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# A survey-based study of the changes to self-efficacy, trust in coaching, goal orientation, and state anxiety that occur during a marathon training taper

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# A Survey-Based Study of the Changes to Self-Efficacy, Trust in Coaching, Goal Orientation, and State Anxiety that Occur During a Marathon Training Taper

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**A Survey-Based Study of the Changes to Self-Efficacy, Trust in Coaching, Goal Orientation, and State Anxiety that Occur During a Marathon Training Taper**

Throughout a sport season, athletes' physiological systems are constantly broken down and strengthened due to repeated practices and competitions. The techniques involved in tapering balances rest and conditioning, with the goal to slow down and eventually reverse the effects of muscle fatigue and functional impairment that accompany heavy training (Mujka, Padilla, Pyne, & Busso, 2004; Thomas & Busso, 2005). This approach allows the body to refuel and rebuild, increasing muscular strength while still maintaining peak cardiovascular functions, leading to top performance ability. The marathon taper typically occurs towards the end of a season leading up to an upcoming championship competition or big event (after the buildup of a long and arduous season of training). However, it is not just the physiological benefits of tapering that impact performance.

Psychological factors play a major role in sport performance and the influence of a taper as well. Past research has shown that mood is a mediating variable in the success of a taper approach (e.g. Marten, Andersen, & Gates, 2000; Mujka et al., 2004; Zehsaz, Azarbaijani, & Farhangimaleki, 2011). According to Mujka et al. (2004), mood states (dispositions such as tension, depression, vigor, and confusion that are distinct, but subject to change with time) are sensitive to changes in physical training load, especially the typical reduced load that accompanies tapering. Studies from Morgan and Raglin (1996) (as cited in Mujka, Padilla, Pyne, & Busso, 2004) first detected changes to global mood scores in relation to the taper in college swimmers tapering for four weeks. The decrease in global mood score was related to decreases in perceived levels of fatigue, depression, anger, and confusion, as well as increased levels of vigor. These results led researchers to believe that tapering and psychological factors, namely mood, were strongly related. In a similar study analyzing endurance track cyclists taking part in a

2-week taper, total mood disturbance based on the five-point POMS scale was decreased by 21%, while 4km pursuit performance increased by 2.0%, and mean power output increased by 2.3% (Mujka et al., 2004). These results point to a link between taper and mood state as well as a connection to physical performance.

To further establish the connection between psychological factors and post-taper performance results, 15 male collegiate cyclists took part in high-intensity interval training for 5 weeks. A week of tapering then occurred, during which participants took part in one riding session of 45 minutes at 45-60% maximal heart rate and one graded exercise test, which equated to a 66 % decrease in weekly training time and a 43% reduction in weekly training frequency (Martin, Andersen, & Gates, 2000). Results of this training and taper yielded a significant improvement in performance time in comparison to previous performances; participants' performance improved by an average of 15%. Likewise, total mood scores (a calculation adding POMS scores for tension, depression, anger, fatigue, and confusion and subtracting for vigor score) showed significant improvements overall from baseline (i.e., pre-taper) to post taper, displaying how positive mood, tapering, and performance are inherently linked (Martin et al., 2000). Similarly, in a study comparing 1-week and 3-week tapers in adult, male cyclists, results showed that both taper styles enhanced cycling performance and enhanced POMS scores (mood) as well (Zehsaz, Azarbaijani, & Farhangimaleki, 2011). Altogether, this research suggests that taper performance and mood are related, possibly because an increased load during training leads to increased levels of stress, and a decreased load during taper leads to a decreased stress levels.

Aside from mood, there are likely other psychological factors that impact an athlete's post-taper performance. Weinberg and Gould (2015), suggest that many elements (e.g., personality, sport, stress, anxiety, arousal, self-confidence, and goal-setting) influence

individuals' roles and performances in sport. Likewise, Ripol (1993) more specifically expressed there are many mental and emotional distractions that can effect taper results. In a study of eight elite swimmers on the U.S. national swimming team, open-ended interviews were conducted in an attempt to illuminate individuals' perspectives on training, taper, and competition. The findings provide insight into psychological factors that play a role in post-taper performance. Participants described the importance of mind and body working together in order for one to perform well after taper - one must practice mentally preparing him or herself for races in order to feel confident, capable, and equipped in high pressure competitive situations. As mentioned, confidence was a factor that was reported as essential to optimally prepare for performance success; athletes felt that it was important not to let taper workouts negatively affect their confidence so that they may experience peak performances post-taper. Additionally, athletes felt that overthinking and overanalyzing races, would increase anxiety levels and possibly harm performance. Ripol reasoned, "a large part of not thinking too much goes back to having faith in how her (Sanders, a female U.S. national team swimmer) coach trains her during her taper" (Ripol, 1993, p. 39). In her interview, Sanders also explained she does not focus on winning while racing; instead, she concentrates on swimming strong and racing until the end. This finding suggests that one's goal orientation is another important influence in the performance following taper. This research proposed a diverse set of factors that affect not only performance in general, but post-taper performance as well. Furthermore, other significant findings from this study showed visualization, race thoughts, pressure and nervousness, and communication played a major role in the informants' taper performances.

These previously discussed studies have started the discussion that a taper is not simply a physical process. Psychological factors play a major role in the success (or lack thereof) of a

tapering period during training. Although there appear to be numerous psychological elements that could affect post-taper performances, athletes' self-efficacy or confidence, goal orientation, state anxiety, and trust in coaching may play a central role. While research into these areas is limited, a review of the existent literature is provided below.

Self-efficacy and confidence are psychological elements that seemingly play a role in sport performance and may be related to the tapering process. As Ripol (1993) reasons, confidence in oneself (or self-efficacy in specific contexts) is essential to successful performances. It is important to maintain a high level of self-efficacy in the face of tough competitors and even an uncomfortable taper. Along with Ripol, Lyons (2005) suggests confidence affects performance through bringing comfort to athletes, so they may relax leading up to their performances, increasing their likelihood of more good performances. While the literature connecting self-efficacy and confidence to the taper is limited, this relationship is compelling due to the nature of the efficacy/confidence and performance relationship. Self-efficacy is thought to influence activities individuals desire to take part in, how hard they work at such activities, and the level of perseverance they exhibit when faced with failure (Moritz, Feltz, Fahrbach, & Mack, 2000). Such assumptions indicate a relationship between self-efficacy and performance in sports. To this point, Weinberg, Yukelson, and Jackson (1980) studied 56 males and 56 females who took part in muscular endurance tasks with either a high (one in which participant lifted more weight than researcher) or low self-efficacy condition (in which participant lifted less weight than researcher). Subjects in the high-efficacy condition performed against individuals with injured ligaments or knees, and those in the low-efficacy condition performed against varsity athletes. Originally, a 2x2x2 ANOVA test was employed to determine the success of the efficacy conditioning. Results showed that at an isokinetic leg-lift task, high

self-efficacy males performed significantly better, holding the position longer (191 seconds) than low self-efficacy males (151 seconds). Such results suggest that changes in self-efficacy can be accompanied by changes in performance. Furthermore, in a study of the relationship between self-efficacy and performance of adolescent (13-18 year-old) swimmers, results showed that with successful performances, individuals' self-efficacy scores improved (Weinberg et al., 1980). This finding demonstrates that not only is performance influenced by self-efficacy, but conversely, self-efficacy is impacted by performance, begging the question of the possible relationship between self-efficacy and post-taper performance.

Trust in coaching is another factor that has been found to affect sport performance. Furthermore, coaches can be very influential during the taper period (Ripol, 1993). Their words and actions can provide large benefits or detriments to taper. Some athletes find it easier to trust coaches (and their taper strategies) who offer open lines of communication, so they may be more approachable, easier to talk to, ask questions of, and individuals to whom one can present concerns. Coaches who are supportive and positive aid in creating a trusting relationship with athletes as well. While Lyons (2015) suggests that a positive athlete-coach relationship is essential to successful sport performance, a study that looked into various athletes' affective trust in coaches and its influence on gratitude and self-efficacy found a significant moderating effect between trust in one's coach and self-efficacy (Chen & Wu, 2014). This research was conducted by analyzing athletes' self-efficacy through the Rosenberg Self-Esteem Scale (Rosenberg, 1965), athletes' dispositional gratitude with McCullough's Gratitude Questionnaire (McCullough, Emmons, & Tsang, 2002), and trust in coaching through an affect and cognition-based trust scale known as the McAllister Affect-based and Cognitive-based Trust Survey (McAllister, 1995). Although the results do not directly connect trust in coaching to performance, there is a link

between trust in coaching and self-efficacy. A relationship between self-efficacy and performance has been previously been established, so this finding may yield questions and future research opportunities regarding the connection between trust in coaching and performance.

A second study helps make the connection concerning how performance after taper can be affected by trust in coaching. According to Lyons, "the taper portion of the season creates new challenges for the athletes and coaches" (Lyons, 2005). Drastic changes in behavior that accompany taper such as "feel" while practicing, level of tiredness, and level of stress/anxiety may impact athletes' thoughts, confidence, and performance, among other things. Trust in coaching can help mediate these many changes athletes undergo during the taper period, and those that could benefit their post-taper performance. Building trust in coaches can occur when coaches relate certain workouts to athletes and their ultimate goals for the season during training and explain how athletes are feeling and what athletes can expect while on taper. The article suggests that educating athletes on the taper process is an important factor in helping athletes to trust and believe in their training program (Lyons, 2005). Developing a successful taper, and consequently performance, is a process of coach and athlete growing and learning together. A positive relationship such as this can benefit sport performance.

Anxiety, both trait and state, can influence performance and taper outcome as well. Clingman & Hilliard (1994) examined the relationship between competition and anxiety in adults running a 5K race. After analyzing pre- versus post-race anxiety and performance, significant interactions between anxiety and success were obtained. In this case, comparison of performance to personal expectation related results to successfulness of performance (if an individual met his or her time goal he or she was considered successful). Post-race anxiety was significantly higher in unsuccessful individuals as compared to successful ones ($p < 0.01$). Also, there was a

significant difference in post-race anxiety between successful and unsuccessful athletes ($p < 0.05$). Furthermore, those who performed as well as or better than their stated goals had significant anxiety reductions following competition.

While Clingman et al. (1994) looked into state and trait anxiety and competition, another study examined the role of trait anxiety and gender on the mood state responses of college swimmers during overtraining (i.e., when progressively increasing training to the highest level to maintain performance) and taper (Tobar, 2012). According to Morgan and Raglin (1996) (as cited in Tobar, 2012, p. 137), "athletes possessing positive psychological states and traits would be predicted to be more successful". With overtraining, higher scores on the POMS for depression, fatigue, anger, confusion, and total mood, as well as lower scores for vigor were recorded. Conversely, the taper period saw reversed results. However, during taper, athletes' tension level increased, demonstrating increased anticipation for major competitions following taper. Such results further link taper and anxiety.

While the study by Tobar (2012) looked mainly into trait anxiety and mood state, there are many other aspects of anxiety that can be considered in relation to competition. A meta-analysis conducted by Craft, Magyar, Becker, and Feltz (2003) looked into many aspects of anxiety: cognitive anxiety, somatic anxiety, and the related concept of self-confidence. The Competitive State Anxiety Inventory-2 was used to analyze anxiety and performance. Results showed that low and high levels of somatic anxiety (autonomic arousal) correlated with low levels of performance, while moderate levels of somatic anxiety are associated with higher levels of performance. However, results regarding somatic anxiety and performance are still not significant and much more research needs to be done to develop more conclusive theories (Craft, Magyar, Becker, & Feltz, 2003).

Another important factor that may dictate performance and the success (or failure) of the taper is one's goal orientation. Goal orientation considers what motivates individuals to take part in certain activities (Pintrich, 2000). Generally, individuals are either motivated by outcome-oriented goals (motivated to win/ outperform others) or task-oriented goals (motivated to completely learn and master a skill). Ripol (1993) found that swimmers used practice to teach the body what it needs to do, so athletes could fully master a skill (task orientation), rather than thinking through swims during critical competitions following taper. Moreover, a connection between confidence, taper, and performance has been established. In a similar sense, a study of 594 students (11-18 years old) was conducted to compare levels of perceived competence to goal orientation (Baric, Vlasic, & Erpic, 2015). Although not directly comparing goal orientation to performance, results showed that high perceived competence correlated most significantly and positively with task orientation. Previously, a relationship between self-efficacy (a related concept to perceived competence) and performance has been established, so it may also be the case that goal orientation and performance could be linked.

A second study more directly linked goal orientation and sport performance by focusing on the impact of competitive versus mastery oriented goals on aerobic motor performance (Bar-Eli, Tenenbaum, Pie et al., 1997). Male military, high school students completed two surveys analyzing goal orientation and their thoughts, feelings, and reactions to goal manipulation before and after completing a bi-weekly 1,600 meter run. Although the study's main focus was on goal manipulation and aerobic performance, results suggested there was a connection between goal orientation and sport performance. Specifically, it was shown that task orientation could enhance performance. Despite being randomly assigned and controlled for ability, subjects in goal conditions with high task orientation consistently were more satisfied with their performances,

yielding the idea that higher task orientation could produce more satisfying, and by extension better performances.

An additional study looked into the relationship between mastery (task) goal orientation and performance (outcome) goal orientation and athletic performance of martial artists (King & Williams, 1997). Sixty-eight community college students enrolled in one martial arts class completed the Task and Ego Orientation in Sport Questionnaire (TEOSQ; Duda, 1989) in order to determine their goal orientations. Student also completed a list of 21 statements as to why they would succeed in martial arts and an 8-item scale measuring their beliefs in their ability to improve in karate. In terms of performance, students rated their performance as well as their overall enjoyment and satisfaction with a 5-point scale— (1) representing "poor" and (5) being an "excellent" performance, and (1) representing "not at all" and (5) being "extremely fun or satisfying." Instructors then evaluated students' skills on a 7-point scale, 5-point scale, and 4-point scale assessing students' levels of effort, persistence, and consistency in class. Scores were then assigned as a percentage of total possible points earned. Mastery orientation proved to positively benefit performance in martial arts, as results showed mastery goal orientation was significantly positively related to overall performance as well as self-rated performance. Such an orientation was also seen to enhance athletes' enjoyment in sport (which would also add to their overall experience in sport). Although martial arts and distance running are different sports, an article such as this still makes the case that goal orientation and sport performance in general are related.

In addition, a study by Potgieter and Steyn (2010) analyzing the results of TEOSQ further drives home the case that goal orientation and sport performance are connected. The study investigated 80 randomly selected individuals taking part in sports at the university level. Results

found there was a moderate correlation (r=0.504) between task goal orientation and positive failure. This means task oriented athletes were more likely to respond to failure by working harder and learning how to change in order to avoid the same mistakes. Additionally, low to moderate positive correlation were found between task orientation and positive reactions to success (r=0.332), as well as task orientation and growth mindset in individuals (r=0.234). All of these factors point to a positive ability for individuals with a task centered goal orientation to cope with failure and learn from it, as well as respond positively to success, increasing the likelihood of improved performances. Such an idea suggests that goal orientation and performance may be linked.

Just as the previously mentioned study looks into goal orientation and sport performance in martial artists, a study of 200 Division I athletes examined the relationships between goal orientation, flow in sport, perceived ability, and performance (Jackson & Roberts, 1992). The study analyzed male and female athletes taking part in gymnastics, swimming, cross-country, track, golf, distance running, field sports, tennis, and diving by administering a questionnaire including a goal orientation scale, flow scale, assessment of perceived ability, and open-ended questions to assess best and worst performances as well as challenges and skills to participants. Results of this study showed that mastery-oriented mindsets were associated with best performance, while competition-oriented (or outcome oriented) mindsets were linked to worst performances. Additionally, while some 66% of athletes reported process-focused thoughts during their best performances, 88% of athletes reported outcome-oriented thoughts during their worst performances. These results point to a relationship between goal orientation and performance.

In conclusion, limited empirical information exists that demonstrates there is more to the effects of tapering than physiological factors. Ripol (1993) and others have pointed to variables of interest, but much more support is needed before the relationships between these psychological factors and tapering can be firmly established. Therefore, the purpose of this study was to extend the current literature that has found connections between self-efficacy, trust in coaching, state anxiety, goal orientation, and sport performance (and in some cases post-taper sport performances) by assessing these variables during a marathon training taper period. Specifically, changes to these psychological factors among young adults training for their first marathon will be assessed to identify which are most susceptible to change during the tapering process (thereby identifying the variables that are likely to have an impact on post-taper performances).

## Methods

### Participants

The population studied included 29 subjects who were enrolled in a general-education health and fitness course focusing on marathon training at a mid-sized University in the Mid-Atlantic region of the United States. It was required of students that the marathon they completed in class be their first. The largest response rate occurred during the baseline survey period, which consisted of 14 participants (48.3% response rate). Seven responses (24.1% response rate) were collected with the pre-taper survey, while the post-taper survey had only four responses (13.7%). Unfortunately, only three participants (10.3%) completed surveys at all three data collection periods, so the final sample size available for answering the study's research questions was very small and constrained appropriate data analysis options and the ability to draw conclusive and generalizable results (see the proposed study limitations in the discussion section for an

explanation of probable causes of this low response rate). However, a look at the existing responses helped to identify some of the trends in the data that can be further explored with more robust samples.

Participants who completed the first round of data collection were all white/Euro-American males and females. Eight females took part in the study, while 6 males participated. Students who responded to the baseline survey ranged in age from 18-21 years ($\bar{x}$ = 19.5 years). It is important to describe the full sample to illustrate the homogeneity of the group and begin to formulate reasons for such a low response rate. The original participants also had an average of 4.04 years of running experience; and while eight participants had experience with taper, the other six did not. Individuals who provided a full set of data were 3 white/Euro-American males with an average age of 19 years (ranging from 18-19 years). These participants had an average of 3.83 years of running experience, with only 1 subject having previous experience with utilizing the tapering strategy when training for an endurance event.

**Marathon Training Program**

In order to gain a better understanding of the participants and their training experience, it is important to become familiar with their training schedule and class expectations. Before beginning the marathon training program, it was expected that students could complete a five mile run. Members of the class began training on their own the week before classes started for the fall semester. The full training program was 14 weeks long, with the marathon occurring on the 15$^{th}$ week. For the first eight-week phase of the program, students completed shorter runs on a Monday, Wednesday, and Sunday schedule, and met on Fridays to complete their long runs together. During the next three-week phase, participants ran shorter runs on Monday's, Tuesday's, and Thursday's and met on Saturday's to complete long runs. During the following

two weeks, students were expected to train over the Thanksgiving break by themselves. By weeks 11 and 12 (peak distance weeks), participants' long runs were lasting 18 miles. During the first taper week, long runs decreased to 9 miles on week 13 and 8 miles on week 14. Finally, during race week (week 15), students were "rested" and were only required to run 3 miles on Monday and Tuesday and walk 3 miles Thursday (see Appendix A).

**Instruments**

The overall design of this study took a quantitative approach, meaning a formal, objective, systematic format that utilized numerical data (Miles & Huberman, 1994) to gain insight into the following research question: How would goal orientation, self-efficacy, trust in coaching, and state anxiety change throughout the training and taper of a marathon running population? Several surveys were used to analyze how the major variables of study related to the tapering process, with all survey questions presented in Qualtrics (an electronic survey program) to administer to participants via online format.

**Goal orientation.** Duda and Nicholl's (1992) Task and Ego Orientation in Sport Questionnaire (TEOSQ) was used to investigate the goal orientations of participants. This 13-item questionnaire was used to define whether an athlete feels success in sport is "task oriented" or "ego oriented" in nature. In completing this questionnaire, individuals were to consider the statement, "I feel most successful in sport when…" followed by a sport scenario (e.g., I can do better than my friends) to which they were required to indicate their level of agreement on a five-point Likert scale (ranging from strongly disagree to strongly agree).

**Self-efficacy.** A self-efficacy scale designed specifically for marathon runners (Samson, 2011) was used to examine participants' self-efficacy. This 5-item scale ranked an individual's confidence about his or her ability to be successful at marathon-specific preparation and

performance. For example, respondents were to evaluate their feelings toward the statement, "I can complete a marathon." The response scale ranged from 0 (I cannot do it at all), to 50 (I am moderately certain I can do it), to 100 (I am certain I can do it).

**Trust in coach.** McAllister's (1995) Affect and Cognition-Based Trust Scale was used to measure individuals' trust in coaching. The section of the scale that was used included 11 items that assess trust toward supervisors; on a 7-point Likert scale (ranging from strongly disagree to strongly agree). Permission was obtained from McAllister to use a portion of the scale without damage to the instrument's validity and to modify the items so that trust in one's coach was assessed. An example of the revised scale follows: the original statement, "I can talk freely to this individual at work about difficulties I'm having and know that (s)he will listen." was revised to, "I can talk freely to my coach about difficulties I'm having and know that (s)he will listen." The Affect and Cognition-Based Trust Scale has been used successfully with athletes in other studies (e.g., Chen & Wu, 2014).

**State anxiety.** Lastly, state anxiety was assessed using The Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Vealey, and Burton, 1987). The CSAI-2 is a 27-item survey that measures three anxiety subscales: cognitive anxiety, somatic anxiety, and the related component of self-confidence. The CSAI-2 analyzes statements pertaining to athletes and their feelings about competition (e.g., "I feel nervous") and operates on a scale of one to four (1 = not at all to 4 = very much so).

**Participant Recruitment**

After IRB approval was secured from the institution at which the study was to be conducted, the researchers met with potential participants at the beginning of the semester to give them a brief review of the research purposes, procedures, risks, and benefits. Students were

informed the survey completion should take no longer than 15-20 minutes per session and could be completed on their own time (within the boundaries of five-day data collection periods). The researchers incorporated an informed consent form into the online survey so participants could review the study information prior to agreeing to (or declining) participation. Individuals who agreed to participate were then able to complete the survey, and those who chose not to participate were directed away from the consent form, and the survey connection was terminated.

**Survey administration.** Surveys were administered three times during the course of participants' marathon training program. To gain a baseline measurement of all variables, the participants first completed the online survey during week 6 of the program (week 5 of the academic semester). The second assessment period occurred on week 12, preceding the start of the taper. This was done in order to gauge the participants' responses when they completed their highest workload at the peak of training. Finally, the surveys were completed a final time during week 14, following the first taper week, but a day or so before the marathon. This timeline was used to get an understanding of the participants' mental state after the taper began, but not so close to the race so as to distract the athlete with thoughts that could disrupt his or her performance during the marathon. At the start of each data collection period, all consenting participants were sent an email to which the study survey was linked. Once taken to the survey site, the participants were asked to create a unique identification code that was reused for each data collection time-point so that the data analyses could be completed without breaching confidentiality of the students.

Participants were given a date by which they needed to have each survey submitted (with each survey period lasting 5 weekdays in duration), but were given freedom to complete the survey in a location of their choosing. However, they were advised about the benefits of

completing the survey in a quiet and private location and on a computer with a reliable internet connection. During each of the survey periods, students were sent notifications the first day the survey was available for completion and a day before the last day of the survey period in order to remind them to participate in the study. An email reminder was also sent to the class instructor during the middle of the survey period, so that he could remind his students of the pending survey in an attempt to bolster participation (see Appendix B). Careful wording was utilized in the messages in order to explain that students' participation was important, but that participation was not required to avoid any issues with coercion (see Appendix B).

**Data Analysis**

Descriptive statistics (i.e., means and frequency counts) were calculated to summarize participants' age, year in school, ethnicity, years of running experience, and prior experience using a taper strategy.

Due to the low response rate, graphical interpretations and descriptive analyses of the data at all three time points (baseline, pre and post taper) was performed and a non-parametric test was used to address the research question as best as possible and to provide and illustration of the sample in light of the focal psychological variables of study (i.e., self-efficacy, state anxiety, goal orientation, trust in coaching).

First, mean values for all participants on each of the focal variables were plotted graphically (x-axis= survey periods, y-axis= variable values) at each of the three survey time-points. One-line graph was produced for each focal variable in order to discuss the general trends found throughout the data across the three assessment periods and to see if any variables differentiated between individuals who fully participated and those who dropped out. It is meaningful to look into the responses of those who participated in the full study in order to

assess a complete set of data. However, data of those who dropped out are still important because they could suggest possible reasons for those participants' inability to continue participating.

Additionally, a non-parametric Wilcoxon Signed-Rank test was performed for each focal variable only using the data from the three participants who completed the full study protocol. This non-parametric test was chosen for this data because it is a distribution-free test, which does not assume a large sample size or that the data follow a normal distribution (Kinnear & Gray, 2010). Although this test is lacking in statistical power in comparison with a parametric test, it does provide both a p-value and effect size to demonstrate significance and the robustness of the results.

## Results

Data from a total of three participants was analyzed at the conclusion of this study, with none of the analyses reaching significance. However, results will be reported in order to highlight any visible trends. Note: In the case of the major analyses (non-parametric tests), baseline data has not been considered as changes in variables occurring from pre to post-taper are the focus of the research questions.

As described previously, the data were analyzed using Wilcoxon Signed-Rank tests conducted for each psychological variable. Results in all cases proved insignificant; however, some median values showed slight changes from pre to post taper (with specific results presented in Appendix C). Overall, results indicated that from pre- to post-taper, self-efficacy levels experienced a slight decrease. Results for task goal orientation median numbers slightly increasing, while median values for cognitive-based trust showed a small increase from pre to post-taper. Unlike the previously mentioned variables, cognitive anxiety, somatic anxiety, ego goal orientation, and affect-based trust showed no changes in median values.

Although the Wilcoxon Signed-Rank tests did not yield significant results, graphical data can help show trends that went undetected or were minimized by the non-parametric tests. In terms of this information, changes from baseline to pre-taper have been included. Despite not being part of the research question, it would be interesting to see if any training appeared to have some connection to the variables discussed in this study or if these psychological variables could have played into whether a participant continued on with the study. With regard to graphical trends, although all participants throughout this study were analyzed, only three participants completed each baseline, pre-taper and post-taper survey. For this reason, the first few graphical interpretations will only depict data from this sample—participants numbered one through three on the graph were the only individuals with a full data set. Following this, baseline to pre-taper results for all participants were analyzed. This was done to highlight any possible trends that might point to why individuals would have continued or discontinued participation.

After reviewing the results from baseline to pre-taper of the three participants, it was determined that although there were a few minor trends, there seemed to be a great deal of variability between participants from time-point to time-point, yielding few compelling results that can convincingly direct future research. In terms of self-efficacy, participant one's (P1) feelings of self-efficacy decreased, while participant two (P2) and three's (P3) self-efficacy increased (see Figure 1 in Appendix D). P1's feelings of cognitive state anxiety stayed the same, P2's decreased, and P3's increased (see Figure 2); similarly, P1's level of somatic state anxiety stayed the same, P2's decreased, and P3's increased (see Figure 3). When looking at ego goal orientation, from baseline to pre-taper values for this variable decreased for P1, and increased for P2 and P3 (see Figure 4), while task goal orientation levels decreased for P1, increased for P2, and stayed the same for P3 (see Figure 5). Regarding trust in coach, feelings of affect-based trust

remained the same for P1, increased for P2, and decreased for P3 (see Figure 6) and cognitive-based trust, levels increased for P1, and decreased for P2 and P3 (see Figure 7). Again, there did not appear to be any consistent directionality trends between or within the participants studied, making it difficult to draw any major connections between taper and these psychological factors.

Looking at results from pre to post-taper among participants 1-3, similar trends were seen from baseline to pre-taper. However, during this time period, there were a few more consistent changes in the variables highlighted between participants that may suggest potential trends to investigate. The self-efficacy of P1 increased, and then decreased for P2 and P3 (see Figure 1). With regard to anxiety, feelings of cognitive state anxiety remained the same for P1 and P2, and decreased for P3 (see Figure 2); somatic state anxiety level increased for P1 and P2, and decreased for P3 (see Figure 3). At the same time feelings of ego goal orientation stayed the same for P1, decreased for the P2, and increased for P3 (see Figure 4)., while from pre to post-taper levels of task goal orientation increased for P1 and P3, and remained the same in P2 (see Figure 5). Furthermore, feelings of affect-based trust remained the same in P1, and increased for P2 and P3 (see Figure 6), while cognitive-based trust decreased in P1, and increased for P2 and P3 (see Figure 7). These results show that although values found in the present study proved insignificant, some variables showed slight trends that may be worth looking into with future research.

Consideration of data from participants who participated from baseline to pre-taper, but did not complete the post-taper questionnaire further complicated visible trends among the study's variables in question (see Appendix E). Results from participants varied a great deal for all variables with the exception of ego goal orientation. In the case of the three main participants' responses from baseline to pre-taper, ego goal orientation seemed to mostly increase (P2 and P3

increased, while P1 decreased). Similarly, from baseline to pre-taper the results showed that a majority of the other participants (n = 4) experienced an increase in ego goal orientation as well, while only one participant experienced a decrease. While this information does not help to distinguish between those who participated and those who dropped out, the results show a compelling increase in ego-orientation from baseline to pre-taper among most individuals surveyed. This finding may indicate that, at this point in the training process, athletes were experiencing increases in motivation related to outperforming their classmates (as opposed to personal growth and the process).

Although the study did not maintain enough participants for results and trends to hold strong statistical merit, it does support some interesting ideas worth pursuing with larger studies in the future. These suggestions will be considered in the discussion.

## Discussion

The present study aimed to identify a possible relationship between the taper during marathon training and changes in psychological factors (i.e., self-efficacy, goal orientation, state anxiety, and trust in coaching). Although there is a good amount of current literature dedicated to finding a link between psychological factors and performance, the purpose of this study was to extend the current (yet limited) research that has found connections between these psychological variables and post-taper sport performances by assessing changes to these variables during a marathon training taper period. In particular, changes to these psychological factors with regard to young adults training for their first marathon were analyzed to identify which were most susceptible to change during the tapering process in order to identify the variables that were likely to have an impact on post-taper performances.

Overall, results of the study did not show a strong influence of taper on self-efficacy, goal orientation, state anxiety, and trust in coaching. Sheer numbers could have played a role in this outcome, as it is hard to make any solid conclusions or formulate any substantial theories when the study only had three participants. While further research and larger studies pertaining to this topic are needed, a discussion related to how the current findings relate to previous research is presented below.

**Self-Efficacy**

First with regard to the relationship between self-efficacy and taper, a Wilcoxon signed-rank test showed that the taper period did not elicit a significant change in self-efficacy across the three participants. Although insignificant, there was a slight decrease in self efficacy score among participants from pre- to post-taper. This small decrease in self-efficacy after taper could have been due to the decreased intensity in training. During taper, run length was significantly scaled back, meaning individuals who were previously running upwards of 18 miles on their longest run were running a fraction of that. Without maintaining heightened training levels, individuals may have been uncomfortable and lacked confidence in their ability to complete a 26-mile-long marathon. Some researchers suggest that the variability in running taper success is due to psychological changes that counteract the physiological changes resulting from taper. Research from Luden demonstrates that while some athletes did have notable improvements in performance, many others showed no change or significant decrements to performance (Luden, 2010). A meta-analysis of taper's effect on performance showed that some cross country runners improved up to 22%, some showed no change, and others showed a decrement of 1% (Luden, 2010). The lack of improvement that often accompanies taper in runners is often suggested to be the result of lack of confidence in the taper's significantly decreased training volume. While

logical, this trend does not seem to be desirable given the previously discussed literature that advocates for the need for elevated efficacy for optimal performances. According to Ripol (1993), self-efficacy is essential to successful performances. It is important to maintain a high level of self-efficacy in the face of challenging impending competitions and even an uncomfortable taper. Similar to Ripol, Lyons (2005) proposes confidence affects performance by bringing comfort to athletes, so they may relax leading up to their performances; this leads to self-efficacy in athletes' ability to perform well and will increase their likelihood of more successful performances. The two studies discussed above indicate how self-efficacy should ideally change during taper. In the present study, though, that did not seem to be the case. As results differed from theorized norms and were found to be not significant, further research in this area could prove useful to better understand the relationship between taper and self-efficacy.

Concerning other research, a qualitative study by Samson (2014) looked into how sources of information influence self-efficacy beliefs of college individuals training for a marathon run. Prerace, individuals attributed injuries and training experiences (i.e. completing long runs in practice) to changes in self-efficacy beliefs. This finding could shed light on the results of this study. While some participants' self-efficacy could have grown from being "better trained" or in "better shape," others' self-efficacy levels could have decreased due to mild training injuries and discomfort, as well as not feeling confident in their training. Another study by Heazlewood and Burke (2011) supported the theory that decreases in self-efficacy prior to a distance event are not conducive for good performance by exploring the affect self-efficacy had on predicting Ironman triathlon performance. Study methodology utilized physiological measures as well as psychological constructs to predict total performance time and individual swim, cycle, and run performance times. Results of this study showed that triathletes self-predictions were, in fact,

quite predictive of their actual performances; the relationship between the performance self-efficacy scale and performance were significantly related. These findings, lead one to believe that further research into the taper process and its effect on self-efficacy as well as performance are crucial. Research into whether these types of psychological adaptations or physical changes are more conducive to a successful taper is also essential designing better training programs for athletes.

As there is a key relationship between self-efficacy and performance, coaches should try to maximize this variable during the taper period, leading up to the competition. A review by Brent Rushall (1995) further discusses psychological factors that should be considered while coaching athletes. Rushall theorizes that developing athletes' self-efficacy is important to developing a healthy recovery during taper and in the face of the impending competition (Rushall, 1995). Opportunities that allow athletes to build confidence leading up to competition are essential pre-cursors to successful performances. Rushall suggests that while the physical aspect is taper is important, the psychological training that goes along with it is key to successful post-taper performances as well. This idea indicates that the slight drop in self-efficacy in the current study's participants might not be ideal leading up to the marathon. Although open to interpretation, the drop in self-efficacy could be due to a lack of confidence in the change in training during the taper. Further research on the subject is needed in order to fully understand the relationship between taper and self-efficacy.

**Task Goal Orientation**

In the case of task goal orientation, analyses showed that across the three participants, the taper period did not elicit a statistically significant change; however, there was a slight increase in task goal orientation among participants from pre to post-taper. Many have proposed

performance benefits associated with a task-oriented focus (e.g., King, 1997; Bar Eli, 1997; and Ripol, 1993). Task oriented individuals are more focused on the process than on outcomes and are motivated by personal improvement and mastering a skill as opposed to beating others or extrinsic rewards (Kaplan & Maehr, 2006). Also, task oriented persons are more positive-minded and driven to train more diligently, which suggests that athletes with this mindset would be more motivated to commit to completing the marathon run and help them to be more successful.

For example, a descriptive study by Krouse, Ransdell, Lucas, and Pritchard (2011) looked into motivation, goal orientation, demographics, training habits, and coaching factors behind female ultrarunners. This study found that most women set goals for upcoming events and most ultrarunners focused on more task-oriented goals than ego-oriented. Such a result suggests that a task goal orientation is more popular, so it may be more useful and beneficial to distance or extreme distance runners. This concept could then be transferred to the present study's participants who didn't report any major changes in task goal orientation but saw minor increases in ego goal orientation. In their case, it could be assumed that a more task oriented outlook on the marathon could lead to a greater willingness to stick with the training process, which could have a facilitative effect on their race day performances.

**Cognitive-Based Trust in Coaching**

Another interesting factor proved to be cognitive-based trust. A Wilcoxon signed-rank test showed that the taper period did not elicit statistically significant changes in each of the three participants, but similar to task goal orientation discussed above, there was still a small increase in this factor from pre to post-taper. The training/taper period leading up to the marathon was 15 weeks long, cognitive-based trust could have developed in participants because over this long period of time they could have begun to understand and learn to trust in their coach through their

time spent training with him and in class with him, and trust in his knowledge regarding training and taper, and thus, trust in their training and taper more. Previously mentioned, a study by Lyons (2005) discussed the connection between trust in coaching and training (specifically, the taper process). She proposed trust in coaching could help mediate the many physical and emotional changes athletes undergo during the taper period, and benefit their post-taper performance. Like Lyons' findings, evidence from the present study suggests that trust in coaching could be key to marathon running and that training/taper may affect this variable. Although results of the present study were inconclusive, further research in this area could be useful to understand the interaction between trust in coaching and taper.

**Affect-Based Trust In Coaching**

Like cognitive-based trust, the taper period did not produce a statistically significant change across the three participants with regard to affect-based trust; however, scores showed a trend toward increasing affect-based trust with time. A related study by Chen and Wu (2014) looked into the role dispositional gratitude played in shaping athletes' lives as well as how dispositional and situational factors can shape athletes' self-esteem. Results of the study suggest that in order to enhance self-esteem, athletes should practice how to be grateful and appreciative towards their coaches, and in turn, to build affective trust between themselves and their athletes, coaches should work to develop stronger relationships among them (Chen & Wu, 2014). In combination, findings from Lyons, as well as Chen and Wu, suggest that athletes who have established trust with coaches are more likely to perform better. Additionally, this concept suggests that athletes may be more likely to feel higher levels of trust in their coach after having been able to develop that trust over a whole training period which could explain why trust in coaching saw slight increases in the present study. These findings also imply that further

research should be done to establish the relationship between both cognitive and affect-based trust in coaching and taper/training period.

To further understand the relationships between coaches and athletes in regard to trust, a study by Zhang and Surujlal (2015) explored the relationship between antecedents of trust (justice, benevolence, integrity and competence) and predicting athletes' trust in their coaches. The study found out that these antecedents made up for 50% of variance in athletes' trust in coaches. Perceived benevolence of coaches contributed the most to athletes' trust in their coaches, followed (in order) by competence, justice, and integrity (Zhang & Surujlal, 2015). In the case of this study justice referred to treating and dealing with athletes fairly; competence signified knowledge about the sport and the methods in which athletes should be coached; benevolence referred to coaches being kind and concerned for their athletes; and integrity entailed coaches being honest and upholding good morals. These results have implications on the coach-athlete relationship, and what can be done to create a greater bond. Although this study itself does not discuss the relationship between taper and trust in coaching, it does propose reasons participants may have experienced changes in levels of cognitive and affect-based trust in regard to their relationship with their coach. The study in particular suggests that coaches can establish trust between themselves and their athletes best by exhibiting kindness and genuine concern for their wellbeing.

**State Anxiety**

Another factor that was looked into in relation to taper was state anxiety. Tests showed that the taper period did not elicit statistically significant changes in cognitive state anxiety across the three participants. The median cognitive state anxiety score showed no trending changes. In terms of somatic state anxiety, a Wilcoxon signed-rank test also showed that the

taper period did not produce significant changes across the three participants, while, the median somatic state anxiety score didn't change from pre to post-taper. Although these results were not particularly noteworthy, results from a study by Morgan and Raglin (1996) found the athletes' tension level increased during taper, demonstrating increased anticipation for major competitions following taper (as cited in Tobar, 2012, p. 137). This finding is logical, as it would be expected that following a major training modification and preceding an important event, individuals would experience heightened levels of arousal (Tobar, 2012). Another meta-analysis looking into cognitive state anxiety, somatic state anxiety, and self-confidence showed that low and high levels of somatic anxiety (autonomic arousal) correlate with low levels of performance, while moderate levels of somatic anxiety are associated with higher levels of performance. These results suggest that there is an optimal level of anxiety for each individual, and it may lie in the median range. This failure to find a major trend in state anxiety levels from pre to post-taper may not be unusual, as each individual has their own peak level of anxiety and will react different to certain stimuli.

Additional research by Mabweazara, Andrews and Leach (2014) explored the temporal changes in state anxiety in the period leading up to competition in swimmers. According to the study, high school male swimmers experienced an increase from seven days up to an hour before competition with regard to both cognitive and somatic state anxieties. While the study by Mabweazara, et al. (2014) does not directly look into changes in state anxiety during taper or training specifically, as in the current research, this study does look into changes in state anxiety leading up to competition. In terms of temporal sequence, the results from Mabweazara's study can be related to that of the present research under discussion. Furthermore, although the current study's results are inconclusive, had more individuals participated, a trend showing an increase

in state anxiety from pre to post-taper could have developed. A qualitative study by Gillham (2014) was designed to investigate the sources of competitive state anxiety in various sports and competitive levels through the use of focus groups. The study found that themes of uncertainty, consequences, expectations, and letting self or others down were commonly attributed to changes in state anxiety preceding competition (Gilham, 2014). Even though Gilham's study did not look into changes in state anxiety from pre to post-taper, it did propose reasons as to why state anxiety may vary from pre to post-taper. This finding suggests that in the case of the present study, state anxiety levels should have varied from pre to post-taper; perhaps if further research was done more meaningful data concerning trends for these changes would be found.

**Ego Goal Orientation**

Goal orientation was another psychological variable looked into with regard to taper. While task goal orientation was discussed above, a Wilcoxon signed-rank tests also showed that the taper period did not elicit a statistically significant change in ego goal orientation among the three participants; un like task goal orientation though, the median ego goal orientation score did not change from pre-taper to post-taper. In terms of goal orientation, a study by Jackson and Robert (1992) analyzed male and female athletes taking part in gymnastics, swimming, cross-country, track, golf, distance running, field sports, tennis, and diving; the investigated goal orientation, as well as experiences of flow, perceived ability, challenges and skills, and best and worst performances in these athletes. Results indicated that competition-oriented mindsets were linked to worst performances, with 88% of athletes reporting outcome-oriented thoughts during their worst performances and 66% of athletes reporting process-focused thoughts during their best performances (Jackson & Roberts, 1992). This finding suggests that although goal orientation and its effect on performance was not analyzed in our study, future research could be

done to solidify this relationship. Furthermore, while no changes in ego goal orientation were observed in the current study, results from Jackson and Roberts (1992) suggest increases in this variable would not be desirable. To further illustrate the relationship between goal orientation and sport performance, a study by Abraldes, et al. (2014) was designed to check the relationships between goal orientations, satisfaction, beliefs about the causes of success in sport and motivational climate in swimmers; explore the effect of goal orientation on these dimensions, and predict goal orientation in these athletes. Results showed that task goal orientation was more related to fun and enjoyment, as well as effort and perception of a mastery motivational climate, while ego goal orientation was linked to boredom, the use of distraction strategies and the execution motivational climate (Abraldes, Granero-Gallegos, Baena-Extremera, GómezLópez, & Rodríguez-Suárez, 2014). Even though the present study did not look into the relationships between participants' goal orientation and affect toward the task, these results suggest that no trend or a decrease in ego orientation is desirable, as this factor could be related to a negative training experience and not conducive to a good performance.

**Limitations**

Considering the constraints of the study's sample of convenience, there were several factors that could have been addressed in order to increase the quality and efficacy of the project. While the total number of participants who could have taken part in this study was 29, by the final survey period, only 3 individuals remained involved throughout the three survey periods. It is very clear the sample size was small, which limited the type of data analyses we could conduct, the power (or believability) of our results, and our ability to sufficiently address our research questions. This response rate could be at least partially due to a lack of monetary or academic-related incentives to participate in the study. If students were not intrinsically

motivated to volunteer their time or learn more about their psychological state pre and post-taper, they may not have been willing to take the time begin participating in or continue participating in these surveys. Another factor that could have limited the sample size was the timing of when the surveys were administered throughout the semester. Specifically, at the end of the semester, the pre-taper survey was administered before Thanksgiving break when students may have had tests or assignments due or were preoccupied with making their travel plans. Furthermore, the post-taper survey was administered the week following Thanksgiving break when students still may have been overwhelmed with projects, papers, and studying for finals.

Another study limitation was that our sample was very homogenous. All of the subjects that participated in this study were male and between 18 and 19 years old. Additionally, all subject were white/Euro-American. The participants all had some form of running experience as well. They were all college-aged students at a medium to large-sized university and accustomed to living a similar kind of lifestyle, suggesting that individuals were around a similar socio-economic status, as well as fairly educated individuals. These many similarities between participants severely restrict the perspectives incorporated into the results of this study.

Another limiting aspect of this study can be attributed to bias. Because the instrumentation utilized was survey-based, data was self-reported by participants, which is prone to producing self-report bias in participant responses (West, 2014). For this reason, there is no way to verify that the information provided is highly valid. One issue that can lead to self-report bias is a person's introspective ability (or lack thereof). Although an individual may be trying to be honest, they may lack the introspective ability to accurately respond to a question as some individuals see themselves in a different light than the rest of society does. Additionally, individuals may have different understandings or interpretations regarding the meaning of

questions when responding to surveys or questionnaires. Another problem that can arise in the form of self-report bias is self-presentation or impression management (self-aware) and self-deception (unconscious). Forms of self-impression include exaggeration, faking, and lying in responses, while self-deception consists of self-favoring bias, self-enhancement, defensiveness, and denial (Robins, Fraley, & Krueger, 2007). A similar problem that can be observed by participants responding to survey questions is social-desirability bias. This means that individuals have a tendency to respond to questions in a way that will be viewed favorably by others instead of reporting their true feelings. Because of this effect, people are driven to over-report what is thought to be "good behavior" and under-report what is viewed as "bad behavior" (Dodd-McCue & Tartaglia, 2010). These issues can pose a significant problem in self-report questionnaires. Therefore, it is necessary that we trust that the information provided is true and was given to the best of the participant's knowledge.

**Future Research**

Based on current research and the limitations discussed above, future research with regard to self-efficacy, goal orientation, state anxiety, trust in coaching, as well other psychological variables (personality, attention span, mental skills, etc.) and taper is needed. Research with a larger population is vital in order to maximize statistical power, and take into account a variety of participants. Research with a wider range of participants—with differing lifestyles, backgrounds, interests, physical activity experiences, and races—is paramount to more meaningful and representative research. Moreover, research targeting psychological changes through taper and their impact on performance through performance gauging measures (performance time, stats, wins/losses) would be an interesting way to further research in this field. Another intriguing path to extend upon research in this area would be to further study the

relationship between training (as opposed to taper) and psychological variables, allowing researchers to cement their understanding of the psychological aspect of increased training and intensity in comparison to the changes that individuals undergo in the period of time where training intensity is significantly decreased, allowing the mind and body to recover. This information is important for coaches and others in the sports psychology and kinesiology fields to understand so they can tailor different aspects of athletes' tapers (psychological approaches as well as physical training) in order to enable them to perform at their very best.

## Conclusion

The purpose of the present study was to examine the potential relationship between tapering and the psychological factors of self-efficacy, goal orientation, state anxiety, and trust in coaching. Taper resulted in no statistically significant changes in these variables, although small decreases in self-efficacy, and increases in task goal orientation and cognitive-based trust were seen from pre to post-taper. The inability of these findings to reach significance was likely related to a small sample size. Therefore, further research with a larger, wider range of participants would be desirable to better understand the relationship between taper and its psychological implications.

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# Appendix A

## Training Schedule

**Fall 2015 Running-Training Plan – All distances are shown in miles**

| Week | Date (Mon) | Mon | Tues | Wed | Thur | Fri | Sat | Sun | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8/24 | 3 | Off | 3 | Off | 5 | Off | 3 | 15 |
| 2 | 8/31 | 4 | Off | 3 | Off | 6 | Off | 3 | 16 |
| 3 | 9/7 | 4 | Off | 3 | Off | 7 | Off | 3 | 17 |
| 4 | 9/14 | 5 | Off | 3 | Off | 8 | Off | 4 | 19 |
| 5 | 9/21 | 5 | Off | 3 | Off | 10 | Off | 3 | 21 |
| 6 | 9/28 | 5 | Off | 4 | Off | 11 | Off | 4 | 24 |
| 7 | 10/5 | 6 | Off | 4 | Off | 12 | Off | 4 | 26 |
| 8 | 10/12 | 6 | Off | 4 | Off | 14 | Off | 4 | 28 |
| 9 | 10/19 | 7 | Off | 4 | Off | 16 | Off | 4 | 31 |
| 10 | 10/26 | 5 | 8 | Off | 5 | Off | 16 | Off | 34 |
| 11 | 11/2 | 5 | 8 | Off | 5 | Off | 18 | Off | 36 |
| 12 | 11/9 | 5 | 8 | Off | 5 | Off | 18 | Off | 36 |
| 13 | 11/16 | 5 | 8 | Off | 5 | Off | 9 | Off | 27 |
| 14 | 11/23* | 3 | 5 | Off | 3 | Off | 8 | Off | 19 |
| 15 | 11/30 | 3 | 3 | Off | Walk 3 | Off | **26.2** | | 35.2 |

**Week 1: program starts on your own (If people are back and would like to meet on Friday, it would be optional.)**
**Weeks 2-9: Meet at 3 pm Friday**
**Weeks 10,11,12: Meet at 8am Saturday (week 10 may be either Friday or Saturday- TBD)**
*Thanksgiving Week- long runs on November 20/21 and 27/28 will be on your own
**December 5, 2015- Rehoboth Beach Marathon, Rehoboth Beach, DE; 7:00 am start.**

## Appendix B
## Sample Emails

Sample email as sent to marathon running instructor:

Hi Mr. _____,

This is Erica Witoslawski; I came in last week to talk to your class about participating in my marathon running survey for my honors research study. First, I want to say thank you for taking the time to allow Dr. C and myself to come by and speak with your class. Yesterday was the first day of the initial survey period for my study, and Friday is the last day to respond. With that being said, I would greatly appreciate it if you could remind your students that the first survey period ends on October 2, and encourage them to participate if they have not already.

Thank you so much!
-Erica

Sample email as sent to participants:

Hello _____ Marathon Students,
My name is Erica Witoslawski, and I'm the student who came in to your class to talk about my honors research project earlier this week. Again, I ask that all of you consider participating in this study that directly relates to you as marathoners in training.
Participation consists of taking one anonymous, online survey three times throughout the semester. The survey has questions that touch upon your self-efficacy, goal orientation, state anxiety, and trust in coaching. Responding to the survey should only take 15-20 minutes and all responses are greatly appreciated.
The first, baseline survey period extends from **September 28, 2015-October 2, 2015**, so you can choose to complete it at a time and location that best suits you.
Attached is a copy of the informed consent form you will be asked to agree to in order to take part in this study; please look it over if you are interested in additional information about this project. This informed consent form will also appear at the beginning of the survey, where you must "agree" to take part in the survey if you would prefer to review it in that location.
Again, your participation is very much appreciated, and the more participants I have the more reliable test results I will receive.
Here is a link to the survey: **http://jmu.co1.qualtrics.com/SE/?SID=SV_4GG3rj7mvWSZ09L**
My email address is witoslea@dukes.jmu.edu. Please let me know of any questions or technical difficulties you may experience with regard to this survey.
Thank you,
Erica

## Appendix C

| | Z-score | P-value | Pre-taper Median | Post-taper Median | Direction of Change |
|---|---|---|---|---|---|
| Self-efficacy | -1.604 | 0.109 | 95.2 | 88 | ↓ |
| Cognitive state anxiety | -0.447 | 0.665 | 34 | 34 | = |
| Somatic state anxiety | 0.000 | 1.000 | 32 | 33 | ↑/= |
| Ego goal orientation | 0.000 | 1.000 | 3.33 | 3.33 | = |
| Task goal orientation | -1.342 | 0.180 | 3.86 | 4.14 | ↑ |
| Affect-based trust | -1.604 | 0.109 | 6 | 6.8 | ↑/= |
| Cognitive-based trust | -1.633 | 0.102 | 5.5 | 6.67 | ↑ |

Table 1. Psychological variables and Wilcoxon Signed-Rank Test results

## Appendix D

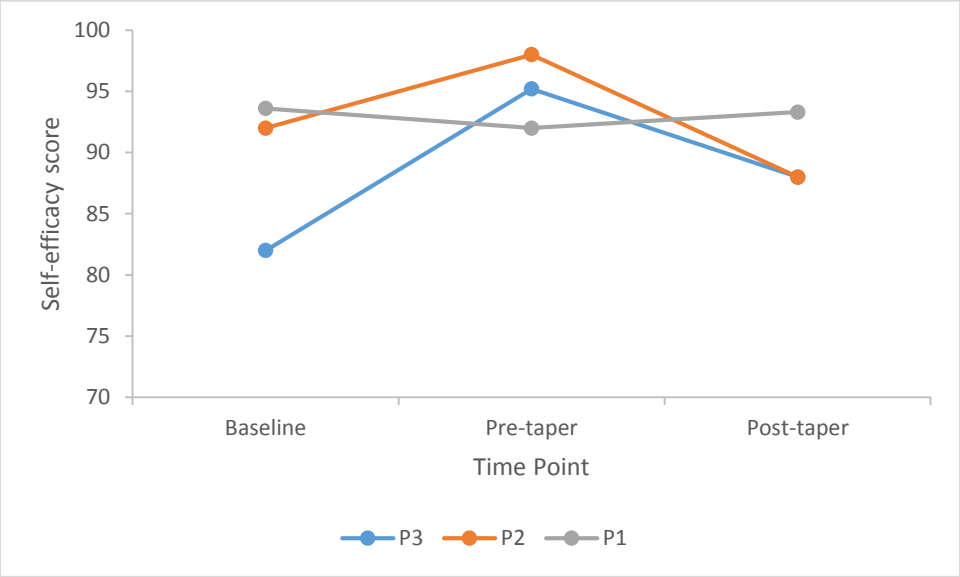


Figure 1. Time and self-efficacy. This figure illustrates how only the three main participants' self-efficacy changed from baseline, to pre-taper, to post-taper.

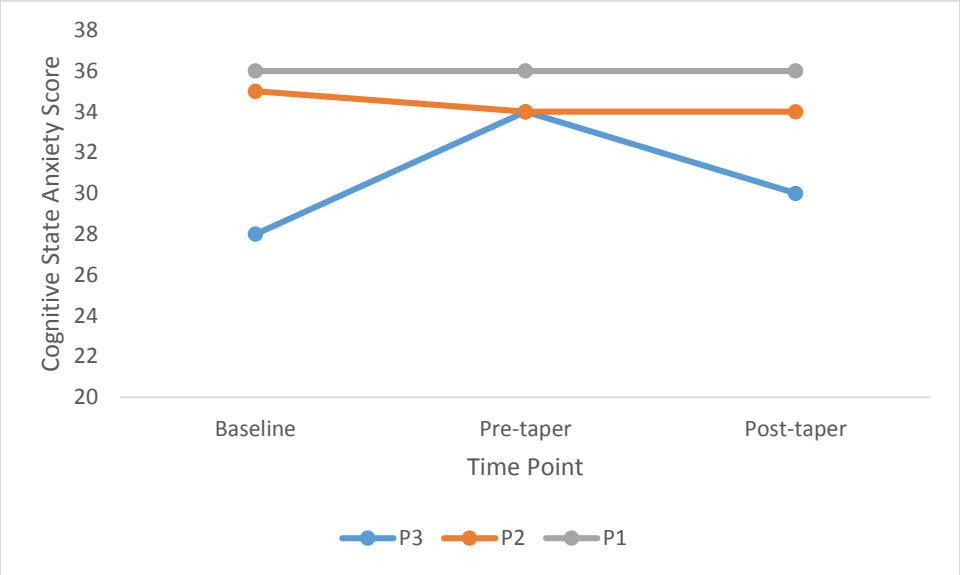


Figure 2. Time and cognitive state anxiety. This figure illustrates how only the three main participants' cognitive state anxiety changed from baseline, to pre-taper, to post-taper.

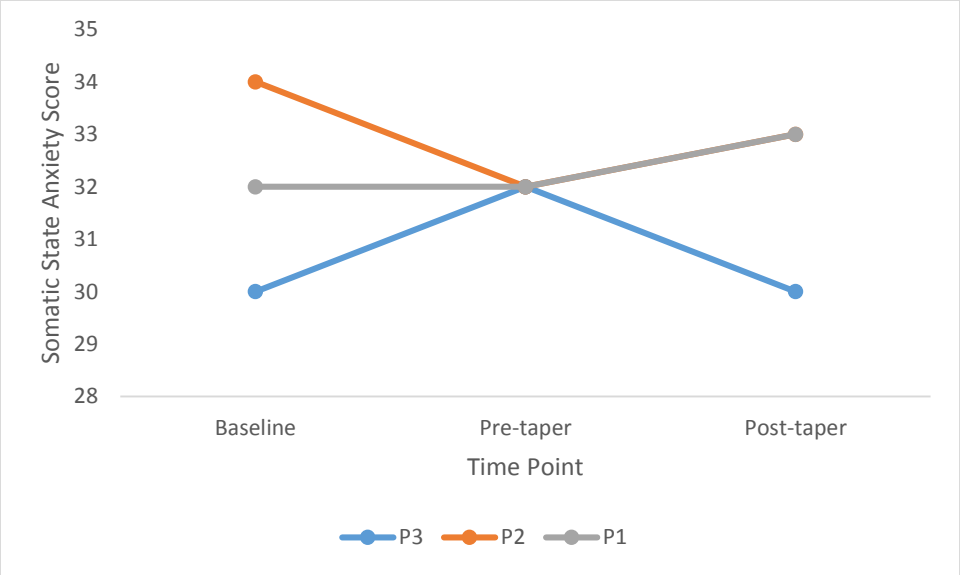


Figure 3. Time and somatic state anxiety. This figure illustrates how only the three main participants' somatic state anxiety changed from baseline, to pre-taper, to post-taper.

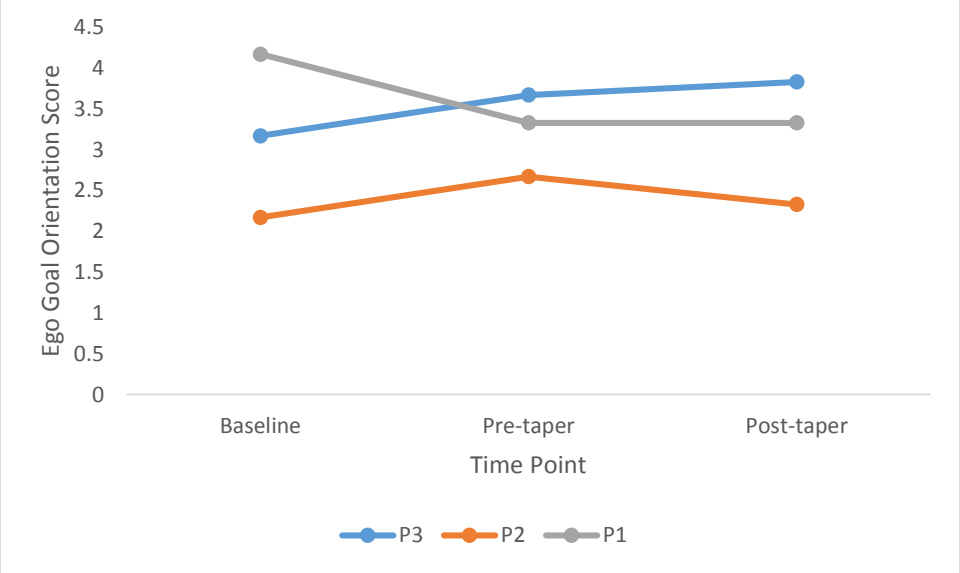


Figure 4. Time and ego goal orientation. This figure illustrates how only the three main participants' ego goal orientation changed from baseline, to pre-taper, to post-taper.

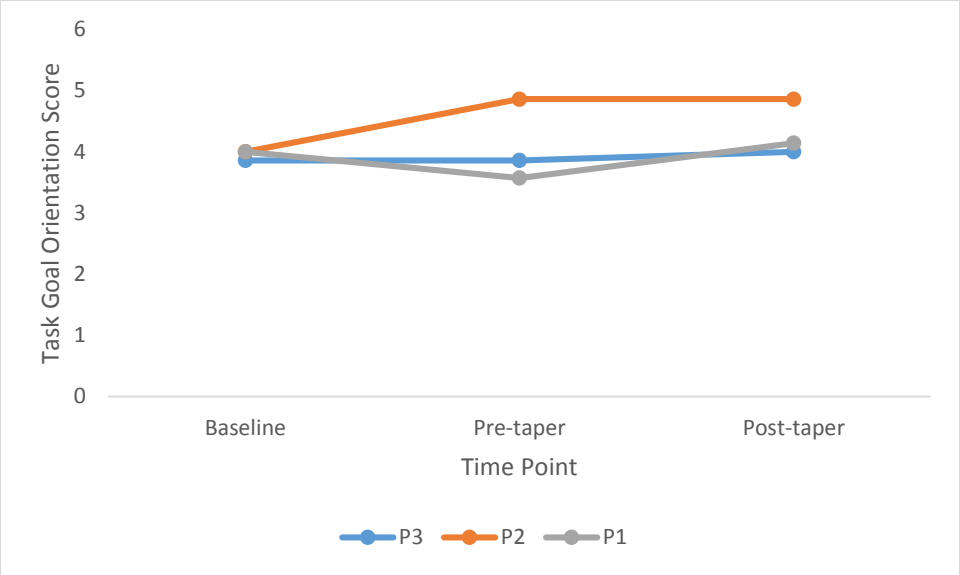


Figure 5. Time and task goal orientation. This figure illustrates how only the three main participants' task goal orientation changed from baseline, to pre-taper, to post-taper.

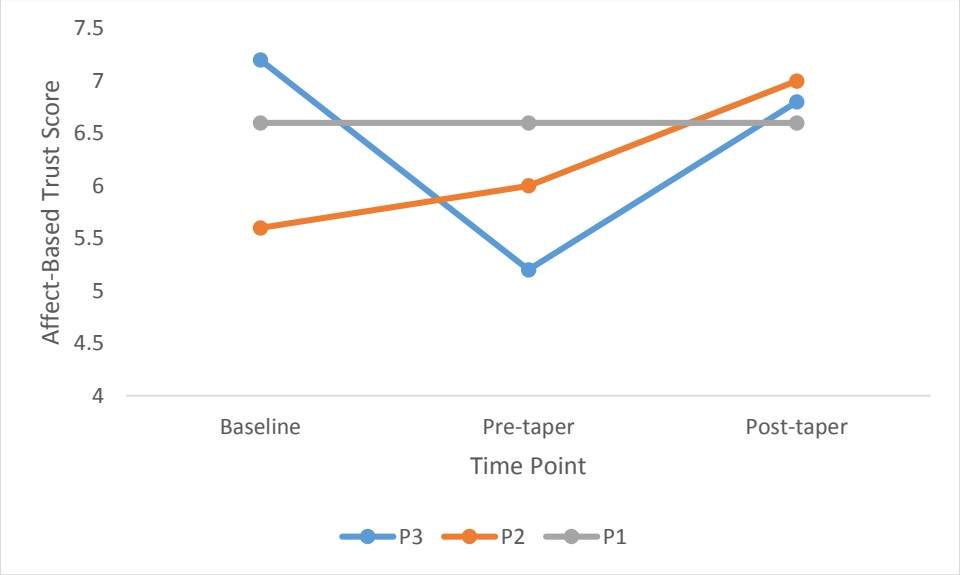


Figure 6. Time and affect-based trust. This figure illustrates how only the three main participants' affect-based trust changed from baseline, to pre-taper, to post-taper.

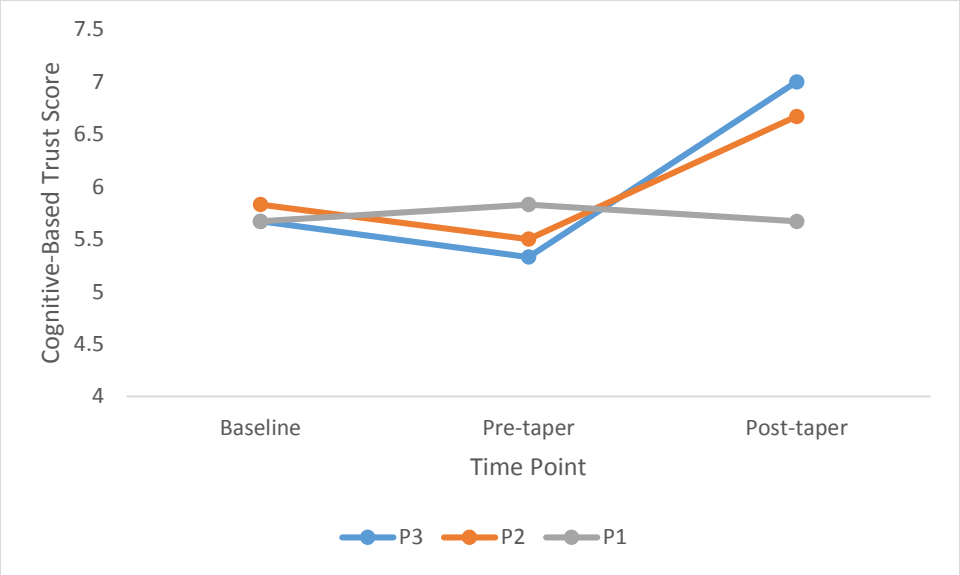


Figure 7. Time and cognitive-based trust. This figure illustrates how only the three main participants' cognitive-based trust changed from baseline, to pre-taper, to post-taper.

## Appendix E

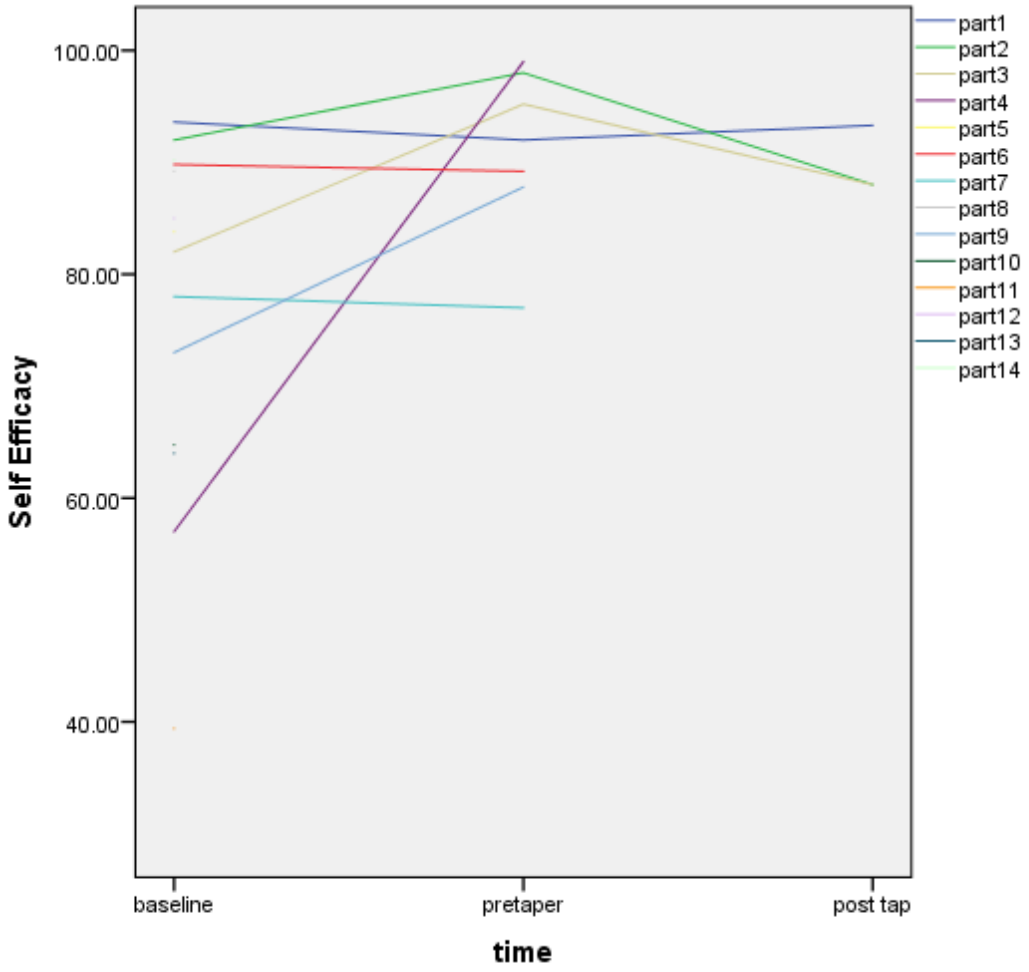


Figure 8. Time and self-efficacy. This figure illustrates how participants' self-efficacy changed from baseline, to pre-taper, to post-taper.

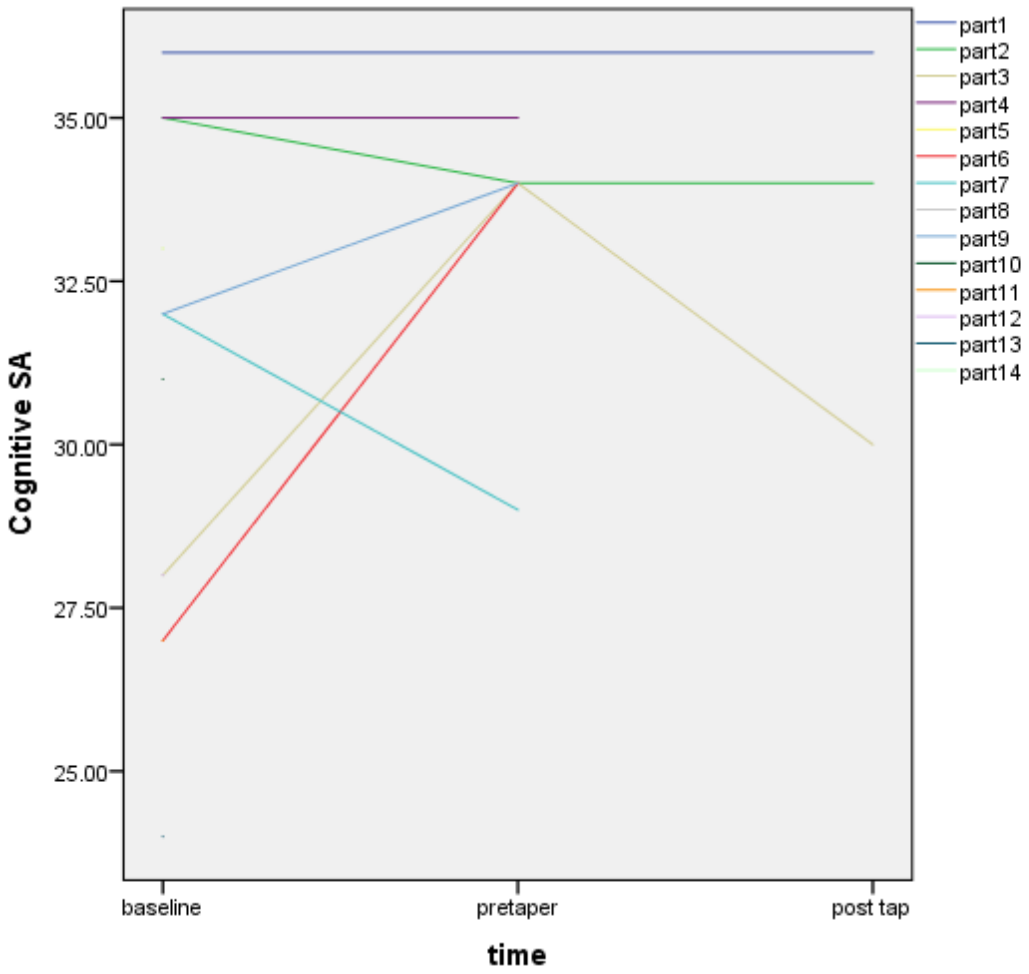


Figure 9. Time and cognitive state anxiety. This figure illustrates how participants' cognitive state anxiety changed from baseline, to pre-taper, to post-taper.

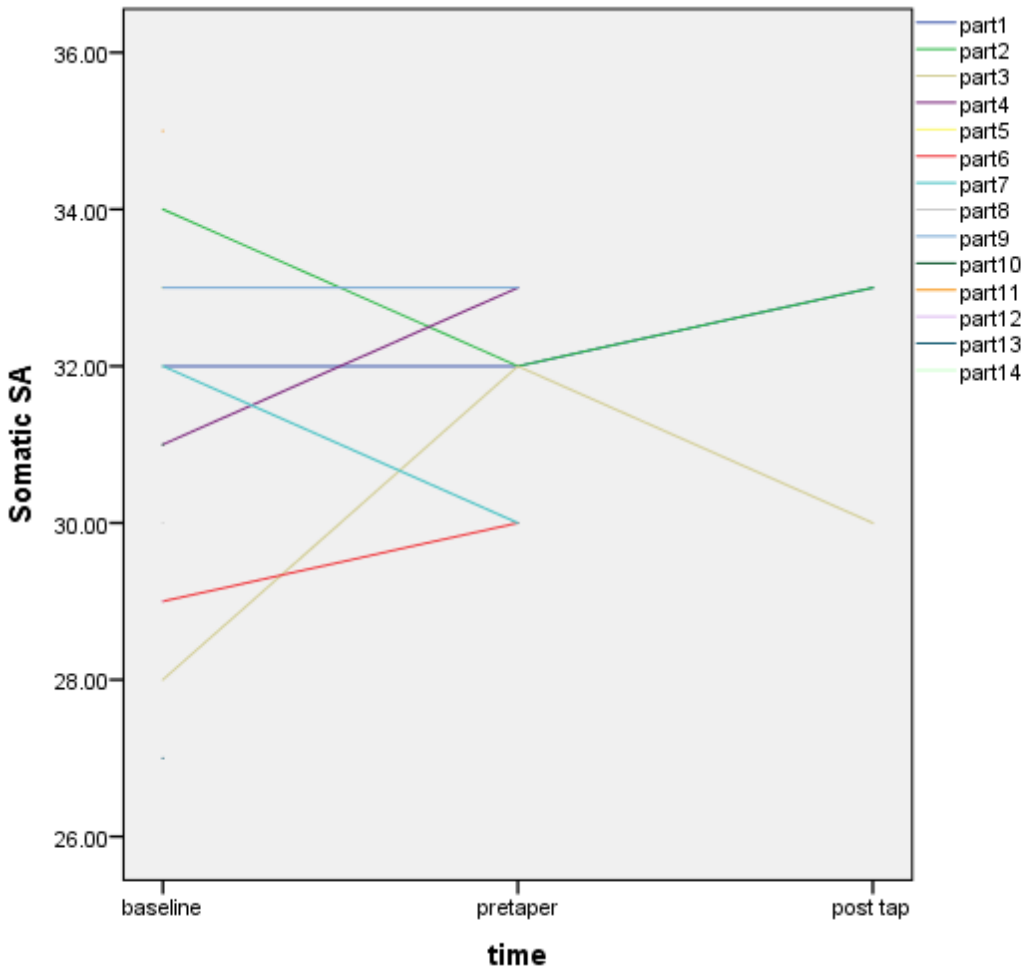


Figure 10. Time and somatic state anxiety. This figure illustrates how participants' somatic state anxiety changed from baseline, to pre-taper, to post-taper.

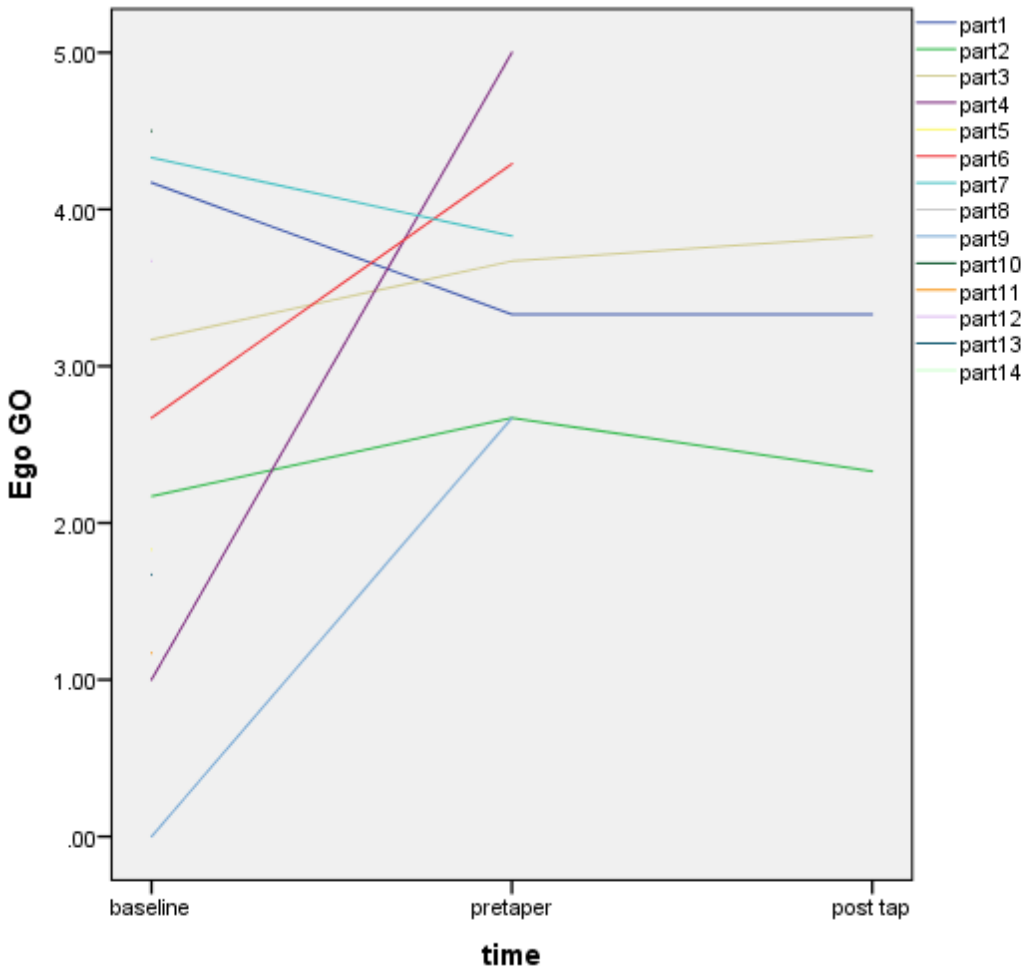


Figure 11. Time and ego goal orientation. This figure illustrates how participants' ego goal orientation changed from baseline, to pre-taper, to post-taper.

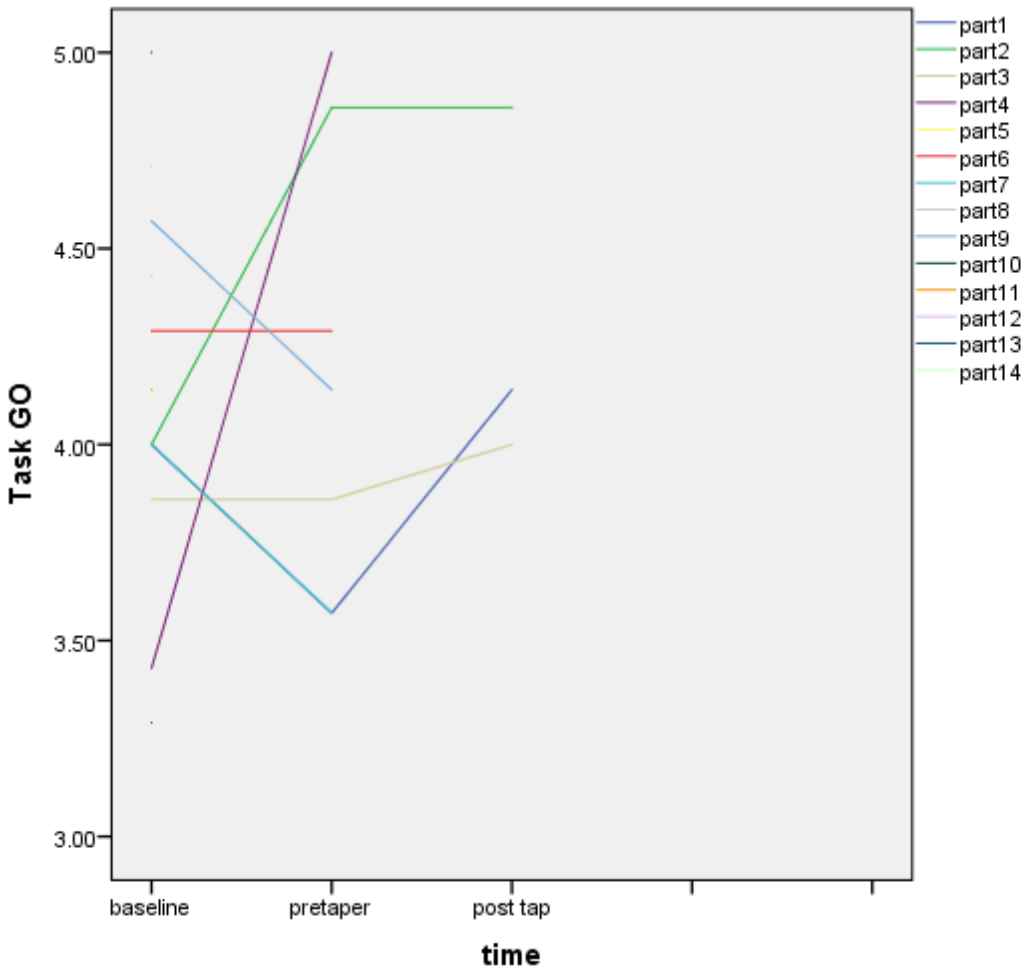


Figure 12. Time and task goal orientation. This figure illustrates how participants' task goal orientation changed from baseline, to pre-taper, to post-taper.

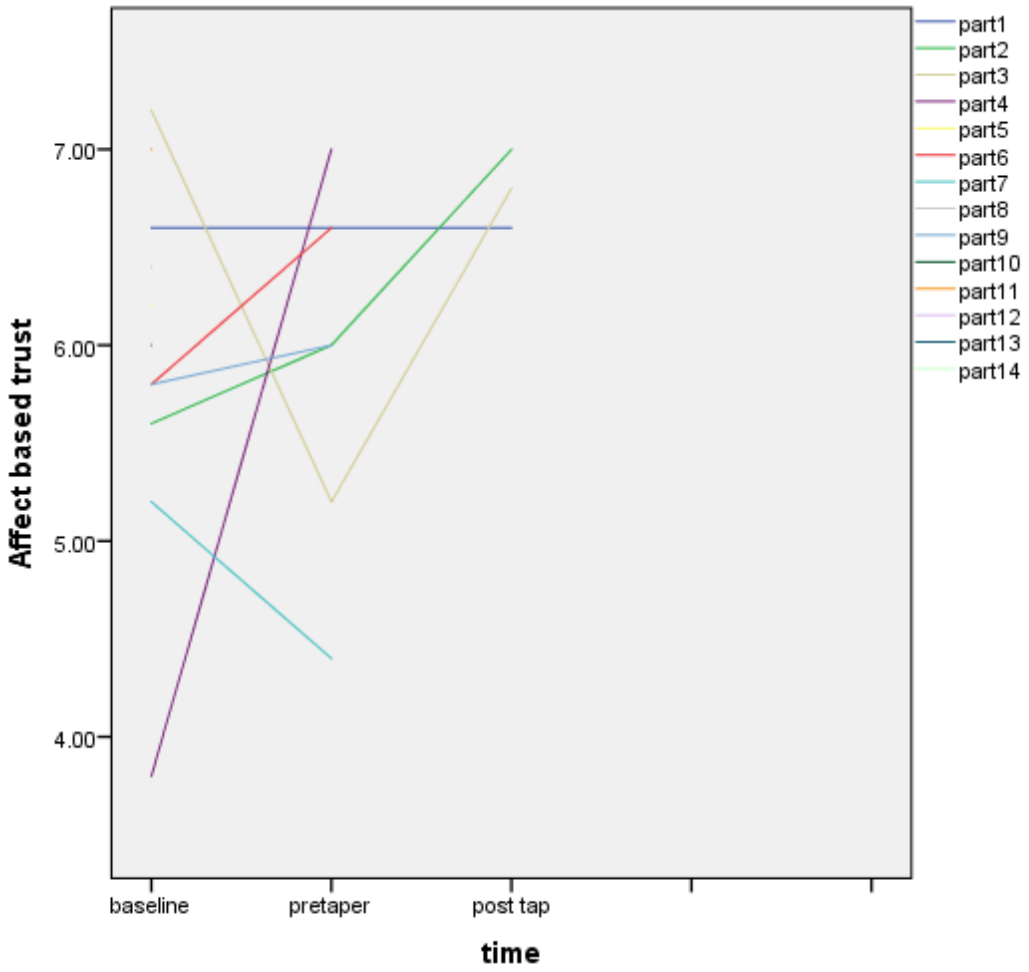


Figure 13. Time and affect based trust. This figure illustrates how participants' affect based trust changed from baseline, to pre-taper, to post-taper.

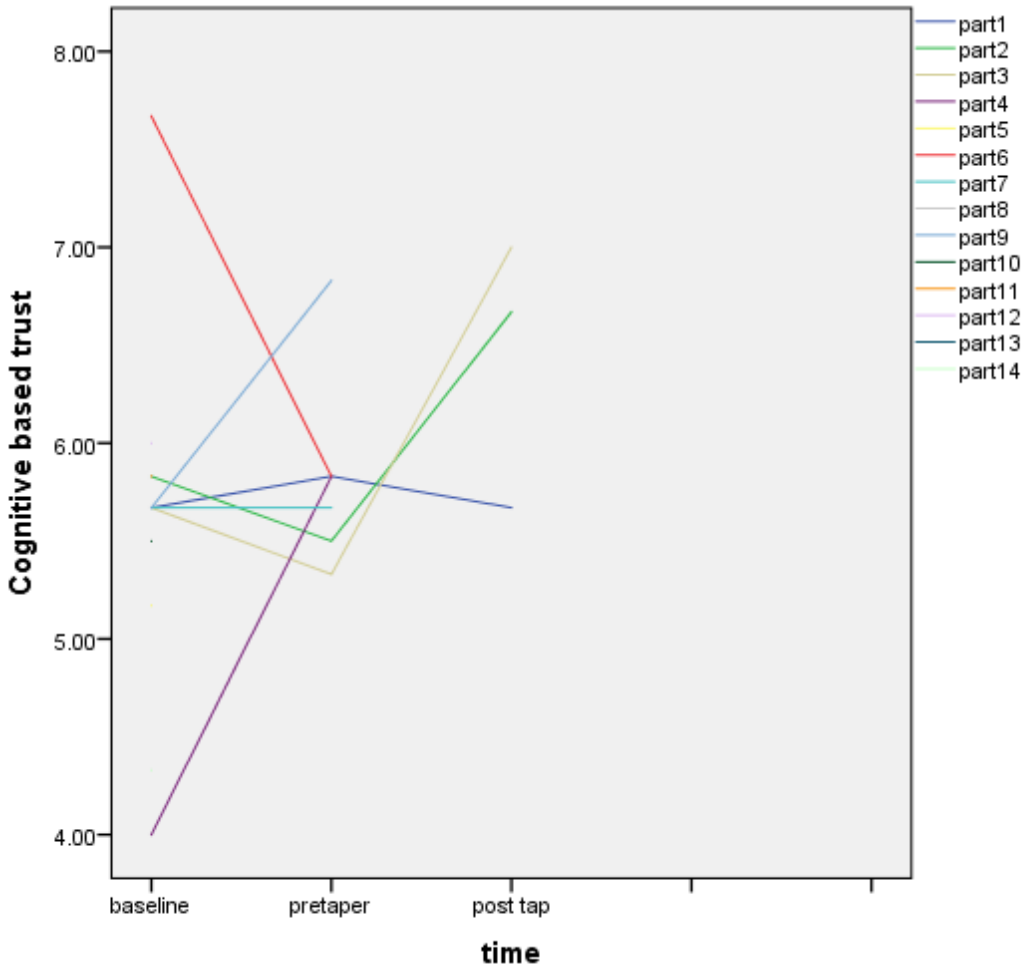


Figure 14. Time and cognitive based trust. This figure illustrates how participants' cognitive based trust changed from baseline, to pre-taper, to post-taper.