Validation of Climate and Motivational Measures from the College Exercise Class Setting to the Physiology Laboratory Setting

By

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Abstract

The purpose of this study grounded in the Achievement Goal Perspective Theory (AGPT) and a Caring framework was to effectively adapt previously validated measures of caring, task-involving (CTI), and ego-involving (EI) climates for college exercise classes to the college science, technology, engineering, and mathematics (STEM) laboratory setting. The items' measurement quality was assessed over two studies. Students (N_{Study1} = 249, female 73%; N_{Study2} = 199, female 78%) enrolled in biology laboratory courses were invited to complete a survey during the last two weeks of their laboratory course. Confirmatory factor analysis (CFA) revealed overall good fit, however, two EI items had low loadings, so their wording was revised for Study 2. CFA results of Study 2 provided reliability and validity support for the use of these relatively brief and easy to administer measures in the college laboratory setting. This research provides additional support for creating CTI climates in the college laboratory setting.

Keywords: graduate teaching assistant, caring, task-involving, ego-involving, Achievement Goal Perspective Theory, STEM

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Effort and enjoyment are important outcomes of individuals' engagement in exercise classes. Researchers emphasize that these outcomes are vital to individuals developing high levels of intrinsic motivation and sustained commitment to exercise (Brown & Fry, 2014; Jaakkola, 2015). While the effect of the motivational class climate on individuals' effort and enjoyment is clear in the primary school (Ames & Archer, 1988), physical education (Moore & Fry, 2017), and college exercise class (Brown & Fry, 2014; Moore & Fry, 2014) setting, these important motivational constructs have been less explored in university course settings. Recently, researchers (Victorino, et al., 2019) found University students' perceptions of the campus climate (e.g., feeling respected) significantly and positively predicted the students' science, technology, engineering, and mathematics (STEM) course engagement above and beyond their demographic characteristics (e.g., gender, SAT, ethnicity, major, and family education). While examining students perceptions of the overall university climate is important, students perceptions of motivational climate within particular STEM courses would be expected to more significantly affect their experiences and motivation to continue in STEM courses. This would including kinesiology, future allied health, and medical professionals. Therefore, the purpose of this research was to successfully adapt to the university STEM laboratory setting measures of motivational constructs that previously produced reliable and valid scores in university exercise classes.

Researchers examining physical activity commitment indicate that if individuals perceive a positive psychosocial environment in physical activity settings, they will be more likely to report greater levels of effort, enjoyment, and intrinsic motivation leading to enhanced commitment to being physically active (Brown & Fry, 2014; Moore & Fry, 2017). One theory that has been helpful in understanding how to foster these positive outcomes is the Achievement

Goal Perspective Theory (AGPT) of motivation developed by educational psychologist John Nicholls (1984, 1989). This theory suggests that individuals who are task-involved will be more likely to report experiencing greater levels of effort, enjoyment, intrinsic motivation, as well as having better interpersonal relationships and psychological well-being (Fry & Hogue, 2018). When task-involved, an individual maintains a self-referenced view of ability, focuses on the current task, and bases success on their personal effort and improvement. While those who are ego-involved gauge their ability and success through comparisons with others based on favorable normative outcomes (Duda et al., 1995).

Nicholls' (1984, 1989) proposes that a key strategy for promoting task-involvement is to create a psychosocial environment that exemplifies task-involving (TI) features and minimizes ego-involving (EI) tendencies. Researchers have indicated that leaders can create a TI climate across achievement settings by rewarding personal effort and improvement, fostering cooperation with others, making all feel they play an important role, and treating mistakes as part of the learning process. In contrast, in an EI climate leaders value and emphasize performance and normative outcomes, foster rivalries, punish mistakes, and extend recognition primarily to the highest performers (Nicholls, 1984, 1989). In addition to Nicholls' suggestions for creating a TI climate, motivational researchers Newton and colleagues (2007) have proposed an additional caring (C) feature of the climate to be assessed when examining individuals' experiences in sport and exercises settings. The C feature of the climate assesses the extent to which individuals perceived to be cared for and respected in a particular achievement setting. Newton and colleagues (2007) based much of their developmental efforts of the C feature of climate on the work of educational philosopher Noddings (1984, 2005), who advocated for youngsters to feel cared for in the educational setting. Researchers Battistich and colleagues (2000) employed the

principles of Noddings (1984) in a comprehensive educational reform with the aim to help elementary schools become more caring. Battistich et al., (2000) found schools with more of a C climate resulted in youths exhibiting enhanced prosocial behaviors and psychological functioning (Battistich et al., 2000). The findings of this study align with the mounting body of motivational climate literature, which has consistently linked individuals' perceptions of a CTI climate with positive outcomes (Fry & Hogue, 2018; Fry & Moore, 2019).

In the past decade, the AGPT and C framework has been applied to the exercise setting, including college exercise classes, with similar results to those seen in sport and primary education (Brown & Fry, 2014; Moore & Fry, 2014; Newland, et al., 2017). This research started with the development of the Perceived Motivational Climate in Exercise Questionnaire (Huddleston, et al., 2012). Researchers examining the effects of perceiving a CTI exercise class climate have found positive associations with college students' competence, effort, enjoyment, commitment, ownership, and empowerment (Brown & Fry, 2014; Moore & Fry, 2014; Newland, et al., 2017). Furthermore, college students' perceptions of an EI exercise class climate were positively associated with increased tension/pressure, and negatively associated with effort, enjoyment, competence, commitment, ownership, and empowerment (Brown & Fry, 2014; Moore & Fry, 2014). Similar results have been found among high school students (Chamberlin et al., 2017; Hogue, et al., 2019; Moore, 2015; Moore & Fry, 2017). In an experimental setting, when learning a new physical skill, college students in the CTI climate reported greater levels of effort and enjoyment, and self-reported less objectively measured stress; whereas college students in the EI climate reported greater anxiety, self-consciousness, and shame, as well as increased self-reported and objectively measured stress (Hogue et al., 2013). This research over

the past decade supports the impact of the class motivational climate for college students in exercise classes.

Of interest, is how the AGPT and C Framework tenants extend to the university academic class setting, specifically STEM laboratories (e.g., chemistry, biology, physiology). These laboratories are often required as gateway courses for kinesiology majors and those seeking to enter into allied health and medical professions (Bassett et al., 2018). Although all academic courses may merit consideration for implementing a CTI climate, laboratory courses would be particularly essential to investigate. Laboratory courses offer a learning environment unlike the ordinary college classroom and are a focal point of most, if not all, university STEM courses. Compared to large lecture courses, the student to instructor ratios in laboratory courses are much smaller, and students are given more hands-on opportunities to gain experience and implement the knowledge obtained from lecture courses to actual experiments. Although laboratory courses are highly regarded as beneficial for students in STEM, researchers Hofstein and Lunetta (1982) indicate students' learning and motivational responses are sometimes sub-optimal due to inadequate instruction and teaching effectiveness.

This is because on many university campuses, especially large research centered institutions, STEM laboratories are taught by graduate students with limited experience cover a majority of science laboratory courses (Kendall & Schussler, 2012). Sundberg and colleagues (2005) surveyed 65 universities in the U.S. and found that STEM discipline GTAs teach 71% and 91% of laboratory courses at comprehensive and research universities, respectively. Graduate students with assigned teaching assistantships (GTAs) often receive minimal to no training and are left to decipher how they will teach these laboratory courses with little direction from more experienced professionals (Rushin et al., 1997). Concerningly, it is likely that the

current instructional state of college laboratory courses falls short of the type of academic environment that would promote the best learning and academic success.

As a result, an important area of inquiry involves considering the quality of experience students have in their STEM laboratory courses. Of particular interest is exploring the relationship between students' perceptions of the climate in their STEM laboratory courses to their self-reported levels of effort and enjoyment in those courses. To examine these research aims, it is necessary to have validated measures of the climate (i.e., C, TI, EI), effort, and enjoyment. Thus, two studies were conducted to adapt existing measures to the college laboratory setting and then validate these adapted measures with a second, independent sample. Study 1 was conducted to apply survey measures with previously verified psychometric properties in the college exercise class setting to the college laboratory setting, to determine if the same measures can be used to examine students' perceptions of the climate and their motivational responses (i.e., effort, enjoyment). Study 2 was necessary to validate the findings of Study 1 and to ensure the psychometric properties held among an additional sample of college laboratory students. Structural equation modeling (SEM) was employed to determine if the psychometric properties of the previously verified latent constructs of C climate, TI climate, EI climate, effort, and enjoyment remain in college laboratory settings. It was hypothesized that by modifying the wording of each measure to fit the laboratory setting, the psychometric properties of the latent constructs would be tenable and accurate to assess students' responses. Validity evidence would be provided by the following hypothesized correlations being significant: C and TI positively correlated with each other, enjoyment, and effort; while EI negatively correlated with C, TI, enjoyment, and effort.

Method

Data was collected from two independent samples of biology laboratories for each study. Each of these studies were approved by the Institutional Review Board and Biology Program at the first author's university, and consent was acquired from all participants. A trained research team administered the survey to all laboratory sections.

Participants

Study 1.

Biology laboratory students (N = 249; female 73%) enrolled at a Midwestern university in the U.S. were invited to complete a brief survey during the final two weeks of their laboratory course. Students in Study 1 reported being primarily sophomores (58%), white/non-Hispanic (70%), and pursuing 19 different degrees of study.

Study 2.

Students (N = 199; female 78%) enrolled in a biology laboratory course at the same university were again invited to complete a survey during the last two weeks of their laboratory course. Students in Study 2 reported they were primarily sophomores (62%), white/non-Hispanic (67%), and pursuing 10 different degrees of study.

Measures

Each participant completed a survey, which assessed student perceptions of the motivational climate (i.e., C, TI, EI) in their respective laboratory sections and included measures of effort and enjoyment. The survey also included a demographics section, which included questions about students' race, gender, academic status, and academic major.

Caring Climate.

The 13-item Caring Climate Scale (CCS; Newton et al., 2007) was employed to assess students' perceptions of the extent the environment within the laboratory was perceived as caring, a place where students feel valued, comfortable, and treated with kindness and respect. A sample item is "The instructor cares about the students in this lab." Students responded using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Results of Newton and colleagues (2007) confirmatory factor analysis found the 13-item CCS to have acceptable model fit (SRMR = .035, CFI = .97, TLI = .97, and RMSEA = .04). In addition, the 13-item CCS displayed adequate internal reliability (α = .92) and variability (M = 3.86, SD = .77). This support was found for the 13-item version of the CCS in youth physical activity settings (Newton et al., 2007).

Perceived Motivational Climate.

The 12-item Perceived Motivational Climate in Exercise Questionnaire-Abbreviated (PMCEQ-A; Moore et al., 2015) was developed to assess individuals' perception of the motivational climate in exercise settings, but was easily adapted for a laboratory setting. The stem was adapted from "In this physical activity course…" to read "In this physiology lab …". Sample items include "the instructor encouraged students to help each other" (TI) and "students feel embarrassed if they don't know how to perform a skill" (EI). Students responded to the items using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Moore and colleagues (2015) have provided support for the psychometric properties and reliability of employing the PMCEQ-A in the exercise setting.

Effort.

The 4-item effort subscale of the Intrinsic Motivation Inventory (IMI; McAuley et al., 1989) was modified and used to assess students' perceptions of their personal effort during

laboratory sessions throughout the semester. Students responded using a 5-point Likert scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is "I put a lot of effort into learning the material presented in each lab." The effort subscale of the IMI has proven to have acceptable internal reliability and psychometric properties for use with college physical activity participants (Boyd et al., 2002) and college exercise classes (Brown & Fry, 2014), which provides great potential for investigating effort levels in the college academic class setting.

Enjoyment.

The 5-item enjoyment subscale of the Academic Satisfaction Instrument (ASI; Duda and Nicholls, 1992) was developed to assess the degree of fun youths reported in academic settings. Students responded to the items using a 5-point Likert scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is "I enjoyed lab session activities." The ASI has demonstrated strong internal reliability in multiple studies ranging from $\alpha = .84$ to .94, and has been used as a measure of enjoyment in classroom settings with adolescents (Duda & Nicholls, 1992).

Statistical Procedures

Initial checks of data quality were conducted in IBM SPSS version 26 (IBM Corp., Armonk, N.Y., USA) as well as calculating descriptive statistics and percentages of missing data for Study 1 and Study 2. Criterion for checks of normality were conducted in RStudio, version 3.5.1 (RStudio Team, 2015). Confirmatory factor analyses (CFA) to assess measurement quality of the constructs in the novel laboratory setting were conducted in the lavaan 0.6-5 (Rosseel, 2012) software package. The CFAs for Study 1 and Study 2 included five latent constructs: C climate, TI climate, EI climate, effort, and enjoyment. To account for missing data, the

parameters' values and standard errors were estimated with full-information maximum likelihood (FIML) (Little, 2013). The fixed-factor method of setting the scale was used in all analyses to obtain standardized, unit-free estimates (Little, 2013).

Measurement Invariance of the Measures (Study 1)

Configural invariance was tested to assess the overall fit of the item-level model for Study 1 (Figure 1). Both absolute (Root Mean Square Error of Approximation [RMSEA]; Standardized Root Mean Square Residual [SRMR]) and relative (Comparative Fit Index [CFI]; Tucker-Lewis Index [TLI]) fit statistics were utilized to determine model fit. CFI and TLI values above .90 and below .08 for the RMSEA and SRMR are considered acceptable fit statistics (Cheung & Rensvold, 2002; Little, 2013).

Parceling was only completed with the constructs that had their measurement model quality supported in previously published articles and were parceled in previous studies (Moore et al., 2015). To parcel the TI and EI climate constructs; items were grouped by feature and followed the same procedure as Moore and colleagues (2015) to decrease the impact of non-common variance and avoid contaminating the latent constructs (Little, 2013; Little et al., 2002). In contrast, the C climate construct required parceling the constructs' items into three parcels as equally as possible based upon the item-level model factor loadings and using the counter-balance method (i.e., stronger and weaker loading items were combined to generate the three parcels) (Little, 2013). Parceling was not implemented for the effort and enjoyment constructs, due to their fewer items and respective factor loadings. Meaningful parameter estimates, such as the factor loadings, intercept values, and residuals are presented for the item-level model (see Table 2) and parceled models (see Figures 2 and 3). The covariance matrices for both models can be found in the supplemental documents.

In order to further assess the survey measures' acceptability in the college academic setting, the measurement reliabilities of each construct were calculated by using the composite reliability (CR) value. According to Hair and colleagues (1998) the criterion value for a measures' CR is .60. Analyses indicated that all constructs, except for the EI climate construct demonstrated satisfactory levels of reliability. Based on parameter estimates and reliabilities of the EI climate construct, the wording for two of the EI climate construct items – item 5 and item 6 – were changed to read more naturally for the academic environment. Thus, Study 2 data was collected with the revised EI climate items and assessed to validate the usage of these measures in the college academic setting.

Validating the Measures (Study 2)

A follow-up study was conducted in the same laboratory courses, except with a difference sample of students to further investigate invariance and validate the usage of these measures in the college academic setting. In order to identify the most effective measure, the wording for items 5 and 6 within the EI climate construct were slightly modified to better relate to the academic setting. The TI and EI climate constructs were originally developed in the exercise setting, so it was important to ensure that all items were tailored for the academic setting. Again, an item-level CFA was conducted (Figure 1), followed by a parceled CFA model to reach a final model (Figure 3).

Results

Preliminary findings indicated that there was 0.24% and 0.62% missing data in Study 1 and Study 2, respectively. Across both samples, the majority of the students perceived the laboratory course climate as being CTI and not EI (See Table 1). Most also reported giving effort in and enjoying the laboratory course.

Measurement Invariance of the Measures (Study 1)

Item-level measurement model.

The initial CFA conducted to assess the quality of the item-level model had poor model fit ($\chi^2_{(517,\ n=249)} = 1645.41$, CFI = .80, TLI = .78, RMSEA = .09, SRMR = .06). The subsequent, parceled configural model had acceptable model fit ($\chi^2_{(125,\ n=249)} = 245.60$, CFI = .95, TLI = .94, RMSEA = .06, SRMR = .05). The reliabilities of each construct were calculated and all constructs, except for the EI climate construct (CR = .46) met satisfactory levels of reliability. Specifically, the other constructs reliability values were: C climate (CR = .97), TI climate (CR = .81), effort (CR = .78), and enjoyment (CR = .84). In addition, the correlations for all the constructs were significant ($p < .001$), and in hypothesized directions and magnitudes (See Figure 2).

Validating the Measures (Study 2)

Item-level measurement model 2:

To validate the usage of the survey measures, a CFA was conducted with sample 2 at the item-level (Figure 1). The item-level model, like in Study 1, resulted in inadequate model fit ($\chi^2_{(517,\ n=199)} = 1615.19$, CFI = .82, TLI = .80, RMSEA = .10, SRMR = .06). Table 2 provides the factor loadings, intercepts, and variances. Results indicated that the revisions to the two EI climate items resulted in an improved factor loading for item 5, while item 6 remained low.

Revised measurement model:

Parceling the climate construct items resulted in acceptable model fit ($\chi^2_{(125,\ n=199)} = 367.48$, CFI = .92, TLI = .90, RMSEA = .10, SRMR = .07). See Figure 3 for the factor loadings, intercepts, and variances. Each construct's reliability met acceptable CR criterion and improved from Study 1: C climate (CR = .98), TI climate (CR = .90), EI climate (CR = .69), effort (CR =

.81), and enjoyment (CR = .87). Correlations for all the constructs were again significant ($p <$ .001) and were theoretically sound in direction and magnitudes (See Figure 3).

The improved factor loadings and model fit suggest the modified wording of the EI climate items improved the reliability of the measure to an acceptable standard. It can be deduced that the survey measures evaluating C climate, TI climate, EI climate, effort, and enjoyment are reliable, valid, and tenable for use in the college laboratory setting.

Discussion

The purpose of this study was to determine if measures of motivational climate, effort, and enjoyment that have previously been validated and utilized in the college exercise class domain could be appropriately used in the college academic setting to assess students' perceptions of these variables in science laboratory courses. Results from Study 1 and Study 2 provide support for the utility and validity of employing these measures in college academic courses. Specially, results from Study 1 provided strong evidence for the psychometric properties of the adapted C climate, TI climate, enjoyment, and effort measures. Study 2 provided evidence to support the use of the revised EI climate items in the academic laboratory setting. In addition, the correlations between the constructs were theoretically consistent and the reliabilities of each measure were determined to be acceptable, as previously found in the physical domain (Moore et al, 2015; Brown et al., 2013; Duda & Nicholls, 1992).

While the motivational climate measures used have been validated in the exercise domain, it is important to note that the wording is somewhat generic and relevant to classroom situations, since the features of the climate (e.g., emphasizing effort and improvement, treating mistakes as opportunities for learning) are somewhat consistent across achievement contexts. It should be noted that the climate measures were parceled in this study, as has been a

recommended procedure by Little (2013), and utilized by researchers in previous studies with these same measures in the exercise domain (Moore & Fry, 2014; Moore et al., 2015). The EI climate scale was the only measure that failed to demonstrate an adequate reliability value (CR > .60) in Study 1. However, when two problematic items (i.e., low factor loadings) were reworded to be more appropriate for the classroom setting, the results were enhanced. Specifically, EI climate item 5 – "Students are encouraged to do better than other students" – was first adapted from the exercise version of the PMCEQ-A (Moore, et al., 2015; "Members are encouraged to do better than other members"). In the physical domain, exercise leaders often encourage participants to compete against one another in cycling classes, etc. However, in the academic classroom, instructors are less likely to outwardly tell students to outperform each other. They may use a more subtle approach and, for example, describe the kind of students who will receive As and/or excel in the course. Thus, the wording of EI climate item 5 was changed for Study 2 to, "The instructor is pleased when some students do better than others", suggesting that the instructor is concerned with identifying the best students in the class. The original adaptation of EI climate item 6 was "Students are excited when they do better than their peers." This wording suggests that perhaps students show their excitement outwardly in the course, as is the case often in the physical domain when individuals outperform others. Again, in the academic classroom, the excitement may be more internal, and so EI climate item 6 was reworded for Study 2 to read, "Students feel good when they do better than other students." This wording, while slightly adapted, maintained the essence of the EI climate items.

The primary purpose of this study was to validate measures for use in a college academic setting. These measures are central to understanding students' experiences in science laboratory courses, and lay a foundation for promoting and sustaining students' motivation over time.

Considerable research has outlined the benefits of individuals perceiving a CTI climate in the physical domain. Clearly, participants' perceptions of a positive and supportive environment is associated with enhanced levels of effort and enjoyment, which has led to optimal exercise and physical activity experiences (Fry & Hogue, 2018; Fry & Gano-Overway, 2010; Hall et al., 2017; Newland et al., 2017). Results from this study in the academic domain align with previous research in the physical domain, as students reported exerting greater effort and experiencing heightened enjoyment the more they perceived their science laboratory course as reflecting a CTI climate. College students are in the midst of a key developmental period where they are gaining greater responsibility over their lives and setting the groundwork for their futures (Committee on Improving Health, 2015). Though this is a period of tremendous growth, there can be struggles with anxiety, depression, and relationships (American Psychological Association, 2013). If college instructors can establish a positive environment in science laboratory courses, students may find themselves more engaged and focused on their academic pursuits. In their qualitative work, researchers, Enghag and Niedderer (2008) present the need in the academic domain to enhance student engagement and identify optimal levels of ownership in order to improve student learning and teaching effectiveness in physics teaching. Moore and Fry (2014) investigated ownership in the physical domain and found that college students in physical education classes who perceived a CTI climate reported feeling greater ownership within that course and promoted participants' exercise empowerment.

Universities have much to gain from having access to reliable, relatively brief, and easy to administer measures that provides feedback from students in a timely and convenient manner regarding their course experiences. Of all the student educational outcomes that universities desire their students demonstrate, effort and enjoyment may be the two most important to

measure in terms of students' experience (Smith et al., 2016). Evidence from previous studies suggest that effort and enjoyment are related to higher levels of intrinsic motivation and commitment, and this is good news for students in the STEM fields, particularly those more susceptible to discontinuing their education. For example, Griffith (2010) conducted a review of literature and found that female and minority students are less likely to continue a STEM degree than both male and non-minority students. Griffith went on to report that students' educational experiences (i.e., grades, instructor-student connection, institution characteristics) highlight some of the crucial factors that impact student retention and dropout rates between groups and merit further investigation. Examining minority, underserved, and at-risk college students' perceptions of the climate in their college courses may provide college instructors, faculty, and administrators with valuable information about how to optimize student learning.

Future Research

This study provided foundational work to validate measures for the academic domain that assess college students' experiences in science laboratory courses. These results open the door for future research. It would be interesting, for example, to have students identify the behaviors and strategies their instructors used to create a CTI climate, as well as the behaviors and strategies instructors use that reinforce an EI climate. While creating a CTI climate may lead to more students having fun, developing a true love for the course material, and feeling empowered to continue in their STEM education, students who experience an EI climate in their laboratory courses may be more likely to feel discouraged, less competent, and less likely to continue their educational journey in a STEM degree. However, research is needed to identify the precise behaviors that instructors utilize to create the CTI and EI climate features in the academic classroom.

Based on the results of this study and previous research on the deficiency in teaching effectiveness and training of GTAs, it may be beneficial to employ training interventions for instructors to help them develop the capacity to create a more CTI climate. This would involve assisting them with identifying strategies to emphasize effort and improvement of each student, foster cooperation among peers in the class, reinforce mistakes are part of learning, and grow a spirit of mutual caring and respect for everyone in the laboratory classroom setting. It seems likely that beneficial increases in students' learning and motivational outcomes may be even more apparent if students are fortunate to complete courses with instructors trained to establish a CTI climate. Differences might likely be seen in not only effort and enjoyment levels, but grades, retention, and overall commitment to their field of study.

To include variables such as grades and retention, it would be important to be able to identify students and track their progress across the college years. In the present study, the surveys were anonymous, so there is no way to link students' responses to their continued performance and progress in the course and major. This is an important future direction, though it comes with pros and cons. The participation rate of students completing this survey was over 95%, which is excellent. Students were assured that faculty and administrators would not have access to the individual survey responses, which a number of students indicated was important to them and influenced their willingness to complete the survey. Although instructors were outside the room when students completed the surveys, it was not unusual for students to ask, "You're sure my instructor won't see my answers?" This suggests that students appreciate the opportunity to provide feedback but also want to feel confident that their responses will remain confidential. Requiring students to provide an identifier would be beneficial for advancing this line of research to examine students' experiences over time in science courses, but might result in some students

declining to complete the survey. It would be important to assure students that even though they are providing a personal identifier, their responses would be kept confidential.

While this study provided insights to important areas of future inquiry, it was not without limitations. First, students were surveyed one time at the end of the semester. Students' course experiences are dynamic and it will be important in future work to include more than one assessment point across the semester. Adding a midpoint survey along with the end of the semester survey would allow researchers to have a better indication of students' experiences as they progress through the course.

In addition, the study included student self-report measures, and future research may include an observational tool that could be utilized to help instructors see their interactions with students, and to continue to identify best practices for creating a CTI climate. In addition, though the measures of climate, effort, and enjoyment were validated in this study and received strong initial support for their use in science laboratory courses at a Research 1 university, it will be important to continue to validate the measures and examine whether they hold strong across gender, race/ethnicity, SES, and a variety of science laboratories as well as other university science courses.

In conclusion, research suggests and this study provides additional support for the benefits students experience from their exposure to a CTI climate. Students taught in a CTI climate may enjoy and be better equipped to succeed in their academic studies. As coaches' behaviors are influenced by the coaching behaviors they experienced as an athlete (Moore, 2017), professionals' behaviors may also be influenced by the behaviors of their teachers. Thus, college students who experience a CTI climate may be more likely to develop the skills to foster

the same CTI climate with their future clients/patients. This study sets the stage for continued research in this area of improving the learning experiences of students in STEM fields.

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Table 1.

Means, Standard Deviations, min, max, and Frequencies for Study 1 and Study 2

Measure	M (SD)	Min	Max	Strg Dis. (1.0-1.5)	Disagree (1.6-2.5)	Neutral (2.6-3.4)	Agree (3.5-4.4)	Strng Agree (4.5-5.0)
Study 1								
Caring	4.65 (.46)	3.08	5.00	0.00%	0.00%	2.01%	27.31%	70.68%
Task	4.22(.60)	2.50	5.00	0.00%	0.82%	9.05%	45.27%	44.86%
Ego	1.71 (.49)	1.00	3.17	40.49%	54.66%	4.86%	0.00%	0.00%
Effort	4.12 (.59)	2.00	5.00	0.00%	2.82%	6.05%	56.85%	34.27%
Enjoyment	3.97 (.65)	1.80	5.00	0.00%	1.63%	17.14%	58.37%	22.86%
Study 2								
Caring	4.51 (.56)	2.38	5.00	0.00%	1.02%	3.05%	32.99%	62.94%
Task	4.10 (.73)	1.83	5.00	0.00%	5.03%	10.05%	45.23%	39.70%
Ego	1.88 (.53)	1.00	4.17	31.98%	59.39%	8.12%	0.51%	0.00%
Effort	4.14 (.65)	1.60	5.00	0.00%	2.56%	7.18%	52.82%	37.44%
Enjoyment	4.00 (.69)	1.75	5.00	0.00%	2.58%	17.53%	55.15%	24.74%

Table 2

Item-Level Parameter Estimates for Study 1 and Study 2

	Study 1			Study 2		
Latent Variables:	**Factor Loadings**	**Intercepts**	**Variances**	**Factor Loadings**	**Intercepts**	**Variances**
Caring Climate Construct		0*	1.0*		0*	1.0*
CARE1	0.851	4.735	0.276	0.888	4.673	0.211
CARE2	0.849	4.747	0.280	0.878	4.701	0.229
CARE3	0.829	4.779	0.313	0.854	4.691	0.271
CARE4	0.845	4.695	0.285	0.852	4.528	0.274
CARE5	0.831	4.679	0.309	0.903	4.528	0.185
CARE6	0.813	4.735	0.339	0.835	4.563	0.302
CARE7	0.626	4.229	0.609	0.785	3.915	0.385
CARE8	0.848	4.655	0.281	0.899	4.487	0.192
CARE9	0.747	4.490	0.442	0.819	4.336	0.329
CARE10	0.769	4.606	0.409	0.820	4.437	0.328
CARE11	0.828	4.671	0.315	0.822	4.533	0.324
CARE12	0.848	4.723	0.280	0.796	4.603	0.367
CARE13	0.900	4.711	0.191	0.840	4.558	0.294
Task-Involving MC Construct		0*	1.0*		0*	1.0*
TASK1	0.625	4.400	0.609	0.792	4.307	0.373
TASK2	0.666	4.355	0.557	0.793	4.256	0.371
TASK3	0.697	3.637	0.514	0.756	3.492	0.428
TASK4	0.680	4.473	0.537	0.773	4.312	0.403
TASK5	0.752	4.185	0.435	0.785	4.060	0.384
TASK6	0.660	4.268	0.564	0.823	4.206	0.322
Ego-Involving MC Construct		0*	1.0*		0*	1.0*
EGO1	0.483	1.305	0.767	0.722	1.523	0.479
EGO2	0.577	1.839	0.667	0.728	1.877	0.470
EGO3	0.661	1.514	0.564	0.604	1.618	0.636
EGO4	0.465	1.361	0.784	0.543	1.538	0.705
EGO5	0.224	1.899	0.950	0.533	1.945	0.716
EGO6	0.268	2.394	0.928	0.205	2.759	0.958
Effort Construct		0*	1.0*		0*	1.0*
EFF1	0.718	3.952	0.485	0.806	4.040	0.351
EFF2	0.736	3.940	0.459	0.840	3.994	0.294
EFF3	0.621	4.480	0.615	0.611	4.430	0.627
EFF4	0.645	4.118	0.584	0.616	4.081	0.621
Enjoyment Construct		0*	1.0*		0*	1.0*
ENJ1	0.708	4.054	0.499	0.848	4.045	0.282
ENJ2	0.804	3.993	0.354	0.853	3.979	0.273
ENJ3	0.542	4.389	0.706	0.701	4.420	0.509
ENJ4	0.626	3.505	0.609	0.560	3.633	0.686
ENJ5	0.867	3.924	0.249	0.803	3.886	0.354

Note: The wording of items EGO5 and EGO6 changed for the EI climate construct from Study 1 to Study 2. EGO5 changed from "Students are encouraged to do better than other students" to "The instructor is pleased when some students do better than others" and EGO6 changed from "Students are excited when they do better than their peers" to "Students feel good when they do better than other students". The asterisks represent the values were fixed.

Figure 1

Item-level CFA Model for Study 1 and Study 2

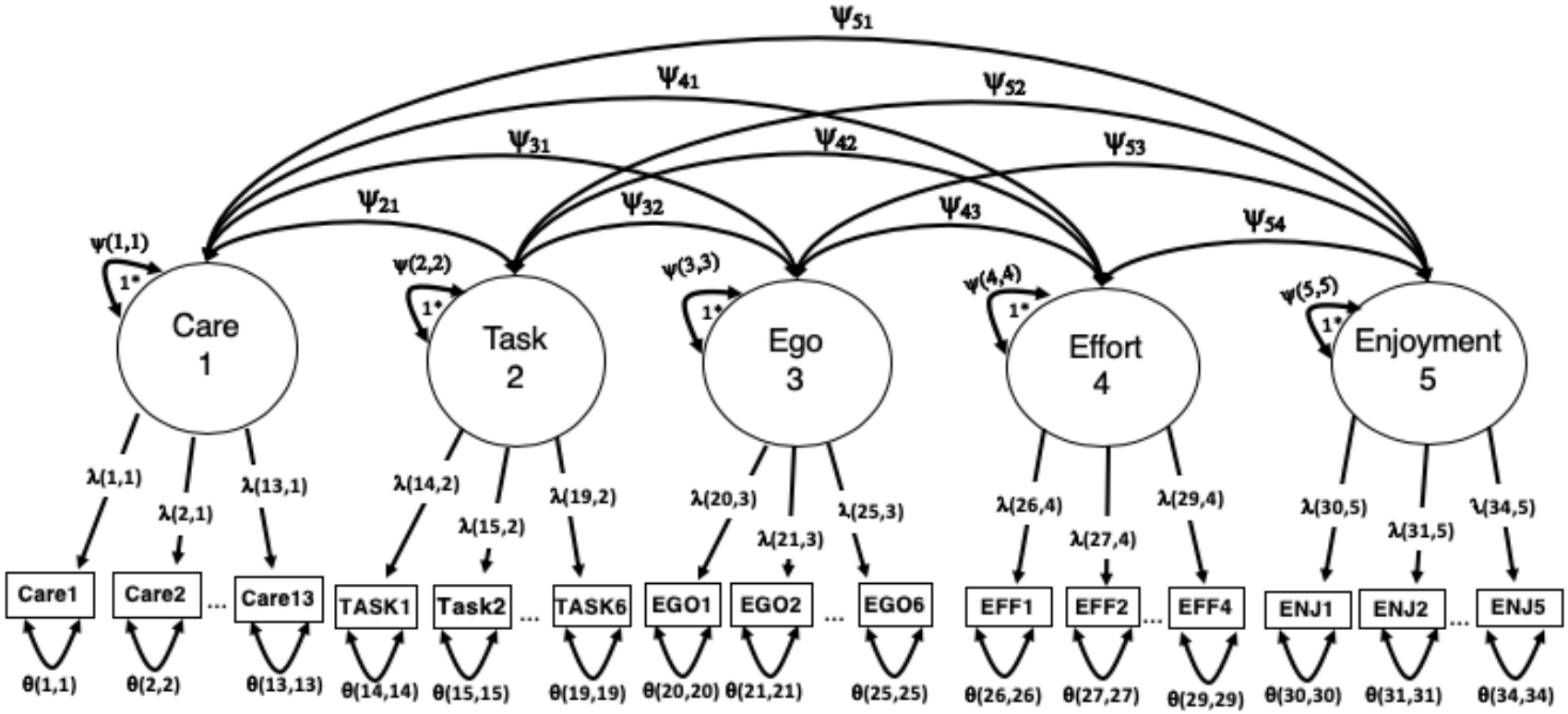


Figure 2

Final CFA Model for Study 1

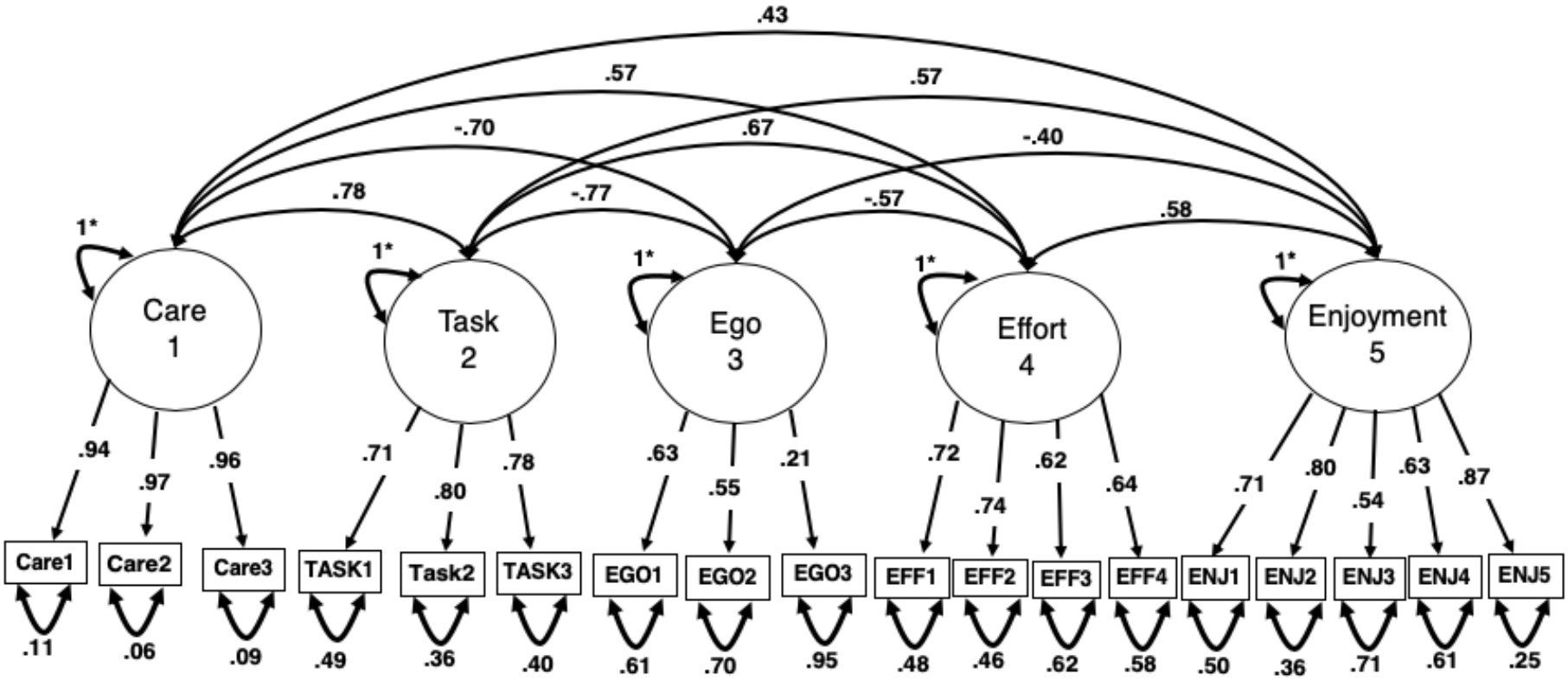
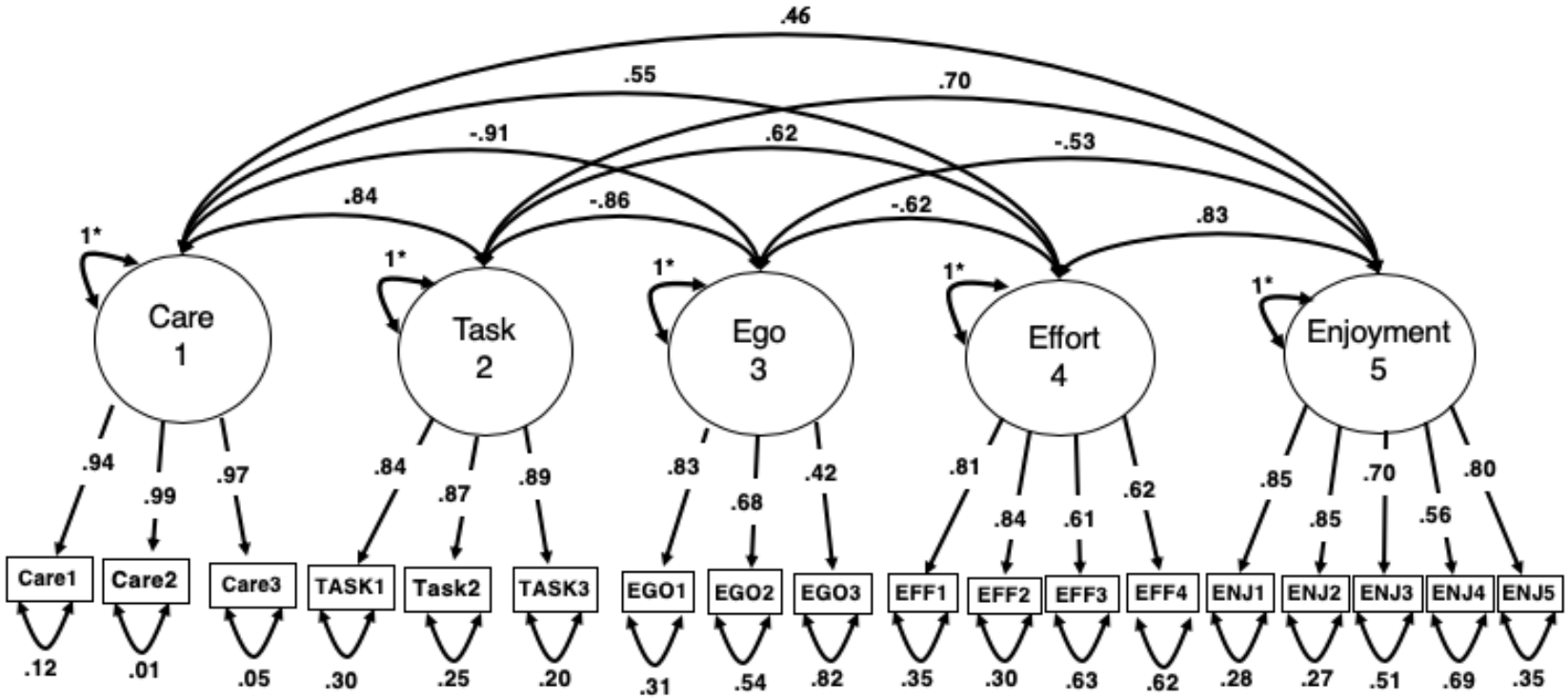


Figure 3

Final CFA Model for Study 2



Date: April 3, 2019

TO: Troy Wineinger, (towineinger@ku.edu)

FROM: Alyssa Haase, IRB Coordinator (785-864-7385, irb@ku.edu)

RE: **Approval of Initial Study**

The IRB reviewed the submission referenced below on 4/3/2019. Approval expires on 4/2/2022.

IRB Action: APPROVED	**Effective date: 4/3/2019**	**Expiration Date : 4/2/2022**
STUDY DETAILS		
Investigator:	Troy Wineinger	
IRB ID:	STUDY00143839	
Title of Study:	Relationship Between Students Perceptions of the Climate in their Physiology Labs to Their Motivational Responses	
Funding ID:	None	
REVIEW INFORMATION		
Review Type:	Initial Study	
Review Date:	4/3/2019	
Documents Reviewed:	• Human Research Protocol, • Information Statement, • Intro Script, • Mammalian Physiology Lab Protocol, • Mammalian Physiology Survey & Demographics	
Expedited Category(ies):	• (7)(b) Social science methods • (7)(a) Behavioral research	
Special Determinations:	• Students / Employees • Waiver of consent documentation	
Additional Information:		

KEY PROCEDURES AND GUIDELINES. Consult our website for additional information.

1. **Approved Consent Form:** You must use the final, watermarked version of the consent form, available under the "Documents" tab, "Final" column, in eCompliance. Participants must be given a copy of the form.
2. **Continuing Review and Study Closure:** Submit a Continuing Review request and required attachments at least 4 weeks in advance of the expiration date. If Continuing Review is not approved before 4/2/2022, the study approval will expire on that date and all human subjects research activities must stop. Please close your study to IRB oversight once your study meets the first 4 milestones, as outlined in the Closing a Study guidance.
3. **Modifications:** Prior to making any significant changes to the project, a Modification request must be submitted *and* approved.
4. **Add Study Team Member:** Complete a study team modification if you need to add investigators not named in original application. Note that new investigators must take the online tutorial prior to being approved to work on the project.
5. **Data Security**: University data security and handling requirements apply to your project.
6. **Submit a Report of New Information (RNI):** If a subject is injured in the course of the research procedure or there is a breach of participant information, an RNI must be submitted immediately. Potential non-compliance may also be reported through the RNI process.
7. **Consent Records:** 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.

Extended Literature Review

Achievement Goal Theory

Motivation is a phenomena that has been investigated for many years has been defined as a process that influences the initiation, path, magnitude, continuation, and quality of goal-directed behavior (Maehr, 2009). While many have made contributions to research examining motivation, few have been as influential as John Nicholls with his development of achievement goal theory (1984, 1989). Nicholls' theoretical framework was established in an educational achievement setting, as he applied his work to the motivational levels of children in elementary schools. This framework has since evolved and has been researched in a multitude of achievement settings, especially that of sport and exercise psychology. The expansion of this theory is due to the positive impact it has had and the manner in which it highlights achievement behaviors, which are behaviors that are influenced by an individual's desire to demonstrate ability levels in pursuit of particular goals and outcomes. Nicholls argues that people will strive to demonstrate high ability or they will avoid actions that would demonstrate low levels of ability (Nicholls, 1984).

Nicholls' maintains that individual's' demonstration of high ability, and minimization of low ability can influence their achievement behaviors either positively or negatively. Much of this stems from how one views the world around themselves, but Nicholls also theorizes that the psychosocial environment one is exposed to will greatly predict their achievement behaviors and motivational responses (Nicholls, 1989). Psychosocial environments are therefore extremely important and are found across all achievement settings with features that are under the control of individuals in leadership positions. Nicholls' achievement goal theory and decades of research indicate that this is indeed the case and it is crucial for people in leadership roles to endorse

positive behaviors and promote an optimal psychosocial environment to maximize positive outcomes (Nicholls, 1989). These positive outcomes may appear differently depending on the achievement setting one finds themselves in, but in reality research strongly suggests that if a positive psychosocial environment is promoted, people will have an optimal experience regarding their performance levels and overall well-being (Fredrickson, 2001).

From the business sector to the sport landscape, optimal performance and well-being is desired from all participants, but it is astonishing the lack of positive psychosocial environments in these and many other achievement settings. This is due to a prominent emphasis being placed on normative outcomes and measuring success based on attaining measurable gains in comparison to losses. Recently, the youth sport setting in America has adopted this mantra more than ever before and embodies many features that result in a maladaptive culture for children. This culture is one that is focused more on winning and normative outcomes, rather than youths having an enjoyable experience and developing through sport (Merkel, 2013). In a systematic review Harwood et al., (2015) echoes the call for promoting a positive youth sport environment and suggests changes must be made by individuals in coaching and leadership positions if an optimal experience is desired for youth athletes. This will stem from influential individuals focusing more on developing and optimizing youth athletes' experience, rather than focusing solely on normative outcomes and winning. It is, therefore, important for researchers to attain a better understanding of how to optimize the experiences of youth athletes in order to combat the current maladaptive youth sport culture.

Research conducted by Fraser et al (2005) suggests that many individuals in leadership positions, especially those engaging with youths in sport, struggle to create optimal environments that enhance youth development. When optimal environments are created and positive youth

development is fostered, research indicates that children will be enabled to yield more positive outcomes, such as, living healthier lifestyles, developing life skills that are important for success in future endeavors, and professional development (Hamilton et al., 2005). Therefore, it is imperative that leaders who influence youth athletes promote positive environments in physical activity settings in order to sustain and facilitate healthier living, development of life skills, and other positive outcomes. While there may be various ways to accomplish this task, there is tremendous support from achievement goal theorists and those in the field of motivation research that suggest promotion of caring and task-involving motivational climates in physical activity settings will foster optimal outcomes. The body of literature examining motivational climates has reliably shown caring and task-involving climates to predict many advantageous motivational and behavioral outcomes while reducing negative outcomes and making experiences more enjoyable for all (e.g. Braithwaite, 2011; Solmon, 1996).

Due to the great benefits and strong support, based on sound theory and consistency in findings examining motivational climates, it is reasonable to consider implementing the features of caring and task-involving climates into interventions that focus on helping leaders (i.e. coaches, parents, peers, and supervisors) foster a better culture in youth physical activity settings (e.g. Hogue et al., 2013; Gould et al., 2012; Fry, 2010). Findings from a multitude of studies, bolster support for these considerations, as numerous studies provide empirical evidence demonstrating the significant impact that perceived motivational climate has on many positive outcomes. For example, research conducted by Hogue et al, (2017) demonstrated that when leaders in a physical activity setting promoted a caring and task-involving climate, adolescents self-reported greater motivational responses, such as, increased effort, enjoyment, and less maladaptive outcomes. This study also examined the relationship between the impact of

perceived motivational climate on physiological outcomes, in particularly the stress hormone cortisol. As one might expect, adolescents who were exposed to leaders who promoted a caring and task-involving climate fostered more favorable cortisol responses when compared to those exposed to leaders who promoted an ego-involving climate. In brief, there is a great wealth of research suggesting positive outcomes (both psychologically and physiologically) are fostered when individuals in leadership positions reduce ego-involving tendencies and strive to create motivational climates that are caring and task-involving in physical activity settings (Hogue et al., 2013; Hogue et al., 2017; Breske et al., 2017).

With the great implications and impact achievement goal theory has in the physical activity setting, it is amazing to consider its conception originated in the early education setting and has extrapolated into so many other fields. This may be due to the commonality shared between fields and human beings that if not all people desire optimal motivational responses in whatever tasks they seek to accomplish. Regardless of reason, Nicholls' social-cognitive theory was first developed to better understand how to optimize youth's experiences and motivation in the classroom. Since then, it has accumulated great interest from many others, due to its practical application in everyday life and its theoretical framework, which outlines features that leaders can endorse to ensure all will perceive the utmost competence and have the greatest experience possible (Nicholls, 1984). Around the time achievement goal theory was established, researchers Crandall et al., (1960), Maehr and Nicholls (1980), and many others were interested in the impact one's competence had on their overall experience. Through insight from other researchers and his own work, Nicholls deduced and implemented in his theory that at any given time children and adults can interpret ability level and competence at tasks in one of two different ways.

Achievement goal theory positions the two ways individuals may interpret their ability level or competency at tasks in either a task-involving or ego-involving manner (Nicholls, 1984). The achievement goal theoretical framework suggests when individuals are task-involved or have a task-goal perspective, they approach tasks with mastery in mind. When individual's apply a mastery approach, they seek out tasks they find great value in, focus on giving high effort, look for ways to improve levels of confidence, and seek ways to succeed based on self-referenced standards (Ames, 1992). In contrast, when individuals are ego-involved or have an ego-goal perspective, they approach tasks with a mindset of achieving performance defined success, winning at all costs, and demonstrating high normative ability in comparison to others. Concisely, individuals who have an ego-goal perspective place greater value and emphasis on normative outcomes and social comparison rather than focusing on the process of learning and practicing new skills.

The impact one's goal perspective has on their motivational outcomes and consequent behaviors has been reinforced in a great multitude of studies highlighting the benefits of being task-involved rather than ego-involved (e.g., Ames and Archer, 1988; Jagacinski and Nicholls 1984 & 1987). The substantial body of literature surrounding achievement goal theory strongly suggests that these positive outcomes will be seen across all ages of individuals, all levels of ability, and a wide array of achievement settings if one maintains a task-goal perspective. Nicholls' work outlines one's dispositional goal orientation, level of cognitive development, and perceptions of motivational climate as the three vital elements that accumulate to produce one's goal perspective at any point in time.

Dispositional Goal Orientation

Goal orientations have been described by Nicholls (1989) as an individual's' personal definition of success in various achievement settings. It may be beneficial to think of the particular goal orientation one has as an individual's set of metaphorical lenses they views the world through, which ultimately determines how they believe success and competency at tasks are attained. Researcher maintained that individuals view success in one of two ways and adopt a corresponding goal orientation based on their interpretation of success. Duda and Nicholls (1992) postulate that individuals have either task- or ego-orientation and as a result view success either arises from exerting high effort, trying hard, and working cooperatively with others (i.e., task-orientation) and/or success results from high normative ability and outperforming others (i.e., ego-orientation). Accordingly, individuals who have a high task-orientation will emphasize mastery of tasks in their lives, as they will perceive competency and success by focusing on the process of their goal attainment and making themselves better, while those who have high ego-orientation will sense success only when they excel in competition and outperforming others. As a result, individuals who are highly ego-oriented may experience feelings of success and competency less often due to many performance outcomes being out of their control and their inability to outperform others. Therefore, if attaining an optimal experience is desired by individuals competing in achievement settings, it is very reasonable to infer that if they adopt a task-oriented view of success they will attain more positive outcomes and experiences.

Attainment of adaptive outcomes is largely due to individual's' conceptualizing their success based on their own effort, which allows them to have full control over achieving competency and success at tasks. In contrast, those who are ego-oriented conceptualize their success in a manner that grants them little to no control over whether they will succeed or not. Winning and outperforming others are uncontrollable outcomes that can only be achieved by a

small number of top performers in any given achievement setting. Therefore, it is imperative that competence and success is self-referenced and based on personal effort and improvement individuals are to experience desires more adaptive outcomes and motivational responses. Smith, Smoll, and Cummings and colleagues (2009) found when young athletes frame their success in this manner (task-orientation) they fostered more adaptive outcomes and were less ego-involved in comparison to those who are ego-oriented. Other achievement goal theorists echo these findings and have established positive implications to both children and adults, across a large range of achievement settings (sports, academia, ect.,) that result from individual's viewing their success in self-referenced, task-oriented way (Seifriz, Duda, & Chi, 1992; Van de Pol & Kavussanu, 2011; Barron, 2000).

Whether an individual is task- or ego-oriented does not only have immediate effects on their outcomes and motivational responses, but there are also implications caused by the way one views one's success and competency that impacts future participation in a multiple of endeavors. This occurs as individuals who are ego-oriented have been found to perceive the exertion of high effort as a compensatory mechanism exhibited by those with lower ability (Jagacinski & Nicholls, 1987, 1984). Therefore, individuals who are highly ego-oriented perceive success not only when they outperform others, but also when they find they may exert less effort and match the capabilities and higher effort of others. Hetherington and Parke (1975) position that this type of reasoning is hazardous as it can result in ego-oriented participants avoiding competition or particular achievement settings due to feeling threatened with the potential of losing or demonstrating low ability in comparison to others. Choice of task has been found to then be impacted by the desire to avoid demonstrating low ability as a weakness to others, and if participation in these circumstances may lead to lower effort (Nicholls, 1984). In 1988, Ames

and Archer (1998) conducted a study in the classroom setting to examine this phenomena of how students' goal orientations impacted their motivational responses and willingness to exert effort. They found that students' respective goal orientation had the potential to facilitate task-orientation or diminish ego-orientation adaptive motivational responses, as students who were ego-oriented and perceived they had low ability levels reported not trying as hard on tasks in the classroom. In sum, it is concerning to observe the immediate and long-term impact goal orientations can have on individual's' motivational responses and willingness to approach tasks.

Due to the impact goal orientation has on individual's' motivational responses and the stark differences between being task- and ego-oriented, it may appear that the way one views success and competency is distinct and unrelated. However, Nicholls (1984, 1989) suggests that goal orientations are actually orthogonal in nature, meaning that individuals can at any moment in time simultaneously be both high or low in ego- and task-orientation, or any combination of the two (e.g., high task-, low ego-orientation). Research conducted by Stavrou and colleagues (2015) investigated the orthogonal nature of goal orientations and the impact goal orientations had on athletes' performance and motivational responses. Results indicate that athletes can view success and competency in both an ego- and task-oriented manner and that having high task-orientation fosters the best motivational outcomes. High task-orientation important for the best outcomes, as those who are low in both ego- and task-orientation or high in ego-orientation and low in task-orientation often struggle more in comparison to individuals who have either high task- and low-ego-orientation and those who have both high task- and ego-orientation (Stavrou et al, 2015).

Goal orientation not only impact individuals' propensity to excel in current situations, but has also been thought to impact their willingness to seek out help to succeed in the future. This is

especially prevalent in those who are highly ego-oriented, as pursuing assistance from others may be seen as a lack of ability and weakness in comparison to others. Gall (1990) investigated whether this is indeed the case, as she examined the relationship between adolescent students' goal orientations and their propensity to seek help from others. Results suggested that students who reported being highly task-oriented sought out more adaptive ways to solve their problems and viewed receiving help more constructively than students' who reported being low in task-orientation (Gall, 1990). These findings reinforce the results of a study conducted less than a decade prior by Russell Ames (1983) who found similar results in the classroom suggesting students who were more task-oriented were more likely than ego-oriented students to seek help. Students' who were higher in task-orientation, in contrast to those who were higher in ego-orientation, attributed seeking out assistance and clarification on difficult information important to fostering better outcomes (higher grades, better understanding of material, ect.). These attributions, as well as the display of avoidance to seek help by students who were highly ego-oriented, align with achievement goal theory literature and highlight the need to help individuals, especially those who are ego-oriented, reduce maladaptive responses and achieve the greatest outcomes possible.

One strong option for meeting this need, which is supported in the achievement goal theory literature, is having a positive psychosocial environment. Ames (1992) utilized the classroom setting, and positioned that almost all achievement settings consist of instructional tensions, situational constraints, and psychosocial characteristics that directly relate to an individual's cognitive and motivational outcomes. As a result, achievement settings can serve as an optimal mediator for reducing maladaptive responses and increases the potential of all, if a positive psychosocial environment is fostered. This appears to be possible if leaders are effortful

in modifying the environments they create in their respective achievement settings to better reflect a task-involving setting.

Jagacinski and Nicholls (1984) were pioneers in examining exactly how psychosocial environments cause individual's conceptions of ability to vary in different achievement settings. As predicted, they found psychosocial environments with instructors who promoted more ego-involving tendencies fostered a greater number of negative outcomes than when instructors created more of a task-involving environment. Many students reported that their effort facilitated mastery of tasks, but those who were in more of an ego-involving environment perceived their own ability levels to be lower the more they tried and had to exert greater effort. These perceptions and their reported greater feelings of incompetency simultaneously reduced their ability to grow in competence at the tasks set before them (Jagacinski & Nicholls, 1984). These findings align with Nicholls' (1979) theorizing ego-involving achievement settings would likely generate pronounced motivational inequality, while task-involving environments would optimize motivation levels and competency. In sum, motivational climates, especially those that are ego-involving, can have immense negative implications on the motivational responses of participants in achievement settings.

The goal orientations and manner in which one believes success and competence is achieved, has implications that merit further examination across a multitude of achievement settings. Researchers Duda and Nicholls (1992) developed a measure for the sport setting called the Task and Ego Orientation in Sport Questionnaire (TEOSQ). This measure consists of 13-items with 7 task- and 6 ego-items that tap into the virtues that cause an individual to feel personally competent and successful when engaging in physical activity. When completing this measure respondents respond to items using a 5-point Likert-type scale ranging from 1 (strongly

disagree) to 5 (strongly agree), with each question using the same stem, "I feel most successful [in physical activity/sports] when…". A sample question gauging task-orientation is, "… Something I learn makes me want to practice more", while a sample gauging ego-orientation is, "…the others can't do as well as me". This measure has been found to be distinct from other measures examining sport achievement orientations (Duda & Nicholls, 1992), demonstrates satisfactory psychometric properties (Duda & Whitehead, 1998), and has been utilized extensively in sport psychology research across a great myriad of achievement settings (Duda, & Nicholls, 1992; Newton & Duda, 1993; Duda & White, 1992; Walling, Duda, & Chi, 1993).

These studies, and many others in the achievement goal theory literature, highlight the need for leaders in the sport setting to be cognizant of participants' goal orientations. While each individual's goal orientation is noteworthy, it appears it may be even more important to be aware of the motivational climate that is being created by leaders in sports and other achievement settings. This is the case regardless of whether participants validate their competence and success based on normative outcomes and social comparison or they conceptualize their competence and success in a self-referenced manner. Granero-Gallegos (2017) and colleagues recently investigated this relationship, as they examined the impact that the perceived motivational climate fostered by youth coaches had on athletes' goal orientations and motivational responses. Results of this study indicate that when youths perceive a task-involving motivational climate, where mastery of skills is emphasized by leaders, athletes are more likely to report being task-oriented and believe their success is achieved through effort. In contrast, when youth athletes perceive their coaches create an ego-involving motivational climate, where performance outcomes are desired by leaders, youths are more likely to report being ego-oriented and believe their success stems from their athletic ability and use of techniques (Granero-Gallegos, 2017).

Findings linking the impact of a positive motivational climate to improved goal orientations and many other positive motivational outcomes independent of individual's' dispositional goal orientations reiterates the influential role leaders can serve in the lives of others (Ntoumanis & Biddle, 1999; Balaguer et al., 1999). These findings support the contentions made by Nicholls at the time of conception of the achievement goal theory, where he positioned that the type of psychosocial environment fostered by leaders in achievement settings will consistently predict whether individuals will have positive or negative motivational responses and outcomes (Nicholls, 1984). Accordingly, Nicholls suggested that people can find themselves in one of two distinct motivational climates at any given time: a mastery motivational climate (later termed task-involving climate) or a performance motivational climate (later termed ego-involving climate). Nicholls (1989) outlined the features of a task-involving motivational climate as one where leaders make all feel they play an important role, value individual effort and improvement, foster cooperation, and treat mistakes as part of the learning process. Conversely, in an ego-involving motivational climate, leaders will recognize only a few of the most outstanding performers, value individuals for their ability and performance outcomes, create rivalry, and punish mistakes.

Level of Cognitive Ability

In order to optimize motivation and foster the best experiences for all Nicholls (1989) positions that it is important to understand the development of humans' cognition and how/when people attain their conceptualizations of competence. During his time spent working in elementary education setting, Nicholls suggested that in some ways young children are shielded from the adverse culture of the world and do not find their value based on comparison to others. This stems from children having low cognitive development, which results in them being unable

to distinguish between tasks of varying difficulty, or tasks that require skill to perform well versus those requiring luck. Therefore, during the first part of a youngsters' lives, they embody more of a natural task-oriented view of the world, as they maintain a self-referenced point of view and believe all could perform at the same level on any given task, as long as adequate effort is exerted (Nicholls, 1989). It is not until around the age of 12 that youths begin to develop a mature understanding of the world around them and conceptualize ideas of ability, luck, effort, and task-difficulty.

Nicholls theorized that around the age of 12, youths conceptualize these ideas no longer in a self-referenced manner; rather they engage in social comparison, which plays a major role in judging ability and task selection. Around this age children will also begin to associate that their ability pertains to skill and not luck and maintain that their level of capacity is distinct from effort (Nicholls, 1989). This is highlighted in Nicholls (1978) study, which examined students' perceptions of academic attainment among 5-13-year-olds. Findings showed that younger children self-rank themselves very highly, while older children ranked themselves lower and often more accurately. Based on this study and others in the achievement goal theory literature, it can be reasoned that as youths develop cognitively they likely experience a decline with their natural task-oriented tendencies and evaluate task difficulty, ability, and rank on performance in reference to others (Nicholls, 1978, 1989; Jagacinski & Nicholls, 1984). The implications of the developmental changes that youths encounter as they mature cognitively is important for researchers and leaders to be aware of in order to better understand achievement behaviors and motives across age groups and achievement settings.

Motivational Climate

Over the past half-century, researchers in sport psychology have produced a great wealth of literature highlighting the influence leaders have in establishing both positive and negative experiences for others. This body of literature indicates that at the foundation of an individual's' experiences are the motivational climates fostered by those in leadership positions (Fry & Moore, 2019). Nicholls theorized that there are two distinct motivational climates leaders promote in achievement settings, namely these motivational climates are defined as task- or ego-involving. Motivational climates are different from previously mentioned psychosocial environments, as motivational climates convey definite features that are perceived to be valued (e.g., mastery vs. performance), and certain activities are structured (i.e., cooperation among participants vs. competition). Nicholls theorized that achievement settings mirroring a mastery climate where leaders emphasize cooperation and mastery of skills (i.e., task-involving motivational climate) will reliably predict a multitude of positive psychological and motivational outcomes. In contrast, achievement settings reflecting a performance climate where leaders promote rivalry and competition among individual's, focus on high performers, and normative outcomes will reliably predict many adverse psychological and motivational outcomes.

The majority of Nicholls' work was developed in the early education setting. As a result, he examined the impact the motivational climate fostered by educators had on youths academic experiences. Nicholls was troubled by the commonality shared among educators throughout school systems who cultivated ego-involving motivational climates and negatively influenced children. In turn, Nicholls life work investigated how to flip the script and optimize all students' experiences and suggested this to be possible if teachers promote a task-involving motivational climate (Nicholls, 1989). In examining the achievement goal literature, many researchers have contributed to the body of literature in the field of sport psychology. Those in the field have

provided extensive support for Nicholl's theoretical tenants in the academic setting and among a multitude of achievement settings, especially in the physical activity domain (Ames, 1992; Ames & Archer, 1988; Epstein, 1989; Newton, Fry, et al., 2007; Theeboom et al., 1995).

The expansion of motivational climate research opened the floodgates for the demand to be able to measure individuals' perceptions of the motivational climate across achievement settings. The Achievement Goals Questionnaire developed by Ames and Archer (1988) was the first survey tool devised to tap into individuals' perceptions of climate. This measure, which was designed with Nicholls (1984, 1989) work in mind, examined students' perceptions of climate in the classroom. Seifriz and colleagues utilized this survey tool as a reference to develop the Perceived Motivational Climate in Sport Questionnaire (PMCSQ; Seifriz et al., 1992), which was used in physical activity-based settings to examine participants' perceptions of climate. The PMCSQ was a cutting-edge survey instrument in physical activity-based settings and consisted of 21-items, with 9 task items and 12 ego. Respondents answer item questions using a 5-point Likert-type scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). A sample task item is, "On this basketball team the focus is to improve each game.", while a sample ego item is, "On this basketball team the only things that matters is winning". Seifriz (1992) and Walling et al., (1993) have utilized the PMCSQ in physical activity settings and shown the measure to exhibit satisfactory psychometric properties.

Within a decade of the conception of the PMCSQ a second version (PMCSQ-2) was developed, to examine specific characteristics of the motivational climate in physical activity settings. The PMCSQ-2 contains a total of six subscales with three representing task- and three representing ego-involving motivational features of the climates in sport settings (Newton et al., 2000). Researchers Huddleston, Fry, and Brown (2012) added to the existing measurement tools,

to examine perceptions of climate in the exercise setting. They accomplished this by developing the Perceived Motivational Climate in Exercise Questionnaire (PMCEQ; Huddleston, Fry, & Brown, 2012). This 23-item measure was developed more specifically to examine the exercise setting and was later modified to an abbreviated 12-item version (PMCEQ-A) that proved to be less taxing on respondents and maintained adequate psychometric properties (Moore et al., 2015).

The multitude of measures allowing researchers to more accurately assess motivational climates and the growing interest due to effects of respective climates caused many to recognize that motivational climates encompass more than merely task- and ego-involving features (Newton, 2007; Pensgaard & Roberts, 2002). Although supporters of achievement goal theory, Newton and colleagues (2007) theorized that a critical feature being overlooked in Nicholls' theoretical framework was a caring component. Newton et al., (2007) suggested the caring component went beyond the scope of task-involving features and entailed an interpersonal, bonding element necessary for an optimal climate. Researchers supporting this additional caring-climate facet, suspected that individuals would obtain the most optimal experience and motivational outcomes if the motivational climate they are exposed to is both highly caring and task-involving (Newton et al., 2007). Support for this proposition has been established in the sport psychology literature (Newton, Fry, et al., 2007; Fry et al., 2012; Gano-Overway et al., 2009; Fisher et al., 2019; Larson & Silverman, 2005). Due to the high regard established for creating a caring climate, especially in physical activity settings, researchers Newton, Fry, and colleagues developed the Caring Climate Scale (CCS; Newton, Fry, et al., 2007) to accurately assess the extent individuals perceive their climate to be welcoming, safe, and supportive. The

CCS has been a revolutionary tool that has demonstrated adequate psychometric properties in the physical activity setting (Newton, Fry, et al., 2007).

For many years, researchers have investigated the impact motivational climate has on individuals' motivational outcomes and responses have examined these impacts across a multitude of different achievement settings (i.e. academic, exercise, sport) (Ames, 1992; Huddleston et al., 2012; Fry & Gano-Overway, 2010). Stemming from the vast array of literature examining these different settings, is a great wealth of knowledge and understanding of how responses vary between settings. Variability among respondents has allowed achievement goal theorists to deduce certain behaviors and controllable factors that cause people to have positive or negative experiences. Although determining the factors and behaviors leadings to positive or negative outcomes is beneficial across nearly all achievement settings, in the past half-century surmounting interest from professionals and the general population has led many achievement goal theorists to focus on investigating youths experiences in physical activity settings (Gould et al., 2012; Fry & Gano-Overway, 2010; Ntoumanis & Biddle, 1999).

Examining youths' experiences is not entirely novel, as Nicholls' theory originated in the early education setting and other researchers (Ames & Archer, 1988), since have explored the influence motivational climate has on students' motivational outcomes and responses. However, drawing from the findings in the classroom, many sport researchers inferred similar results could be established in the sport and physical activity settings. Researchers Ntoumanis and Biddle (1999) conducted a meta-analysis examining physical activity settings and found this to be the case. This meta-analysis revealed physical activity settings that were task-involving fostered a multitude of positive outcomes and responses. While in contrast, physical activity settings that were ego-involving promoted maladaptive outcomes and motivational responses. Some of the

many positive outcomes that were examined in the physical activity setting and have further been linked to a task-involving climate are higher levels of effort and enjoyment, intrinsic motivation, and well-being (Fry & Moore, 2019; Duda & Nicholls, 1992; Newton, Duda, & Yin, 2000). Once the distinction was made for the caring aspect of climate, researchers were greatly interested in the additive effect caused by a physical activity setting being caring and task-involving. Research conducted by Gould and colleagues (2012) found that youths, especially those susceptible to the influences of others, respond significantly more favorably and were more likely to foster positive outcomes in physical activity settings that are caring/task-involving. This study and the many other in the achievement goal literature strongly suggest youths will experience more favorable outcomes and motivational responses in physical activity settings when exposed to motivational climates that are caring and task-involving.

In contrast, achievement goal theory literature highlights ego-involving motivational climates as being predictive of a multitude of negative outcomes and responses. Nicholls (1989), positioned this to be the case across achievement settings and expected youths to encounter more maladaptive learning outcomes in the academic setting. Researchers since have linked ego-involving physical activity settings to a vast array of negative outcomes that hinder the experiences of youths by causing them to worry more about performance, increase anxiety levels, have lower levels of satisfaction with peers, experience lower levels of intrinsic motivation, have lower levels of psychological well-being (Walling et al., 1993; Kipp & Amorose, 2008; Ntoumanis & Biddle, 1999), and increase psychological and physiological stress responses (Hogue, Fry, et al., 2013, 2017).

Achievement goal theorist, Candace Hogue, comes from a background of physiology and acquired great interest in the manner which motivational climates influence individual's' stress

responses, both psychologically and physiologically. As a result, she hypothesized that caring/task-involving climates could potentially serve as a buffer to the stresses that participants in the physical activity settings may experience. To test her hypothesis Hogue and colleagues conducted multiple studies to examine both youth and adult participants who were novelists to juggling and taught them how to juggle while being exposed to climate manipulations. Results of these studies provided not only empirical self-reported data, but also objective findings in the form of salivary cortisol levels, reflecting the negative implications ego-involving climates foster for both adults and adolescents (Hogue et al., 2013 & 2017). These findings reinforce the results of previous research conducted by Dickerson and colleagues (2004) who suggested that when individuals are exposed to environments that reflect an ego-involving climate they are likely to have increased stress hormone levels and experience maladaptive psychological responses. Although Hogue may not have been the first to study the relationship of psychosocial environments to cortisol levels and psychological functioning, she was one of the first to employ the achievement goal theory framework into experiments within the physical domain. These experiments lay the foundation for future research tapping into participants' psychological and physiological outcomes and warrant further investigation, especially in youth settings, as adolescence is such a crucial period of development and has proven to be a pivotal time in life to predict future physical activity involvement (Telama, 2000).

With adolescence being such a crucial phase of life and sport being an excellent vessel for helping youth develop and live healthy lifestyles it is important that leaders in physical activity settings are doing all they can to optimize the experiences of youngsters. Creating caring and task-involving motivational climates appears to be the most viable option for accomplishing this, as there is a great wealth of literature highlighting the positive outcomes and motivational

responses youths experience when exposed to caring/task-involving climates. Some of the positive outcomes youths report experiencing when exposed to a caring/task-involving climate are greater feelings of psychological well-being (e.g., hope, happiness, self-esteem), interpersonal relationships, emotion regulation, and skill mastery (Gano-Overway et al., 2009; Fry et al., 2010; Fry et al., 2012; Newton et al., 2007). Increasing research supports the position that when adolescents acquire these positive outcomes they are better equipped to be resilient in the future when faced with adversity, have reduced risks of disease, and enhance quality of life (Ryff, 2014). Findings from Lowry (2013) reiterate the demand for these positive outcomes in the lives of adolescents, as they found when youths adopt a positive attitude and have a positive experience in the physical activity setting they are more likely to physically active in the future and consequently less sedentary.

At the heart of Nicholls' theory and the abundance of supporting literature is the role leaders in achievement settings play in fostering a respective climate. Among the research conducted examining youths outcomes and responses in physical activity settings are plenty of studies highlighting the important role physical education instructors and coaches hold in fostering optimal experiences. Studies conducted by achievement goal theorists have examined numerous sport settings (e.g., soccer, basketball, tennis, volleyball) and consistently found that a caring and task-involving motivational climate is a vital component for youth coaches and instructors to promote on their teams and in the classroom to optimize sport experiences and generate the greatest number of positive outcomes (Fry & Gano-Overway, 2010; Iwasaki & Fry, 2013; Braithwaite et al., 2011). These results are undeniable and should evident in coach training programs, parental workshops, and all leaders engaging with youths, as leaders can be assured their actions directly influence their athletes to have positive sport experiences.

While researchers have uncovered distinct relationships outlining the impact coaches and physical educators have on adolescents' physical and mental functioning, less work has been conducted studying the influence of parents. Although there is limited research, the existing literature indicates there is a significant relationship between the motivational climates fostered by parents and the experiences youths have in sport and physical activity settings. Fry and Hogue (2018) outlined in a chapter of the Oxford Handbook the important role parents play in the lives of their children and how parents also have the power to create task- and ego-involving motivational climates with their children. Dependent upon the climate parents foster, they can cause their children to perceive love and psychological support that reflects a caring/task-involving climate or they can perceive they are valued only when they win and perform at a high-level, reflecting an ego-involving climate. Consequently, the respective climate children are exposed to from their parents has been shown to strongly influence their behaviors, values, moral functioning, depositional goal orientations, and other psychological outcomes (Lavoi & Stellino, 2008; O'Rourke et al., 2011, 2013).

More recently, researchers Wagnsson and colleagues (2016) further examined the relationship between parent-initiated motivational climates and children's psychological outcomes and responses among youth football players. Findings of this study indicate that parents, especially mothers, influenced the development of their children's moral decision making (Wagnsson, 2016). Taken together, it is fascinating to the influence all leaders surrounding the youth sport and physical activity landscape can have on young athletes' experiences. In an innovative study conducted by Smoll, Smith, and Cumming (2007) they set out to examine the impact that a task-involving climate intervention, in the form of parent and coaching education, would have on youths psychological outcomes. Findings of this study

demonstrated noteworthy differences between youths levels of anxiety and focus between teams whose parents and coaches were exposed to the climate intervention and a control group whose parents and coaches received no training (Smoll, Smith, & Cumming, 2007). The novel study design promoted by Smoll, Smith, and Cummings provided excellent structure to conduct an experiment with parents and coaches to determine the effectiveness of a climate intervention on youth athletes psychological responses. This study and the others existing in the achievement goal literature examining the influence of the climate fostered by parents and other leaders and have found strong support for the benefits adolescents can reap from being exposed to caring/task-involving climates, while perceptions of an ego-involving climate will likely lead to maladaptive responses and outcomes. In sum, it seems there is a great wealth of literature highlighting the psychological influence parent-initiated climate has on youths motivational responses and outcomes, yet there is a lack of research investigating the impact climates fostered by parents has on youths physiological functioning and responses.

Social Self Preservation Theory

The preservation of a positive social self, by maintaining social-status, acceptance among others, and social esteem has been found to be central to individual's' overall well-being and survival (Baumeister & Leary, 1995). As a result, when one perceives conditions that threaten their social self, a cascade of evolutionary based psychological, physiological, and behavioral fluctuations ensue to harmonize a fitting response to the unfavorable situation (Dickerson et al., 2004, 2009). The social self-preservation theoretical framework (Gruenewald, 2004) follows in the footsteps of renown stress researcher Hans Selye (1956) who argued all forms of stress would elicit a generalized stress response in the body. This foundation has allowed the work of contemporary researchers to advance the exploration of stress and how individuals respond when

their social self is threatened. This theory provides a principal context to reference when attempting to comprehend the possible outcomes stemming from enhancing social evaluative characteristics of youth sport and physical activity settings.

When initially examining stress, researchers believed that psychosocial triggers were a rare occurrence that served as protective function necessary to generate a "fight or flight" response for survival. However, according to Sapolsky (1994) humans are more consistently being exposed to situations that lead to these psychosocial triggers causing the once thought acute necessary bout of stress to transform into a more chronic detrimental strain the body encounters daily. Contemporary stress manifests in many forms when people are exposed to situations that potentially may threaten their competencies, ability levels, or characteristics, which in turn activate the same stress responses that was once important only for survival (Gruenewald et al., 2006). Research has shown that long term exposure to psychosocial triggers with inadequate coping mechanisms will likely result in compromises of mental and physical health and cause one to be more apt to succumb to illness and have increased proinflammatory and cortisol activity (Mariotti, 2015; Dickerson et al, 2004).

To further examine the impact of psychosocial triggers and the social evaluative threats individuals may perceive, Dickerson and colleagues (2004) conducted a series of studies examining participants' physiological responses and emotions that were present when exposed to threats to social self. Results of these studies demonstrates that threats to individuals' social selves will increase endocrine hypothalamic pituitary adrenal (HAP) cortisol levels and proinflammatory activity, while simultaneously experiencing negative emotions, such as shame, fear, and sadness (Dickerson et al., 2004). These findings are noteworthy as there is a great wealth of literature showing that feelings of negative emotions and enhanced endocrine HAP

activity are not unique to laboratory settings. Rather they are pertinent and commonly found in all settings, especially those which are highly socially-evaluative in nature and make individuals feel as though they have little control.

These two conditions, namely social-evaluation and uncontrollability, have been found across a multitude of studies to reliably predict and elicit a psychological stress response, which in turn initiates a rise in cortisol (Dickerson & Kemeny, 2004). The commonly examined hormone cortisol, is responsive to stress that is released into the blood to help regulate physiological activities by traveling from the adrenal glands through the body to target sites to assist in alleviating stress (Dickerson & Kemeny, 2004; Nicolson, 2008). Cortisol can be assessed in studies accurately and inexpensively through salivary cortisol sampling (Segerstrom & Miller, 2004), which allows researchers to make inferences, outlining the impacts certain motivational climates or psychosocial triggers have physiologically on the body. Consequently, cortisol reactivity based on socially evaluative threatening conditions that are defined by characteristics of social-evaluation and uncontrollability has been assessed in many studies (Dickerson et al., 2004, 2009; Dickerson & Kemeny, 2004; Gruenewald et al., 2004; Strahler et al., 2015; Miller et al., 2002). Results of these studies and many more indicate there are other physiological factors (e.g. increased proinflammatory cytokines, decreased glucocorticoid and catecholamine resistance) effected by social evaluative threats, which have been linked to detrimental psychological and physiological functioning (Febbraio & Pedersen, 2002; Glaser et al., 1999; von Känel et al., 2008; Schnyder-Candrain et al., 2005).

Although once a protective stress response, the psychological and physiological rise in negative thoughts and endocrine activity has more recently become a chronic maladaptive phenomena humans face daily. This provides researchers with an imperative task, which is to

educate people about the deleterious effects chronic stress has on the body and mind through research exemplifying factors that lead to elevated psychological and physiological stress. Stress researchers have made great progress linking certain conditions, such as social-evaluation and uncontrollability to higher levels of stress, but have not united in applying a theoretical framework to diminish these negative perceptions. Innovative work conducted by Hogue and Fry (2013, 2017) has made strides toward implementing Nicholls' achievement goal theory as a solution for diminishing maladaptive stress responses and negative motivational outcomes in two groundbreaking studies. These studies used an analogous study protocol examining both adolescents and college students psychological and physiological stress responses when learning to juggle in both caring/task- and ego-involving motivational climates. Findings from these studies produced comparable outcomes in the caring/task- and ego-involving groups, as both populations experienced maladaptive responses in the ego-involving condition and positive outcomes when exposed to the caring/task-involving climate condition (Hogue & Fry, 2013, 2017). Positive outcomes consisted of increased positive psychological responses (i.e. effort, enjoyment, self-confidence, ect.), which in turn appeared to buffer increases in salivary cortisol levels. In contrast, negative outcomes linked to the ego-involving climates, indicated participants experienced positively correlated increases in salivary cortisol levels with greater self-reported levels of anxiety, shame, stress, and other maladaptive motivational responses (Hogue, Fry, et al., 2013, Hogue, Fry, et al., 2017).

The findings from Hogue and Fry (2013, 2017), Fontana and colleagues, and many other researchers in the achievement goal literature support findings in the social preservation theory literature and Dickerson and Kemeny's (2004) research linking environments that promote social-evaluation and uncontrollability (ego-involving climates) to increased negative emotions

and cortisol levels. Taken together, it is quite apparent that leaders would do well to minimize ego-involving tendencies and maximize caring/task-involving traits to optimize youth athletes psychological and physiological outcomes in sport and physical activity settings. However, what is less evident in the achievement goal literature is the cumulative effect leadership from parents and coaches have on youth athletes physiological outcomes. Prior research conducted by Smoll, Smith, and Cummings (2007) suggests that coaches and parents have the capabilities to influence youth athletes psychological outcomes through climate, but there is a research gap highlighting the influence coaches and parents have on youths physiological outcomes, particularly cortisol reactivity. Research highlighting the impact parents can have on their child's psychological and psychological functioning in this aspect is crucial, as links could be established demonstrating the effect parent-fostered climates can have on their child's overall experience. This is an important relationship to investigate as it is possible the climate that parents foster with their children could negate or enhance the positive or negative outcomes generated by youth sport coaches.

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Questionnaires

Lab Survey

Directions*:* Read each statement and think about how much you believe the statement describes this lab. Then choose the answer that best expresses how much you agree or disagree with the statement.

In This Lab…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. Students are hesitant/embarrassed to ask the instructor or other students for help.	1	2	3	4	5
2. Students of all skill levels are made to feel valued.	1	2	3	4	5
3. The instructor encourages students to help each other.	1	2	3	4	5
4. Students feel embarrassed if they don't know how to perform a skill.	1	2	3	4	5
5. Students are rewarded and noticed when they try hard.	1	2	3	4	5
6. The instructor gives most of their attention to only a few students.	1	2	3	4	5
7. The instructor emphasizes to always try your best.	1	2	3	4	5
8. The instructor makes it clear who they think are the most smart and or skilled students.	1	2	3	4	5
9. The instructor encourages students to try new skills.	1	2	3	4	5
10. Students are encouraged to do better than other students.	1	2	3	4	5
11. The focus is to keep improving on each skill.	1	2	3	4	5
12. Students are excited when they do better than other students.	1	2	3	4	5

Directions*:* Read each statement and think about how much you believe the statement describes this lab. Then choose the answer that best expresses how much you agree or disagree with the statement.

In This Lab…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. The students are treated with respect.	1	2	3	4	5
2. The instructor respects the students.	1	2	3	4	5
3. The instructor is kind to students.	1	2	3	4	5
4. The instructor cares about the students.	1	2	3	4	5
5. The students feel that they are treated fairly.	1	2	3	4	5

6. The instructor tries to help the students.	1	2	3	4	5
7. The instructor wants to get to know the students.	1	2	3	4	5
8. The instructor listens to the students.	1	2	3	4	5
9. The instructor likes the students for who they are.	1	2	3	4	5
10. The instructor accepts 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. The students feel welcome.	1	2	3	4	5

Directions*:* Read each statement and think about how much you believe the statement describes your Biology Instructor. Then choose the answer that best expresses how much you agree or disagree with the statement.

In This Lab, I Feel The Instructor…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. Makes an attempt to know my name.	1	2	3	4	5
2. Recognizes me.	1	2	3	4	5
3. Introduces me to other students when appropriate.	1	2	3	4	5
4. Is available when I need then.	1	2	3	4	5
5. Has a positive attitude towards me.	1	2	3	4	5
6. Is helpful.	1	2	3	4	5
7. Greets me warmly when I walk in the door.	1	2	3	4	5
8. Encourages me to try my best.	1	2	3	4	5
9. Seems happy I'm in this lab section.	1	2	3	4	5
10. Encourages me to strive towards my fitness/health goals.	1	2	3	4	5
11. Is friendly towards me.	1	2	3	4	5
12. Makes eye contact with me.	1	2	3	4	5
13. Notices improvements I've made.	1	2	3	4	5
14. Loves their job.	1	2	3	4	5
15. Wants to be working as a lab instructor.	1	2	3	4	5
16. Makes me feel welcome.	1	2	3	4	5
17. Talks/Interacts with me.	1	2	3	4	5
18. Wants me to understand the results of lab.	1	2	3	4	5

During This Lab…	Not at all	A little bit	Somewhat	Very Much	Extremely
1. I feel confident about my abilities.	1	2	3	4	5
2. I worry whether I am regarded as a success or a failure.	1	2	3	4	5
3. I get frustrated or rattled about my performance.	1	2	3	4	5
4. I have trouble mastering the skills.	1	2	3	4	5
5. I feel self-conscious.	1	2	3	4	5
6. I feel I am as capable as others of learning the skills.	1	2	3	4	5
7. I am displeased with myself.	1	2	3	4	5
8. I am worried about what other students think of me.	1	2	3	4	5
9. I feel confident that I understand material presented.	1	2	3	4	5
10. I feel inferior to other students.	1	2	3	4	5
11. I am concerned about the impression I am making.	1	2	3	4	5
12. I feel like I have less academic ability than others.	1	2	3	4	5
13. I feel like I'm not doing well.	1	2	3	4	5
14. I worry about looking foolish.	1	2	3	4	5

Directions: The following items describe how people sometimes feel about themselves when performing a new task or during an activity. Please circle **ONE** (only one) of the five choices to indicate how you feel during physiology lab

When I'm In This Lab…	Never	Seldom	Sometimes	Frequently	Almost Always
1. I feel like I am never quite good enough.	0	1	2	3	4
2. I feel somewhat left out.	0	1	2	3	4
3. Compared to the other students in my lab, I feel like I somehow never measure up.	0	1	2	3	4
4. I think that people look down on me.	0	1	2	3	4
5. I feel insecure about others' opinions of me.	0	1	2	3	4

6. I see myself as being very small and insignificant.	0	1	2	3	4
7. I feel intensely inadequate and full of self-doubt.	0	1	2	3	4
8. I feel as if I am somehow defective as a person, like there is something basically wrong with me.	0	1	2	3	4
9. I scold myself and put myself down.	0	1	2	3	4
10. and I compare myself to others, I am just not as important.	0	1	2	3	4

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	Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
1. I put a lot of effort into learning material presented during each lab.	1	2	3	4	5
2. I find lab sessions interesting.	1	2	3	4	5
3. I try very hard during the lab sessions.	1	2	3	4	5
4. I have fun during lab sessions.	1	2	3	4	5
5. It is important to me to do well during each lab session.	1	2	3	4	5
6. I feel involved during lab sessions.	1	2	3	4	5
7. I do not try very hard during the lab sessions.	1	2	3	4	5
8. I find time flies by during lab sessions.	1	2	3	4	5
9. I enjoy lab session activities.	1	2	3	4	5

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859 **Directions:** Read each statement and then *circle **ONE** (only one) of the five choices* to the right
860 of the statement to indicate *how you feel about this lab*.

	Not At All	**Somewhat**	**Neutral**	**Moderately So**	**Very Much So**
1. I look forward to going to lab each week.	1	2	3	4	5
2. Being in this lab this semester has made me more excited about my major.	1	2	3	4	5
3. I feel like this lab has prepared me well for the next courses I'll take in my major	1	2	3	4	5
4. I feel that my instructor will continue to care about me even after the semester ends.	1	2	3	4	5
5. I've really gotten to know my classmates during this lab throughout the semester.	1	2	3	4	5

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Please take time to reflect on your instructor's behaviors this semester and answer the questions below.

1. **What are things your lab instructor does that make you feel that they care about you?**

2. **What are things your lab instructor does that make you feel that they don't care about you?**

3. **What are things your lab instructor does that make you feel that they care about your classmates?**

4. **What are things your lab instructor does that make you feel that they don't care about your classmates?**

5.Please share any other comments about your experience in this lab this semester.

Demographics

Choose one of more races that you consider yourself to be:

□ East Asian or Asian American
□ South Asian or Indian American
□ Latino or Hispanic American
□ Other
□ Non-Hispanic White or Euro-American
□ Native American or Alaskan Native
□ Middle Eastern or Arab American
□ Black, Afro-Caribbean, or African American

What is your gender identity?

□ Female
□ Male
□ Prefer to self-describe:_____.
□ Prefer not to say
□ Non-binary/third gender

Please indicate your academic status of school as of Fall 2019:

□ Freshman
□ Sophomore
□ Junior
□ Senior
□ 5th + year of undergraduate studies
□ Graduate Student

What is your degree of study/major/minor and career aspirations?

Major: _____.

Minor: _____.

Future Occupation:_____.

What section of Mammalian Physiology are you enrolled in for the semester?

□ Mammalian Physiology 547
□ Mammalian Physiology 247

Please check the box below your Mammalian Physiology instructor and what day and time you met with them?

Instructor Name:	**Days & Times**
□ **John Doe**	□ **Mon: 2:00-3:50PM**
	□ **Mon: 4:30-7:20PM**
□ **Jane Doe**	□ **Mon: 2:00-3:50PM**
	□ **Thurs: 11:00-1:50PM**
	□ **Thurs: 2:30-4:20PM**