll have you take a questionnaire home to your parents so we can gather some information about you to see if you are eligible for the study – we really wish everyone could participate, but we only have room for so many students. But we only want students who really want to be involved in the study. None of you have to be in it, so only do this if you really want to. Your parents or guardian will have to agree for you to be in the study if you want to.

Also, no one will know what your answers are to the questions we ask you. Each of you will be given a unique number and your responses will be mixed with all the other students who agreed to help with this study. And, when I tell other people about my research, I will not use your name or even your school's name, so no one can tell who I am talking about – I'll just summarize everything for them without including any personal information.

I will be happy to answer any questions you may have now or when we are taking part in the activities together. Who is interested in being in the study?"

Appendix G
Questionnaire – Study 1

Perceived Motivational Climate in Sport Questionnaire
(PMCSQ; Seifriz, et al., 1992)

Directions: Think about how it has felt to participate *in the juggling session*. Read the following statements carefully and respond to each item in terms of how you viewed the typical atmosphere.

During the Juggling Session…	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. Students felt good when they did better than others.	1	2	3	4	5
2. Trying hard was rewarded.	1	2	3	4	5
3. Students were encouraged to work on weaknesses.	1	2	3	4	5
4. Each student's improvement was important.	1	2	3	4	5
5. The instructors paid the most attention to the "stars."	1	2	3	4	5
6. Doing better than others was important.	1	2	3	4	5
7. Students tried to learn new skills.	1	2	3	4	5
8. Students were encouraged to outplay each other.	1	2	3	4	5
9. Everyone wanted to be the best juggler.	1	2	3	4	5

During the Juggling Session…	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
10. Only the top jugglers "got noticed."	1	2	3	4	5
11. Students were afraid to make mistakes.	1	2	3	4	5
12. Most students got to learn to juggle.	1	2	3	4	5
13. Only a few students could be the "stars."	1	2	3	4	5
14. Students were punished for mistakes.	1	2	3	4	5
15. The instructor focused on skill improvement.	1	2	3	4	5
16. All students had an important role.	1	2	3	4	5
17. The instructors favored some students.	1	2	3	4	5
18. Out-playing the other students was important.	1	2	3	4	5
19. The instructor wanted us to try new skills.	1	2	3	4	5
20. Students liked juggling with more skilled jugglers.	1	2	3	4	5
21. Students were taken out for making mistakes.	1	2	3	4	5

Caring Climate Scale
(Newton, Fry, et al, 2007)

Directions*:* Read each statement and think about how much you believe that statement describes the Juggling Session. Then choose the answer that shows how much you agree or disagree with the statement.

During the Juggling Session…	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. Students were treated with respect.	1	2	3	4	5
2. The instructors respected the students.	1	2	3	4	5
3. The instructors were kind to students.	1	2	3	4	5
4. The instructors cared about the students.	1	2	3	4	5
5. The students felt that they were treated fairly.	1	2	3	4	5
6. The instructors tried to help the students.	1	2	3	4	5
7. The instructors wanted to get to know the students.	1	2	3	4	5
8. The instructors listened to the students.	1	2	3	4	5
9. Everyone liked the students for who they are.	1	2	3	4	5
10. The instructors accepted students for who they are.	1	2	3	4	5
11. The students felt comfortable.	1	2	3	4	5
12. The students felt safe.	1	2	3	4	5
13. Students felt welcome.	1	2	3	4	5

Positive Affect, Negative Affect Scale
(PANAS; Watson, Clark, & Tellegen, 1988)

Directions: This scale consists of a number of words that describe different feelings and emotions. Read each item and then choose the answer using the following scale that best describes how your personal experience during the juggling session.

During the Juggling Session I was…	**Very Slightly or Not at All**	**A Little**	**Moderately**	**Quite a Bit**	**Very Much So or Extremely**
1. Interested	1	2	3	4	5
2. Distressed	1	2	3	4	5
3. Excited	1	2	3	4	5
4. Upset	1	2	3	4	5
5. Strong	1	2	3	4	5
6. Guilty	1	2	3	4	5
7. Scared	1	2	3	4	5
8. Hostile	1	2	3	4	5
9. Enthusiastic	1	2	3	4	5
10. Proud	1	2	3	4	5
11. Irritable	1	2	3	4	5
12. Alert	1	2	3	4	5
13. Ashamed	1	2	3	4	5

During the Juggling Session I was…	**Very Slightly or Not at All**	**A Little**	**Moderately**	**Quite a Bit**	**Very Much So or Extremely**
14. Inspired	1	2	3	4	5
15. Nervous	1	2	3	4	5
16. Determined	1	2	3	4	5
17. Attentive	1	2	3	4	5
18. Jittery	1	2	3	4	5
19. Active	1	2	3	4	5
20. Afraid	1	2	3	4	5

Sport Satisfaction Scale - Enjoyment

(Duda & Nicholls, 1992)

Directions: The statements below ask about your enjoyment during the juggling session. Please read each of the statements and circle the number on the 5-point scale listed below that represents how you truly feel for each individual item.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. I found learning to juggle interesting.	1	2	3	4	5
2. I had fun learning to juggle.	1	2	3	4	5
3. I was involved while learning to juggle.	1	2	3	4	5
4. I enjoyed learning to juggle.	1	2	3	4	5
5. I found time flew by when I was learning to juggle.	1	2	3	4	5

Intrinsic Motivation Inventory Effort Subscale

(IMI; McAuley et al., 1989)

Directions: Read each statement and think about how much the statement applied to you during the juggling session. Then choose the answer that shows how much you agree or disagree with each statement.	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. I am satisfied with my performance at the juggling session.	1	2	3	4	5
2. I did not perform well at the juggling session.	1	2	3	4	5
3. I put a lot of effort into this juggling session.	1	2	3	4	5
4. I tried hard while at the juggling session.	1	2	3	4	5
5. I did not try very hard at the juggling session.	1	2	3	4	5

Individual Items

Directions: A number of statements that students have used to describe student's feelings while learning a new physical skill in a group setting are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you feel about the Juggling Session.*

	Not At All		**Somewhat**		**Moderately So**		**Very Much So**
1. I felt stress during the juggling session.	1	2	3	4	5	6	7
2. I felt shame because of the juggling session.	1	2	3	4	5	6	7
3. I felt like I was being judged by the other students during the juggling session.	1	2	3	4	5	6	7
4. I felt ashamed during the juggling session.	1	2	3	4	5	6	7
5. I felt embarrassed during the juggling session.	1	2	3	4	5	6	7
6. I felt self-conscious during the juggling session.	1	2	3	4	5	6	7
7. I felt humiliation during the juggling session.	1	2	3	4	5	6	7
8. I am interested in continuing to juggle.	1	2	3	4	5	6	7
9. I am excited to continue juggling.	1	2	3	4	5	6	7

Appendix H

Ice Breakers – Study 1

Name Game:

Have participants circle up
Grab an object from the box & tell participants to follow your lead:
Point to a person across from you "what's your name again?" (smile)
Wait for their response
"Okay (*insert receiver's name)*, you ready?" while still pointing at them
Once they say yes, "here we go" – toss the object to them
Now have the receiver continue to look at you and say "thank you (*insert thrower's name)*"
Have them pick someone else across from them (make sure everyone gets a chance)
Make sure you are reminding them to make eye contact, that they are sure the other person is ready and to use names.
Reinforce that it is ok if they forgot their partner's name, and to just ask again.
Once you comes to a complete circle (back to you) you should say, "thank you *thrower*'s *name*) while maintaining eye contact.
Then try two objects sequentially (repeat)
Once your group gets down 2 objects, then go one after another until the box is empty.

Glory Days:

Circle participants up
Ask each participant to say their name, grade, and share their greatest sports accomplishment
React favorably towards athletic accomplishments

Appendix I

1

IRB Approval – Study 2

THE UNIVERSITY OF KANSAS Research

APPROVAL OF PROTOCOL

February 5, 2016

Candace Hogue
cmhogue@ku.edu

Dear Candace Hogue:

On 2/5/2016, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	The Relationship Between the Perceived Motivational Climate in Middle School PE Classes and Psychological Stress, Coping, and Self-Esteem.
Investigator:	Candace Hogue
IRB ID:	STUDY00003642
Funding:	None
Grant ID:	None
Documents Reviewed:	• HogueFry_IRB2015_PEstudy_Questionnaires.docx, • HogueFry_IRB2015_PEstudy_Assent.docx, • Hogue Fry_IRB2016_PEstudy_Parent Info Sheet 2.docx, • HogueFry_PhysicalEducationStudy_HSCL_Initial_Submission_Form.pdf

The IRB approved the submission from 2/5/2016 to 2/4/2017.

1. Before 2/4/2017 submit a Continuing Review request and required attachments to request continuing approval or closure.
2. Any significant change to the protocol requires a modification approval prior to altering the project.
3. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at https://rgs.drupal.ku.edu/human_subjects_compliance_training.
4. Any injury to a subject because of the research procedure must be reported immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.

If continuing review approval is not granted before the expiration date of 2/4/2017 approval of this protocol expires on that date.

Please note university data security and handling requirements for your project:
https://documents.ku.edu/policies/IT/DataClassificationandHandlingProceduresGuide.htm

You must use the final, watermarked version of the consent form, available under the "Documents" tab in eCompliance.

Sincerely,

Stephanie Dyson Elms, MPA
IRB Administrator, KU Lawrence Campus

2

Appendix J

Assent – Study 2

"My name is (Candace Hogue/Mary Fry) and I am a (graduate student/professor) at KU. I am here because I am really interested in learning about the opinions of adolescents, like you, and to see if you and some of your classmates want to participate in our study where you'll fill out a short questionnaire. The questionnaire will ask you about your perceptions of the environment in your PE class, your experiences during PE class, and your opinions about your PE class.

Also, no one will know what your answers are to the questions we ask you – we won't even collect your name. Each of you will be given a unique number and your responses will be mixed with all the other students who agreed to help with this study. And, when I tell other people about my research, I will not use your name or even your school's name, so no one can tell who I am talking about – I'll just summarize everything for them without including any personal information.

I will be happy to answer any questions you may have. Who is willing to complete the questionnaire?"

Appendix K

Questionnaire – Study 2

Abbreviated Perceived Motivational Climate in Exercise Questionnaire
(Moore, Brown & Fry, 2015)

Directions: Think about how it feels to be in your PE class. Read the following statements carefully and respond to each item in terms of how you view the typical atmosphere. ***During PE class…***	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. The teachers encourage students to try new skills.	1	2	3	4	5
2. Students of all fitness levels are made to feel valued.	1	2	3	4	5
3. Students are rewarded and noticed when they try hard.	1	2	3	4	5
4. The teachers encourage students to help each other.	1	2	3	4	5
5. The teachers emphasize always trying your best.	1	2	3	4	5
6. The focus is to keep improving on each exercise/skill each class.	1	2	3	4	5
7. Students are hesitant/embarrassed to ask the teachers or other students for help.	1	2	3	4	5
8. The teachers give most of his/her attention to only a few students.	1	2	3	4	5
9. Students feel embarrassed if they don't know how to perform an exercise/skill.	1	2	3	4	5
10. The teachers make it clear who he/she thinks are the most fit and/or most skilled students.	1	2	3	4	5
11. Students are encouraged to do better than other students.	1	2	3	4	5
12. Students are excited when they do better than their fellow peers.	1	2	3	4	5

Caring Climate Scale
(Newton, Fry, et al, 2007)

Directions*:* Read each statement and think about how much you believe that statement describes your PE class. Then choose the answer that shows how much you agree or disagree with the statement.

During PE class…	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. Students are treated with respect.	1	2	3	4	5
2. The teachers respect the students.	1	2	3	4	5
3. The teachers are kind to students.	1	2	3	4	5
4. The teachers care about the students.	1	2	3	4	5
5. The students feel that they are treated fairly.	1	2	3	4	5
6. The teachers try to help the students.	1	2	3	4	5
7. The teachers want to get to know the students.	1	2	3	4	5
8. The teachers listen to the students.	1	2	3	4	5
9. Everyone likes the students for who they are.	1	2	3	4	5
10. The teachers accept students for who they are.	1	2	3	4	5
11. The students feel comfortable.	1	2	3	4	5
12. The students feel safe.	1	2	3	4	5
13. Students feel welcome.	1	2	3	4	5

Primary Appraisal/Secondary Appraisal Scales

"Threat & Challenge" vs. "Self-Concept of Competence & Control Expectancy"

(PASA; Gaab, Rohleder, Nater, & Ehlert, 2005)

Directions: Please indicate the extent to which the following statements apply to you during PE class.	**Strongly Disagree**	**Disagree**	**Slightly Disagree**	**Slightly Agree**	**Agree**	**Strongly Agree**
1. I do not feel threatened during PE class.	1	2	3	4	5	6
2. PE class is important to me.	1	2	3	4	5	6
3. In PE class, I know what I am able to do.	1	2	3	4	5	6
4. I find PE class very unpleasant.	1	2	3	4	5	6
5. I do not care about PE class.	1	2	3	4	5	6
6. I have no idea what I am supposed to do during PE class.	1	2	3	4	5	6
7. I can protect myself against failure in PE class through my behavior.	1	2	3	4	5	6
8. I do not feel worried because PE class does not represent any threat for me.	1	2	3	4	5	6
9. PE class is not a challenge for me.	1	2	3	4	5	6
10. I can think of lots of alternative actions to take in PE class.	1	2	3	4	5	6
11. I have a great deal of control over what will happen in PE class.	1	2	3	4	5	6
12. PE class scares me.	1	2	3	4	5	6
13. The activities in PE class challenge me.	1	2	3	4	5	6
14. I can think of lots of solutions for the challenges I face in PE class.	1	2	3	4	5	6
15. When my teacher judges me positively it is because of my effort and personal commitment.	1	2	3	4	5	6
16. It mainly depends on me, whether my teacher judges me positively.	1	2	3	4	5	6

The Internalized Shame Scale
"Inadequate & Deficient" subscale
(Cook, 1993)

Below is a list of statements describing feelings or experiences that you may have from time to time or are familiar to you. Read each statement carefully and circle the number underneath the item that indicates the frequency with which you have found yourself feeling or experiencing what is described in the statement ***during PE class.***	**Never**	**Seldom**	**Sometimes**	**Often**	**Almost Always**
1. I feel like I am never quite good enough during PE class.	0	1	2	3	4
2. I feel somehow left out during PE class.	0	1	2	3	4
3. Compared to the other students in my class, I feel like I somehow never measure up.	0	1	2	3	4
4. I think that people look down on me in PE class.	0	1	2	3	4
5. I feel insecure about others' opinions of me in PE class.	0	1	2	3	4
6. I scold myself and put myself down during PE.	0	1	2	3	4
7. I see myself as being very small and insignificant when I'm in PE.	0	1	2	3	4
8. I feel intensely inadequate and full of self-doubt when I'm in PE class.	0	1	2	3	4
9. When I'm in PE class I feel as if I am somehow defective as a person, like there is something basically wrong with me.	0	1	2	3	4
10. When I compare myself to others in PE class, I am just not as important.	0	1	2	3	4

Perceived Stress Scale
(Cohen, Kamarack & Mermelstein, 1993)

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, please indicate by circling the appropriate number how often you felt or thought a certain way. ***In the last month, how often have you:***	**Never**	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**
1. Been upset because of something that happened unexpectedly?	0	1	2	3	4
2. Felt that you were unable to control the important things in your life?	0	1	2	3	4
3. Felt nervous and "stressed"?	0	1	2	3	4
4. Felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. Felt that things were going your way?	0	1	2	3	4
6. Found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. Been able to control irritations in your life?	0	1	2	3	4
8. Felt that you were on top of things?	0	1	2	3	4
9. Been angered because of things that were outside of your control?	0	1	2	3	4
10. Felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4