View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by University of Wisconsin-Milwaukee

University of Wisconsin Milwaukee
UWM Digital Commons

Theses and Dissertations

May 2013

Behavior Change in Applied Sport Psychology: The Use of Processes of Change in Psychological Training for Athletes

William Vincent Massey
University of Wisconsin-Milwaukee

Follow this and additional works at: https://dc.uwm.edu/etd


Part of the Cognitive Psychology Commons, and the Kinesiology Commons

Recommended Citation
Massey, William Vincent, "Behavior Change in Applied Sport Psychology: The Use of Processes of Change in Psychological Training for Athletes" (2013). *Theses and Dissertations*. 138.
https://dc.uwm.edu/etd/138

This Dissertation is brought to you for free and open access by UWM Digital Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of UWM Digital Commons. For more information, please contact open-access@uwm.edu.

BEHAVIOR CHANGE IN APPLIED SPORT PSYCHOLOGY: THE USE OF PROCESSES OF CHANGE IN PSYCHOLOGICAL TRAINING FOR ATHLETES

by

William V. Massey

A Dissertation Submitted in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

in Health Sciences

at

The University of Wisconsin-Milwaukee

May 2013

ABSTRACT

BEHAVIOR CHANGE IN APPLIED SPORT PSYCHOLOGY: THE USE OF PROCESSES OF CHANGE IN PSYCHOLOGICAL TRAINING FOR ATHLETES

by

William V. Massey

The University of Wisconsin-Milwaukee, 2013
Under the Supervision of Professor Barbara B. Meyer

The results of previous research (e.g. Leffingwell, Rider, & Williams, 2001; Massey, Meyer, & Hatch, 2011; Zizzi & Perna, 2003) have led scholars to conclude that the Transtheoretical Model (TTM) may be an appropriate paradigm to study readiness to change in sport psychology settings. However, processes of change – a critical element to the TTM – have yet to be studied or measured in an athlete population. As such, the purpose of the current investigation was to initially develop and examine a measure of the processes of change for use in applied sport psychology settings. Informed by relevant literature, an initial pool of 114 items was generated. Content validity was established by consensus agreement of three judges with expertise in elite sport performance. In an effort to test the psychometric properties of the measure, data were then collected from two independent samples. Participants included National Collegiate Athletic Association Division I athletes, professional athletes, and athletes training for or competing in the Olympic Games ($n_1 = 201$; $n_2 = 358$). In sample one, exploratory structural equation

modeling yielded a 7-factor solution (χ^2 = 117.719, p = .003; CFI = .973; TLI = .942; RMSEA = .043). In sample two, a CFA was used to cross-validate the model structure found in sample one (χ^2 = 372.588, p < .001; CFI = .949; TLI = .937; RMSEA = .043). Model-based reliability coefficients were calculated using standardized estimates with five of the seven subscales showing sufficient reliability (ω = 0.74 – 0.85). The Processes of Change in Sport Questionnaire (PCSQ) demonstrated concurrent validity with a modified version of the Processes of Exercise Change questionnaire (Marcus et al., 1992). Additionally, construct validity was shown as there were significant differences in the use of an athlete's processes of change across classifications of stage of change (p < .05). Results of the current study contribute to the sport performance and behavior change literature as it is the first to show validity for the processes of change construct as it relates to adopting and adhering to a PST routine for improved sport performance. While measuring the long-term effects of psychological intervention on sport performance remains a difficult task given the multitude of variables that account for sport performance, the TTM provides a framework for sport psychology professionals to address another key issue in the field – whether or not they are successful in helping athletes change and maintain more productive behaviors. As such, researchers should continue to examine whether TTM constructs can be measured reliably in an athletic population in an effort to create stage-based mental skills training interventions.

DEDICATION

To Megan & Tristan: For your love, support, and joy.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENTS

As no good project is done without the help and support of others, there are several people to thank and acknowledge for their help in the completion of this work. First, I would like to thank the participants and coaches who took the time to make this research possible. Next, I would like to thank Dr. Barbara Meyer, who has served as my Dissertation Committee Chair, Ph.D. faculty advisor, and a mentor for my professional and personal development over the last four years. Barbara has been an outstanding example of how to continually put the needs of students and clients above her own, something I aspire to achieve as I move forward in my career. I cannot thank you enough for the mentoring, friendship, and hate, you have sent my way over the last four years! I would also like to thank and acknowledge my dissertation committee – Dr. Laura Otto-Salaj, Dr. Sean Mullen, Dr. Susan Cashin, Dr. Kyle Ebersole, and Dr. Tony Hains – for their various contributions to both the current project, as well as my educational and professional development over the past four years. In addition to my dissertation committee, I would like to express my thanks to Dr. Kevin Keenan. Dr. Keenan has not only helped me develop my research skills over the past four years, but has been a tremendous mentor and supporter throughout my doctoral studies. I would also like to acknowledge and thank the individuals who helped throughout the content validation phase of the project – Ashley Merkur, Kate Markgraf, Beau Palin, Carrie Trubenbach, and Ryan Wilkinson – as well as my peers in the sport psychology lab, particularly Courtney Fisher for her help with recruitment. Finally, I would like to thank my wife, Megan, for her unyielding support and constant sacrifice, as well as our son, Tristan, for showing me what is truly important in life.

Chapter I: Introduction

Background

Over the past 100 years, scholars have studied a myriad of psychosocial variables in an effort to better understand their impact on athletic performance. From internal variables such as personality (Otten, 2009), achievement motivation (Gucciadi, 2010), anxiety (Morris & Kavassanu, 2009), and self-efficacy (Brown, Malouff, & Schutte, 2005), to external variables such as group cohesion (Rovio, Eskola, Kozub, Duda, & Lintunen, 2009) and the media (Rowe & Gilmour, 2010), various factors have been considered in an effort to better understand the development and maintenance of peak performance. These variables have subsequently been used in psychological skills training (PST) programs in an effort to effectively teach athletes how to cope with competitive situations and enhance their performance. Despite empirical and anecdotal evidence for the effectiveness of PST for sport performance, there is a gap in the literature regarding an athlete's willingness to engage in the PST process.

As competitive sport has evolved and embraced a more scientific approach to actualizing athletic potential, sport psychology consultants have become a part of *the team* for athletes from the high school to the professional ranks. Despite empirical data highlighting the efficacy of psychological interventions for improved sport performance (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011), data indicate that many athletes remain resistant to engaging in PST as a regular part of training (Anderson, 2005; Martin, 2005; Massey, Meyer, & Hatch, 2011). This resistance is similar to that reported in the mental health (Miller & Rollnick, 2002) and health promotion (Pinto et al., 2011)

professions, whereby readiness to change remains a notable concern for practitioners and researchers alike.

The results of previous research (i.e., Keeler & Watson, 2011; Leffingwell, Rider, & Williams, 2001; Massey et al., 2011) have led authors to conclude that the Transtheoretical Model of Behavior Change (TTM) may be an appropriate paradigm to study readiness to change in applied sport psychology. Yet, to date there are no comprehensive (i.e., all TTM constructs – stages of change, processes of change, decisional balance, self-efficacy) studies that have been conducted to test the TTM in the field of sport psychology. Highlighting this gap is the absence of an instrument to measure the processes of behavior change for PST in athletes – a critical element to the TTM (Prochaska, 1979). This lack of a psychometrically sound instrument to measure the processes, in conjunction with the need to conduct a comprehensive test of the TTM (i.e., all constructs) in a competitive sport population, prompts the need for the current study.

Statement of Purpose

The primary purpose of the current study was to examine the TTM as a framework to study behavior change in applied sport psychology research and practice. Specifically, an instrument to measure the processes of change was created and validated in a competitive sport population in regards to how these processes relate to adopting and adhering to a PST routine. To demonstrate appropriate psychometric properties, exploratory structural equation modeling (ESEM) was used to set the structural model in sample 1 (n = 201), while confirmatory factor analysis (CFA) was conducted to identify a

measurement model in sample 2 (n = 358). Reliability coefficients were calculated with standardized estimates using McDonald's (1999) omega (ω) coefficient for each subscale as well as the overall instrument. Furthermore, construct validity was assessed by examining use of the processes of change across an individual's stage of change.

Research Questions and Hypotheses

To test the construct validity of the processes of change instrument, differences in the use of processes of change were examined across an individual's stage of change. Based on previous research in the exercise adherence literature (e.g., Marcus, Rossi, Selby, Niaura, & Abrams, 1992), it was hypothesized that:

1. The use of the processes of change will be significantly less in precontemplation than in any other stage of change.
2. The use of the behavioral processes of change will be significantly greater inaction and maintenance than in pre-action stages of change (i.e., precontemplation, contemplation).
3. The use of the experiential processes of change will be significantly less in maintenance than in action, preparation, or contemplation.
4. The use of the experiential processes of change will peak in the action stage.

Delimitations

In an effort to represent a high performing population of athletes who have knowledge of sport psychology, the current sample was delimited to individuals who currently participate in a sport at the professional level, Olympic or development level, or

by a nationally sanctioned intercollegiate athletic association (e.g., NCAA). The current sample was also delimited to individuals 18 years of age or older.

Assumptions

In conducting the proposed study, the following assumptions were made: (a) participants were open and honest about their experiences and perceptions; (b) participants accurately understood the stated definition of psychological skills training; (c) participants were aware of sport psychology as a sub-discipline in the sport sciences; (d) data that were collected represented continuous, interval level data; (e) the sample was normally distributed; and (f) the manifest variables created in questionnaire development accurately related to the latent factor they were intended to represent.

Scientific Significance

The current study addressed several gaps in the applied sport psychology research literature. By examining readiness to change in a novel population (i.e., competitive athletes) the current study helps advance the literature in behavior change as well as sport psychology. Additionally the current study adds to the scientific literature by developing a psychometrically sound instrument to utilize the TTM as an intervention framework in applied sport psychology research.

Practical Significance

Readiness for behavior change remains a notable concern in applied sport psychology practice. Results of the current study provide sport psychologists with psychometrically sound instruments and practical knowledge to assess stage of behavior

change and processes of behavior change towards PST. This knowledge will assists sport psychologists as they work with athletes to increase readiness and motivation to engage in PST.

Chapter II: Review of Literature

Sport psychology research and practice have been in existence for over a century, with the first North American sport psychology laboratory established by Coleman Griffith in 1925. The academic discipline of sport psychology began to expand in the 1960s, as "evidenced by the emergence of textbooks, professional organizations, and scholarly journals devoted to the field" (Brewer & Van Raalte, 2008, pp. 4). The discipline of sport psychology expanded further in the 1980s with the emergence of the Association for the Advancement of Applied Sport Psychology (AAASP, 1985), Division 47 (sport and exercise psychology) of the American Psychological Association (APA Division 47, 1987), *The Sport Psychologist (*1987), and the *Journal of Applied Sport Psychology* (1989). Additionally, a certification process for sport and exercise psychology professionals was implemented by AAASP in 1991. In the meantime, there has been a cultural shift toward winning and competition in many cultural domains. This trend, which extends to sport, serves to increase the pressure on athletes and support staff alike to reach and maintain peak levels of performance. Concomitantly, scholars have continued to study psychosocial variables to better understand their impact on athletic performance. From internal variables such as personality (Otten, 2009), achievement motivation (Gucciadi, 2010), anxiety (Morris & Kavassanu, 2009), and self-efficacy (Brown, Malouff, & Schutte, 2005), to external variables such as group cohesion (Rovio, Eskola, Kozub, Duda, & Lintunen, 2009) and the media (Rowe & Gilmour, 2010), various factors have been considered in an effort to better understand the development and maintenance of peak performance. These variables have subsequently been used in psychological skills training (PST) programs (i.e., the systematic and consistent practice

of psychological skills to enhance performance; Weinberg & Gould, 2011) in an effort to effectively teach athletes how to cope with a myriad of competitive situations. Despite empirical and anecdotal evidence for the effectiveness of PST for sport performance, there is a gap in the literature regarding an athlete's willingness to engage in the PST process.

Over the past several decades competitive sport has evolved and embraced a more scientific approach to actualizing athletic potential. In addition to a traditional staff of technical coaches, a host of other individuals (e.g., strength & conditioning coaches, athletic trainers, physical therapists, physicians, nutritionists, chiropractors, technical specialists, sport psychologists) serve as support staff for sport teams from the high school to the professional ranks. Despite empirical data highlighting the efficacy of psychological interventions for improved sport performance (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011), data indicate that many athletes remain resistant to adopting and maintaining a PST routine (Anderson, 2005; Martin, 2005; Massey, Meyer, & Hatch, 2011). This resistance is similar to that reported in the mental health (Miller & Rollnick, 2002) and health promotion (Pinto et al., 2011) professions, whereby readiness to change remains a notable concern for practitioners and researchers alike. Given the existing literature examining readiness for behavior change amongst the helping professions, it is reasonable to adopt a similar paradigm for research and practice in applied sport psychology. The primary purpose of the study is to examine the Transtheoretical Model (TTM) as a theoretical framework to study behavior change processes in applied sport psychology research and practice.

To provide a comprehensive rationale for the proposed study, the following information will be discussed. First, the talent development literature will be reviewed to highlight the importance of psychological variables as an athlete transitions to increasingly higher levels of competition. Next, the literature examining characteristics of peak performance will be reviewed to demonstrate the role of psychology in athletic performance. This discussion will be followed by research examining the efficacy of PST for sport performance. In an effort to better understand why many athletes do not take advantage of action-oriented sport psychology services, attention will turn to literature that pertains to perceptions of sport psychology and biases that may exist. Finally, the TTM will be reviewed. The TTM has been conceptualized to address readiness for and adherence to a myriad of behavior change variables (e.g., smoking cessation, diet and exercise promotion, condom use, etc.), and in the current research was used as a theoretical foundation to examine change processes related to adoption of a PST routine in a sample of competitive athletes.

Talent Development

Throughout the course of athletic development, athletes often focus on the physical, technical, and tactical aspects of their sport. In order to reach levels of peak performance, researchers have suggested that both athlete and non-athlete performers (e.g., musicians, artists, etc.) must spend a substantial amount of time practicing the various aspects of their trade. Specifically, Ericsson and colleagues have reported the number of hours spent participating in deliberate practice distinguishes between more and less successful musicians (Ericsson, Krampe, & Tesch-Römer, 1993), and to become an expert in a given field an individual must participate in a minimum of 10,000 hours of

deliberate practice over a 10-year time frame (Krampe & Ericsson, 1996). Researchers have also reported numerous psychosocial factors that play a role in talent development for both athletes and non-athletes. For example, Csikszentmihalyi, Rathunde, and Whalen (1993) reported that teenagers more prone to develop their talent had: (a) personality traits conducive to concentrating on a task and being open to new experiences, (b) families who were both supportive and challenging, (c) teachers who were supportive and modeled enjoyment of the discipline, (d) experienced expressive and instrumental rewards from practicing their talent, and (e) optimal experiences while engaging in their talent.

Building on the work of Csikszentmihalyi et al. (1993), Coté (1999) examined stages of athletic development by conducting interviews with four elite athletes and their families. Based upon his findings, Coté suggested that athletes progress through three stages of development as they pursue an athletic career (i.e., sampling years [6-13 years old], specializing years [13-15 years old], investment years [ages 15 and up]). In a subsequent, retrospective examination of the development and maintenance of talent in 10 former world and Olympic champions, Durand-Bush and Salmela (2002) suggested a fourth stage of talent development - the maintenance years. While the results of these two studies suggest four stages of talent development, other authors have reported an alternative conceptualization to talent development – the early years, the middle years, and the later years (Bloom, 1985; MacNamera, Holmes, & Collins, 2006; MacNamera, Holmes, & Collins, 2008). For the purpose of clarity, the subsequent subsections are labeled as the early, middle, and later years of talent development. In the bounds of these discussions, the sampling years will be conceptualized within the early years, the

specialization and investment years will be conceptualized within the middle years, and the maintenance years will be conceptualized within the later years.

Early years. Throughout the early years supportive others (i.e., family system, coaches, teammates) play a critical role in the physical and psychosocial development of athletes. Bloom (1985) suggested the family serves as a support system in early development, as individuals with identified talents (e.g., sport, music, art, science) often came from families that placed a high value on the talent activity. Coté (1999) also noted that a primary function of parents is to provide young athletes an opportunity to enjoy the sport – as fun and enjoyment are essential for athletes to progress beyond the early years of development. While the family system appears to play a role in the early development, others have suggested the coach as a primary agent of early psychosocial development in sport.

In their seminal work on coaching behaviors and youth sport, Smith, Smoll, and Curtis (1979) examined 31 little league baseball coaches throughout the course of a season. Coaches were randomly assigned to an experimental group (n = 18), in which participants underwent a preseason Coach Effectiveness Training program (CET), and a no intervention control group (n = 13). To measure the leadership behaviors of the coach, the Coach Behavior Assessment System (CBAS) was developed by observing and recording a coach's actions during practice and game situations (Smith, Smoll, & Hunt, 1977). Postseason outcomes were measured from 325 of the youth baseball players on the aforementioned teams. The authors conducted a step-wise discriminant analysis of behavior ratings, and reported difference in athletes' perceptions of the coaches behavior between those playing for coaches in the experimental and control groups (Wilks'

Lambda = .91, $p < .002$). Follow-up analysis of variance (ANOVA) tests revealed significantly higher perceived positive reinforcement, technical instruction, and encouragement scores; and significantly lower punitive responses scores for athletes playing for coaches in the experimental group compared to those playing for coaches in the control group ($F(1,317) = 11.84$, $p < .001$). Additionally, an analysis of covariance (ANCOVA) using baseline measures of self-esteem as a covariate revealed that after the season, those playing for coaches in the experimental group had significantly higher levels of self-esteem than those playing for coaches in the control group ($F(1, 184) = 6.43$, $p < .01$). Interestingly, there were no differences in the win-loss percentages of the trained and untrained coaches. Subsequent interventions conducted by Smith, Smoll, and colleagues have replicated these results (Smith & Smoll, 1990; Smith, Smoll, & Barnett, 1995, Smoll & Smith, 2006; Smoll, Smith, Barnett, & Everett, 1993). Of particular interest are results suggesting increases in self-esteem for athletes playing for coaches trained in the CET method, as these data indicate the coach's role in the psychosocial development of young athletes. Given that Barnett, Smoll, and Smith (1992) reported 21% higher attrition rates for athletes who did not play for CET trained coaches, it appears as though psychological variables in general, and self-esteem in particular, function as correlates to sport enjoyment and continued participation to the middle years of sport development.

Middle years. Throughout the middle years, Bloom (1985) reported substantial increases in practice time, a focus on improvement, and motivation for learning. Similarly, Coté (1999) conceptualized this time period as one in which an athlete shifts his focus to becoming an elite performer. More recent research examining the

developmental transitions in eight elite musicians also reported the middle years as a time period in which individuals committed to pursuing music full-time (MacNamara et al., 2006, 2008). Throughout this period, participants in the MacNamara et al. studies reported both individual and environmental factors that were critical to development. The importance of the musical system, social support, a positive environment, and a learning environment were reported by participants as positive environmental factors, while self-belief, goal setting, dedication, social skills, and the ability to learn, were reported as individual psychological characteristics of developing excellence. Subsequent studies in athletic populations have also reported similar results. Specifically, MacNamara, Button, and Collins (2010a, 2010b) reported competitiveness, commitment, vision, imagery, coping under pressure, addressing weaknesses, game awareness, and self-belief as psychological characteristics of developing excellence (PCDE) in an athletic population. Thus, while results of the aforementioned studies suggest an inherent psychological component to talent development in the middle years, no mention is made of overt training programs or specialized coaches to develop these psychological skills. Although athletes may receive psychological support from their coaches, the need to focus on the complexities of the technical and tactical aspects of a given sport during this specialization period limit the amount of time a coach can spend directly addressing psychological skills. Furthermore sport coaches may not have the resources or the motivation to become more competent in building psychological strengths in athletes. Analogous to other sport-science disciplines (e.g., strength and conditioning, athletic training, nutrition, etc.), there appears to be a need for sport psychology services during this developmental period.

Later years. Researchers have demonstrated that the individual and environmental characteristics important to talent development during the later years are similar to those in the middle years. For example, Durand-Bush and Salmela (2002) reported confidence, motivation, competitiveness, mental toughness, and work ethic were important personal characteristics for success throughout the maintenance years of talent development. Similarly, MacNamara et al. (2006) identified adaptability, self-belief, planning, determination, multi-skills, discipline, and drive as important to success in the later years. In regard to contextual factors important to success during the later years, consistent findings reported in the literature also suggest similarities to the middle years in that family, coaches, and the competitive environment (Bloom, 1985; Durand-Bush & Salmela, 2002; MacNamara et al., 2006, 2008) all appear to play a role in development. Thus the similarities between the personal and environmental factors needed to remain successful in the middle and later years point toward the benefit of sport psychology services and PST throughout this period of talent development.

The above mentioned research provides both breadth and depth to understanding the development process in achieving peak performance, yet less is known regarding continued development once a performer has reached an objective peak (i.e., number one in the world). In an effort to provide insight into ongoing development, Kreiner-Phillips and Orlick (1993) interviewed 17 elite athletes who had previously been ranked number one in the world in their respective sports. The authors categorized the participants into three groups: (a) the continued success group, who achieved a number one world ranking and continued to achieve objective performance success; (b) the decline and come back group, who experienced set-backs after achieving a number one world ranking, but

eventually made their way back to the top of their respective sport; and (c) the unable to repeat group, who group experienced one big career win (e.g., Olympic Champion) but were unable to repeat in subsequent events. Results suggested that success begets additional demands and those best able to cope with and balance these demands are more likely to remain successful. Thus, in the later years of talent development, helping athletes develop skills and strategies to cope with success may also play a role in continued success.

Summary. The research summarized above highlights both similarities and differences among the different stages of talent development. While the application of various skills may change at different levels of sport competition, it appears psychological factors play a role throughout the development process. Self-esteem appears important to early enjoyment and continued participation, while numerous psychological skills and strategies are essential to continued development. Therefore, the use of PST and sport psychology services has the potential to play a beneficial role in the development of athletes. That said, the literature reviewed above makes little mention of overt attempts to improve psychological skills and therefore implies an innate process of psychological development in sport. Yet as will be reviewed below, it has been demonstrated in the literature that PST is effective in improving sport performance. Thus, the ability to engage athletes in PST has implications for both talent development and peak performance. In an effort to provide a rationale for the psychological skills and strategies targeted in sport psychology interventions, and prior to examining research related to the effectiveness of PST, the characteristics of peak performance will be reviewed.

Characteristics of Peak Performance

In one of the first studies to examine the psychological characteristics of peak performance in elite athletes, Gould, Weiss, and Weinberg (1981) reported that wrestlers who placed at the 1980 Big Ten wrestling tournament displayed significantly higher levels of attentional focus ($p = .003$) and confidence ($p = .001$) prior to competition than their less successful counterparts. This study provided useful information on psychological states prior to competition, yet the results are limited to the thoughts and behaviors at the tournament, and say little about the psychological preparation of athletes leading up to competition.

In a more comprehensive examination of the psychological characteristics of peak performance, Orlick and Partington (1988) studied 235 Canadian Olympic athletes. In the first phase of their study, the authors interviewed 75 athletes about mental readiness leading up to the Olympic Games. Results indicated that quality training, clear daily goals, imagery, simulation training, and mental preparation (i.e., precompetitive plan, focus plan, ongoing evaluation, distraction control plan) were links to athletic excellence. In the second phase of the study, the authors administered questionnaires (based on the responses of the 75 previously interviewed athletes) to a sample of 160 Olympic athletes. Results indicated significant relationships between mental readiness and Olympic performance for males and females ($r = .40$; $p < .0001$), attentional focus and Olympic performance for males and females ($r = .25$; $p < .005$), and quality imagery (i.e., able to *feel* and *control* images) and performance for males only ($r = .41$; $p < .005$).

Building on the peak performance literature, Gould, Eklund, and Jackson (1992a; 1992b) examined the mental preparation, thoughts, and affect of 20 United States (U.S.) Olympic wrestlers. Participants were interviewed and instructed to reflect upon their best international performance, their worst performance at the 1988 Olympics, and their most crucial performance at the 1988 Olympics. Results of this study indicated that prior to their best performance, athletes engaged in tactical, motivational, and mental preparation strategies, and exhibited positive expectations, increased arousal, increased effort, and increased commitment. Additionally, during their best performance athletes directed their focus towards match strategy, utilized refocusing techniques, and reported total concentration on the task, high levels of intensity, and high levels of confidence. Conversely, prior to their worst performance athletes reported negative feeling states, too many or too few thoughts, task irrelevant thoughts, negative thoughts, non-adherence to routines, and an inability to visualize. Therefore, the ability to properly execute psychological strategies during competition appears to be a critical factor in successful performance.

In an attempt to expand the literature on Olympic performers, Greenleaf, Gould, and Dieffenbach (2001) conducted an interview study with athletes who met or exceeded expectations at the Olympic Games (n = 8) and athletes who failed to meet expectations at the Olympic Games (n = 7). Discussing factors that positively affected performance outcomes, participants from both groups reported psychological skills (i.e., mental skills and preparation, attitude towards the games), support services, physical preparation, coaching, multifaceted preparation, performance and training routines, housing, excitement, and team unity. Comparing factors across groups (i.e., those who met or

exceeded expectations vs. those who failed to meet expectations) differences in positive performance factors were noted for attitudes towards the games (100% of athletes reporting meeting expectations vs. 58% of those reporting failing to meet expectations), Olympic housing (62% of athletes reporting meeting expectations vs. 14% of those reporting failing to meet expectations), and team unity (50% of athletes reporting meeting expectations vs. 14% of those reporting failing to meet expectations). Conversely, when discussing factors that negatively affected performance outcomes, participants from both groups reported departure from normal routine, media distractions, coach issues, overtraining, injury, housing, training, money, and family and friends. However, participants who failed to meet expectations also reported team selection, team issues, lack of support, jet lag, and officials as negative performance factors. The results of this study suggest that an athlete's ability to cope with several demands leading up to an important competition is paramount to successful performance. Thus, the use of PST to facilitate coping skills may be beneficial for athletes striving for peak performance.

Summary. The research summarized above provides sport psychology researchers and practitioners with a broad overview of the psychological characteristics of high-level achievers. While the results presented are largely descriptive and retrospective in nature, they provide a starting point for understanding the factors associated with peak performance. As summarized by Krane and Williams (2009), the consistency in the findings of the aforementioned research indicates that talented performers display confidence, self-regulate arousal and anxiety, display high levels of focus, are committed and determined, set goals, use imagery, practice coping skills, and develop competition and refocusing plans. Given that athletes use the aforementioned

psychological skills and strategies to reach peak performance, the efficacy of interventions examining the impact of psychological skills on athletic performance will be reviewed next. As will be discussed in the following section, research to date supports the use of PST for athletic performance as well as the reluctance among athletes to engage in such programs (Hatzigeorgiadis et al., 2011; Martin, 2005). Therefore, it is important for researchers and practitioners in applied sport psychology to consider possible reasons why athletes do not engage in PST. As such, perceptions of sport psychology and readiness for behavioral change will be discussed in subsequent sections.

Psychological Skills Training: Theoretical Perspectives and Intervention Efficacy

One goal of applied sport psychology research has been to develop effective interventions to improve sport performance. Both research and practice in sport psychology have been grounded in the action-oriented approach of cognitive behavioral therapy (CBT), as sport psychology consultants often adhere to a psycho-educational approach of teaching psychological skills to athletes. Proponents of CBT propose that human behavior is a reciprocal process of cognitions, feelings, and behaviors (Corey, 2009), with cognition proposed as the most important aspect of human behavior (Walen, DiGiuseppe, & Dryden, 1992). Cognitive behavioral theorists contend that dysfunctional thinking results in distress; therefore, the most effective way to overcome distress and improve athletic performance is to change thought patterns. It is also important to recognize the reciprocal relationship between thoughts, feelings, and behaviors, as interventions targeting affective or behavioral mechanisms have the potential to change thought patterns and increase performance.

Considering the theoretical underpinnings of CBT, it is suggested that use of this approach is applicable to use of PST in the sport domain (Brown, 2011). As such, the cognitive behavioral strategies often associated with PST will be discussed in the subsequent section (i.e., goal setting, intensity regulation, imagery, cognitive training). The theoretical perspectives underlying these psychological skills will be presented, followed by the research examining the effectiveness of interventions that target these skills. Although research supports the efficacy of the strategies discussed below, cognitive behavioral approaches generally assume an individual is ready for behavior change. Thus, it is likely that the literature discussed in the following sections was conducted with participants who were ready, willing, and able to change a behavior (Miller & Rollnick, 2002). This is not the case for all clients, as many individuals remain ambivalent about change. Therefore, while positive, the research presented below may be limited in its application to athletes who already perceive the benefits of adopting a new behavior and have the motivation to do so.

Intensity regulation. Perhaps the most widely studied psychological skill for sport performance, intensity regulation refers to an individual's ability to regulate physiological arousal (i.e., increased heart rate, muscle tension) as well as cognitive anxiety (i.e., negative & disruptive thoughts, fear of failure). Several theoretical and conceptual models have been developed to explain the relationship between intensity and performance, which are discussed below.

Inverted-U hypothesis. In the development of his cue utilization theory, Easterbrook (1959) proposed that as an organism's physiological arousal increased, its attention would become more central, thereby blocking out peripheral cues. As can be

seen in Figure 1, Easterbrook noted that when physiological arousal was low, task-irrelevant cues may interfere with optimal levels of performance. However, as arousal increases, performance also increases as these irrelevant cues are not attended to by the organism. When arousal increases past the point of blocking out only task-irrelevant cues, task relevant cues become occluded thereby impairing performance. Thus, while Easterbrook focused on the role arousal played in attentional resources, he also inferred an inverted-U relationship of arousal and performance (Figure 2), whereby there is a specific level of arousal that correlates to peak performance on a given task.

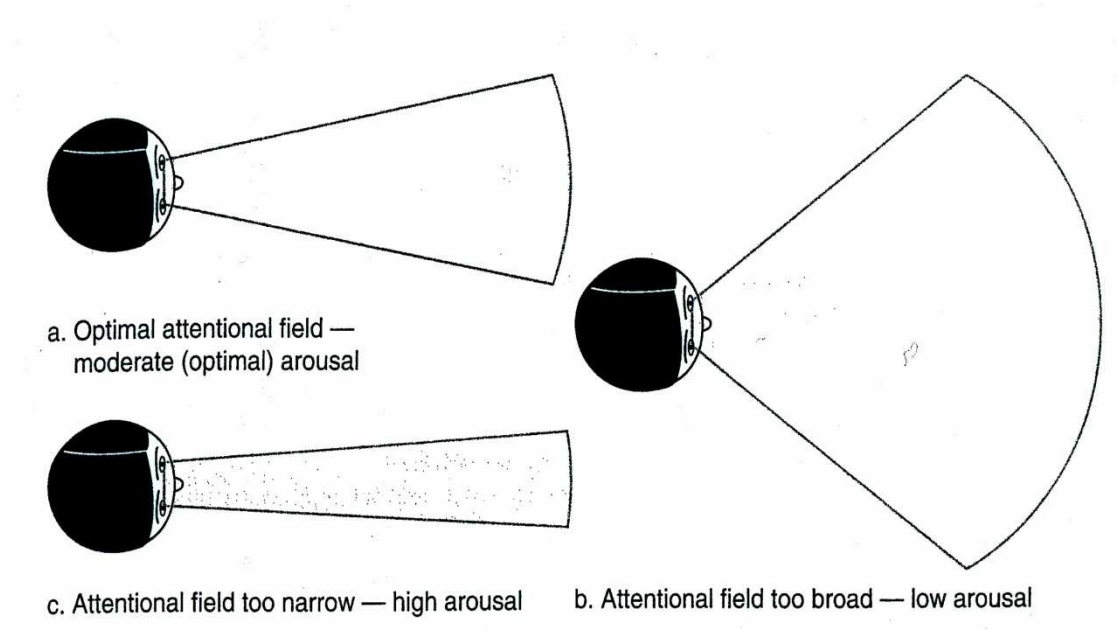

Figure 1. Easterbrook's Cue Utilization Theory. Adapted from "Foundations of Sport and Exercise Psychology," by R. S. Weinberg & D. Gould, pg. 94. Copyright 2011 by Human Kinetics.

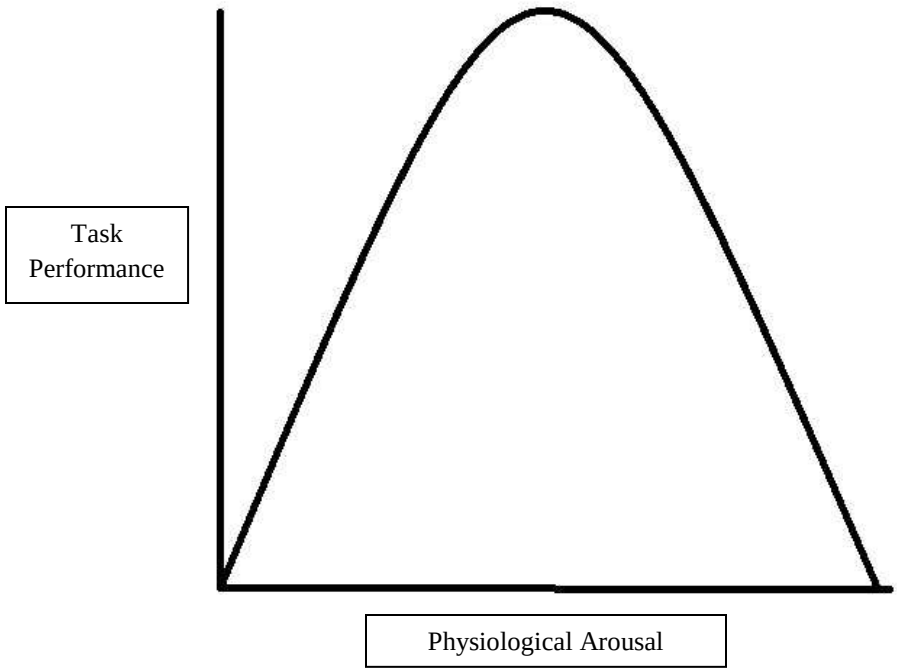

Figure 2. Inverted-U hypothesis for the arousal-performance relationship. Adapted from "Foundations of Sport and Exercise Psychology" by R. S. Weinberg & D. Gould, pg. 88. Copyright 2011 by Human Kinetics.

Research in sport psychology has supported the inverted-U hypothesis as it relates to arousal and performance. For example, Gould, Petlichkoff, Simons, and Vevera (1987) used the Competitive State Anxiety Inventory (CSAI-2) to examine levels of arousal and anxiety to shooting performance in a sample of 39 officers from a university police training institute. While the authors report no trend in cognitive anxiety and performance, there was a significant difference between individuals with varying levels of somatic anxiety ($F(2, 162) = 5.49$, $p < .001$). Follow-up comparisons revealed the data were best explained by an inverted-U pattern. More recently, Craft, Magyar, Becker, and Feltz (2003) conducted a meta-analysis to examine the relationship between state anxiety (as measured by the CSAI-2) and sport performance. The authors reported a non-

significant overall mean correlation between somatic anxiety and performance of -.03 (95% CI = -.08 – .01), supporting the notion that somatic anxiety (i.e., arousal) and performance are related in a curvilinear fashion.

Individual zones of optimal functioning. An alternative view to the inverted-U hypothesis was proposed by Hanin (1989), in which a range of optimal intensity is correlated to peak performance. In this view, intensity is necessary to reach peak performance, however individual athletes will vary with regard to their optimal amount of intensity (Figure 3). Hanin posited there is an individual zone of optimal functioning (IZOF) for each athlete, but that zone may differ based of personality and situational characteristics.

Similar to the inverted-U hypothesis, empirical support has been reported for Hanin's IZOF model. For example, researchers (Prapavessis & Grove, 1991; Raglin & Turner, 1993; Turner & Raglin, 1996) have reported that IZOF data are better predictors of athletic performance than inverted-U data. Additionally, Annesi (1998) helped athletes identify an IZOF, as well as taught self-regulation skills to adjust anxiety to optimal levels. The identification of an IZOF in conjunction with the learned self-regulation skills led to increased performance in three adolescent tennis players, suggesting the identification of IZOF can enhance athletic performance.

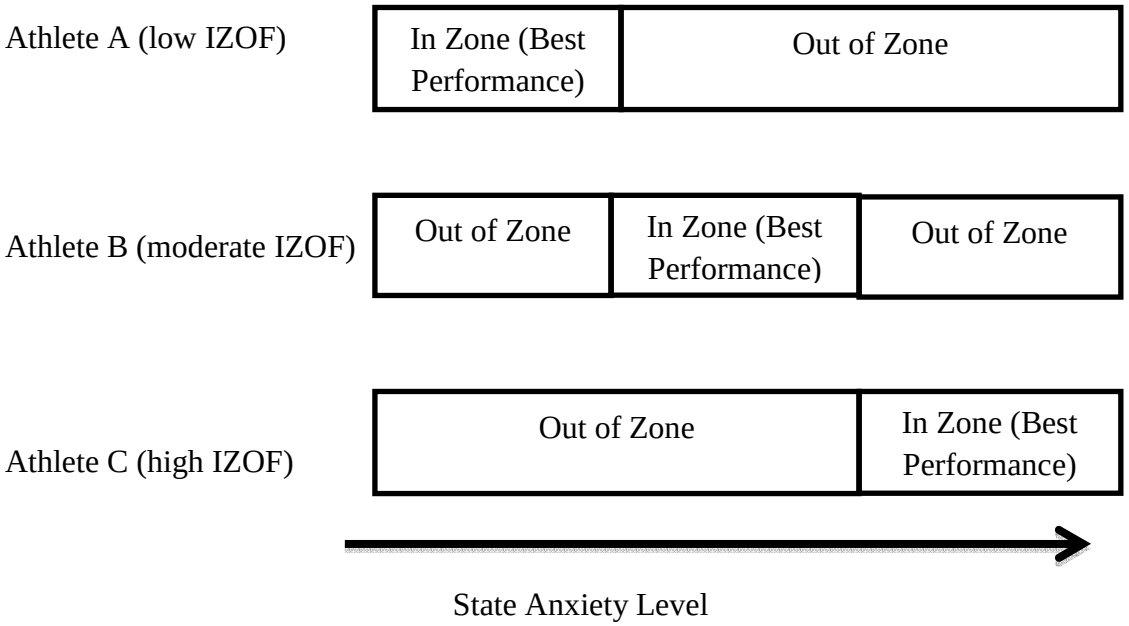

Figure 3. Individual Zones of Optimal Functioning. Adapted from "Foundations of Sport and Exercise Psychology" by R. S. Weinberg & D. Gould, pg. 88. Copyright 2011 by Human Kinetics.

Drive theory. While proponents of the inverted-U theory propose that a specific level of arousal is needed for optimal performance, and proponents of the IZOF proposes a range in which arousal and anxiety facilitate performance, proponents of drive theory suggest a linear relationship between arousal and performance (see Figure 4). Originally developed by Hull (1943), drive theorists propose that performance is a product of drive (i.e., arousal) and skill level (i.e., performance = drive x dominant response). As reported by Cox (2007), the basic assumptions of drive theory include the notion that increased arousal will elicit a dominant response. Early in learning, or during a complex task, the dominant response is the incorrect response. Late in learning, or for simple tasks, the dominant response is the correct response. Thus, from a learning and performance perspective, an athlete must learn to regulate arousal based on the nature of the task (i.e., simple vs. complex, novel vs. learned) in an effort to optimize performance.

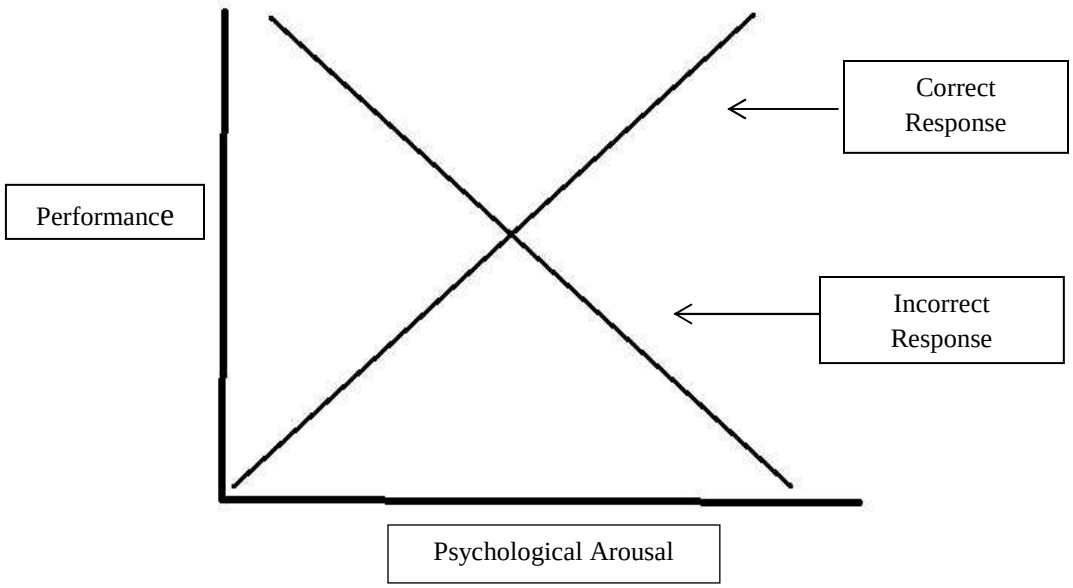

Figure 4. Drive Theory. Adapted from "Sport Psychology: Concepts and Applications," by R. H. Cox, pg. 267. Copyright 2007 by McGraw Hill Companies.

Research examining the tenets of drive theory and performance has remained equivocal, thereby reducing interest in this theoretical perspective to explain the arousal-performance relationship in sport (Cox, 2007). Drive theory of social facilitation, however, has received more recent attention in the literature. Zajonc (1965) originally proposed a drive theory of social facilitation based on the premise that the mere presence of others would increase arousal and elicit a dominant response (i.e., the individual's natural habit). Plantania and Moran (2001) tested this hypothesis in a sample of non-athlete university students. Results indicated that participants in the audience condition (i.e., mere presence of someone else in the room during the experimental task) made significantly more dominant responses during a size discrimination task than participants completing the task without the presence of another individual. Thus, audience effects

during performance on a task appear to increase arousal, and the ability to regulate this arousal becomes important to an athlete's ability to reach peak performance.

Multidimensional anxiety theory. The perspectives presented above described a unidimensional relationship between intensity and performance. Yet as mentioned earlier, intensity involves both somatic and cognitive components. To this end, Martens, Burton, Vealey, Bump, and Smith (1990) proposed the multidimensional anxiety theory. The authors of this theory suggest that anxiety also has both somatic and cognitive components, whereby somatic anxiety displays an inverted-U pattern with performance, and cognitive anxiety displays a negative linear relationship with performance (Figure 5). While these claims have yet to be supported by empirical data, research has demonstrated that cognitive and somatic anxiety have different effects, respectively, on sport performance (Jerome & Williams, 2000). The ability to regulate both somatic and cognitive anxiety, therefore, may be necessary to reach levels of peak performance.

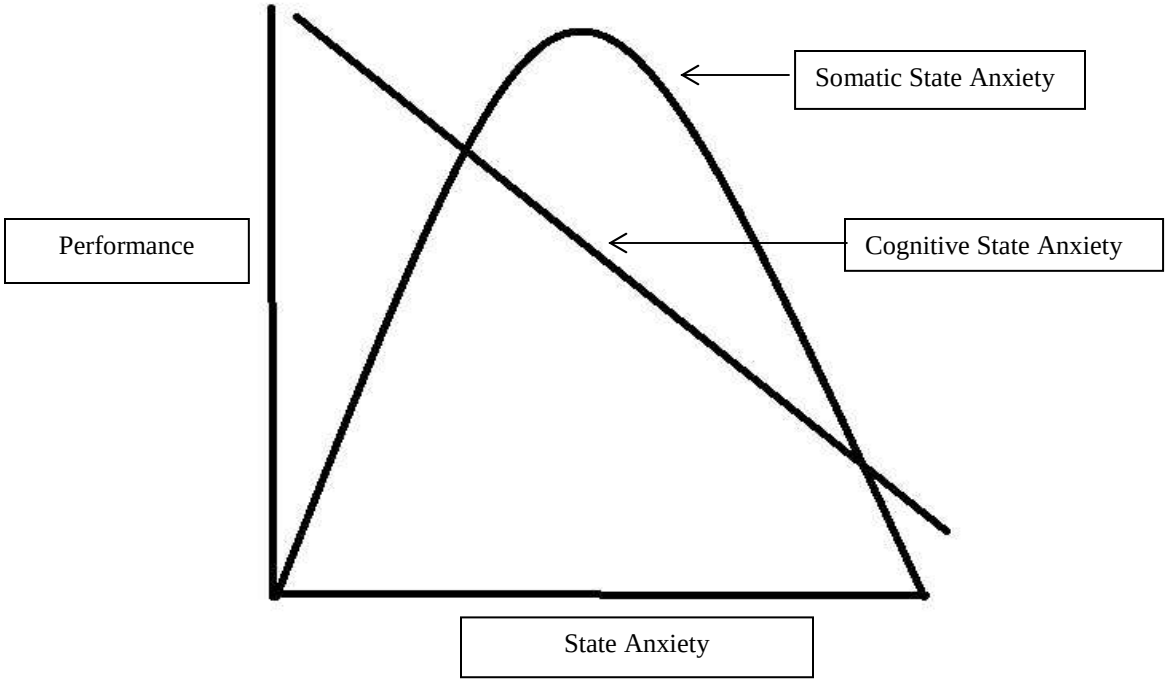

Figure 5. Multidimensional Anxiety Theory. Adapted from "Sport Psychology: Concepts and Applications," by R. H. Cox, pg. 214. Copyright 2007 by McGraw Hill Companies.

Meta-analysis of intensity regulation interventions. Regardless of theoretical perspective, research has supported intensity regulation as an effective strategy to improve sport performance. It should be noted that the majority of interventions aimed at regulating intensity are focused on decreasing anxiety and arousal rather than finding an optimal range (Weinberg & Gould, 2011). Despite a focus on decreasing intensity, Meyers, Whelan, and Murphy (1996) reported a significant performance effect for studies examining both relaxation (d = 0.73, 95% CI = 0.07 – 1.39) and increasing levels of intensity (d = 1.23, 95% CI = 0.52 – 1.94). However, while practitioners can work with athletes to create intensity regulation strategies for performance enhancement, athletes must be ready to adopt a new behavior as these intensity regulation strategies must be practiced on a regular basis in order to remain effective.

Goal setting. Similar to intensity regulation, the sport psychology literature is replete with research examining the effect of goal setting programs on peak performance, which has theoretical underpinnings in the academic disciplines of business and psychology. Discussed below are two theoretical perspectives of goal setting and performance, followed by research examining the effectiveness of goal setting for sport performance.

Goal setting theory. Locke and Latham (1985, 1990, 2006) developed one theory of goal setting often applied to sport psychology research and practice. Supported by over 25 years of research, goal setting theory is based on four mediators of the goal-performance relationship: (a) more challenging goals lead to greater effort and persistence; (b) goals direct attention, effort, and action toward goal-related behaviors; (c) goals motivate behavior and increase persistence; and (d) goals evocate additional strategies and knowledge that facilitate their attainment (Locke & Latham, 2006). In addition to the proposed mediators of the goal-performance relationship, research has demonstrated (a) specific and difficult goals lead to higher levels of performance than easy or vague goals, (b) short-term goals can facilitate the achievement of long-term goals, (c) goal feedback is necessary in goal attainment, and (d) an athlete must accept that a goal is relevant in order for it to be effective (Locke & Latham, 1985; 2006). Thus, according to Locke and Latham, goal setting is beneficial to achieving peak performance when the aforementioned principles are followed throughout the process.

Goal perspective theory. In conjunction with goal setting theory, scholars in applied sport psychology have examined how an individual's goal orientation plays a role in achievement motivation and performance. According to Nicholls (1989), there are two

major goal perspectives – task orientation and ego orientation. An individual with a task orientation is motivated by learning and mastery, and has an internal reference for value judgments (i.e., performance is judged by effort and improvement). Conversely, an individual with an ego orientation is motivated by social comparisons and objective outcomes (i.e., winning; Duda, 1992).

Past research has shown that goal orientation (i.e., task vs. ego) has implications for perceived competence, motivation, enjoyment, and sport performance. For example, Duda, Chi, and Nicholls (as reported in Duda, 1992) reported that individuals with a task orientation believe sport success is a product of motivation and effort, while those with an ego orientation view sport success as a product of ability, deception, and other external factors. Given the external locus of control reported by individuals with an ego goal orientation, goal perspective theorists would suggest these individuals are more likely to quit in the face of failure and have lower levels of perceived competence when faced with a challenging situation than individuals with an internal locus of control (Duda, 1992). Additionally, Hall (1990) reported that individuals with low perceived competence combined with an ego goal orientation recorded lower levels of performance on a laboratory task than individuals with a task goal orientation or individuals with high perceived competence. More recent research continues to support the psychosocial and performance benefits of adopting a task goal orientation (Cox, 2007), suggesting sport psychology consultants may be able to impact an athlete's performance and psychosocial well-being by facilitating a task-oriented approach to goal setting. That said, athletes who adopt an ego goal orientation and have low perceived competence toward a task will

remain resistant to change (Duda, 1992), and may not benefit from a goal setting intervention program.

Meta-analysis of goal setting interventions. While various theoretical perspectives have been utilized to implement goal setting interventions, Kyllo and Landers (1995) conducted a meta-analysis of 36 goal setting studies to determine effectiveness of the intervention in a competitive sport setting. The results of the analysis supported the use of goal setting to improve athletic performance (ES = 0.34). Additional analyses revealed that moderately difficult goals led to performance gains (ES = 0.53, 95% CI = 0.45 – 0.61), while easy, difficult, and improbable goals did not yield significant effects. With regard to specificity of the goal, absolute goals (ES = 0.93, 95% CI = 0.80 – 1.06) and relative goals (ES = 0.27, 95% CI = 0.22 – 0.32) yielded significant effects, while *do your best* goals did not. Finally, both short-term goals (ES = 0.38, 95% CI = 0.28 – 0.48) and a combination of short-term goals and long-term goals (ES = 0.48, 95% CI = 0.05 – 0.91) yielded significant effects, while the use of long-term goals alone did not.

Taken together, these results support the underlying theory of goal setting and enhanced performance in the sport domain. Furthermore, recent research continues to support the notion that proper goal setting can improve individual performance (Brobst & Ward, 2002; Ward & Karnes, 2002) and group performance (Kleingeld, van Mierlo, & Arends, 2011), as well as increase motivation and effort (Guan, Xiang, McBride, & Bruene, 2006; Wilson & Brookfield, 2009). Yet in order to be effective, an athlete must be ready to commit to the daily action of goal setting and evaluation.

Imagery. Imagery is generally conceptualized as the ability to create mental pictures of events, yet includes the utilization of all of the senses to create or recreate an experience (Weinberg, 2008). Although imagery training has been shown to increase confidence, decrease anxiety (Evans, Jones, & Mullen, 2004; Hale & Whitehouse, 1998; Page, Sime, & Nordell, 1999), and increase motivation (Martin & Hall, 1995), it is difficult to discern the specific effects imagery has on performance, not to mention the mechanisms involved in imagery. In an effort to better understand how imagery may play a role in performance, the theories that exist to explain the effects of imagery on performance will be briefly discussed.

Psychoneuromuscular theory. From a psychoneuromuscular perspective, successful imagery duplicates the motor pattern of actual movement in the brain, resulting in low levels of neuromuscular activation (Suinn, 1972). Research has supported the presence of an increase in electrical activity of the muscles during imagery practice (Jowdy & Harris, 1990; Slade, Landers, & Martin, 2002; Smith & Collins, 2004), yet it is uncertain whether this electrical activation actually mimics the neuromuscular patterns that take place during actual movement. Therefore, while proponents of this theory suggest imagery helps develop motor schemas in the brain, causal evidence to support these claims does not exist.

Symbolic learning theory. A contrasting perspective to psychoneuromuscular theory is symbolic learning theory (Ryan & Simmons, 1981). Proponents of this theory propose the effects of imagery are due to an opportunity to practice symbolic events rather than neuromuscular programming. Thus, throughout the imagery process, the individual is preparing his or her actions in advance, which increases the likelihood that

performance will be improved. This notion is supported by research demonstrating greater performance effects for imagery on a cognitive task than on a motor task (Feltz & Landers, 1983). As such, imagery may be particularly effective as a mental practice strategy in sport for tasks that involve a cognitive or tactical component (e.g., practicing making decisions in a variety of competitive situations).

Self-efficacy theory. Self-efficacy theory was proposed by Bandura (1986, 1997) as one component of a social cognitive theory of human behavior. According to Bandura (1997), self-efficacy is a mediating variable in athletic performance. Bandura also postulated a hierarchy of variables that influence an individual's self-efficacy, with the most important being past performances, followed by vicarious experiences, verbal persuasion, and emotional arousal. From a self-efficacy theory perspective, imagery reinforces successful past performances and can act as a tool for vicarious experience to enhance efficacy beliefs, thereby improving performance.

Of the three perspectives mentioned, the most support has been documented for Bandura's theory of self-efficacy. For example, in a study conducted by Callow, Hardy, and Hall (2001) three out of four junior badminton athletes reported significantly higher levels of sport confidence following their participation in an imagery intervention ($p <$ .001). Additionally, Mamassis and Doganis (2004) reported higher than baseline confidence scores among junior elite tennis players on the CSAI-2 following a mental skills training intervention that included an imagery component. Similar results have also been reported in imagery interventions aimed at increasing confidence and sport performance (Callow & Hardy, 2001; McKenzie & Howe, 1997). In accordance with the data presented above, if an athlete is ready, willing, and able to engage in an imagery

training program, self-efficacy will increase, thereby increasing the likelihood of a positive outcome during future performances.

Meta-analyses of imagery interventions. Despite a lack of clarity in the mechanisms that support the relationship between imagery and performance, empirical data suggest a positive association exists. Specifically, effect sizes of 0.48 (Feltz & Landers, 1983), 0.68 (Hinshaw, 1991), and 0.57 (Meyers et al., 1996) have been reported in regard to the effects of imagery on sport performance. Furthermore, Weinberg (2008) conducted a review of research on imagery and sport performance, and concluded that while research should continue to address why and when imagery is effective, it appears imagery can aid performance in a variety of settings. Thus, sport psychology practitioners can use imagery as a tool to help athletes enhance performance. However, similar to the other psychological skills discussed, effective imagery requires daily practice and an athlete must be ready for behavior change prior to the implementation of an imagery program.

Cognitive training. Researchers have clearly demonstrated the importance of positive thinking and self-talk on athletic performance (Gould et al., 1981; Gould et al., 1992a, 1992b; Orlick & Partington, 1988). Researchers have also identified distorted thinking styles that my occlude peak athletic performance. According to Gauron (1984), maladaptive thinking patterns commonly seen among athletes include perfectionism, catastrophizing, dependence of self-worth on achievement, personalization of failure, fallacy of fairness, blaming others for failure, polarized thinking, and one-trial generalizations. To combat the possible negative effects of maladaptive thinking on sport

performance, researchers have conducted multiple forms of cognitive interventions to improve sport performance. These results will be discussed below.

Meta-analyses of cognitive interventions. Meyers et al. (1996) conducted a meta-analysis of intervention studies in sport psychology. The authors reported significant effects for cognitive restructuring (n = 4; d = 0.79, 95% CI = 0.38 – 1.10) and self-monitoring interventions (n = 3, d = 0.66, 95% CI = 0.38 – 0.94). The authors also analyzed interventions conducted to improve focus (n = 7) and interventions aimed at self-instruction (n = 6). Despite moderate to large effect sizes (d = 1.21 and d = 0.76 respectively), the results of the studies reported by Meyers et al. were vastly different causing confidence intervals to fall below zero. In a more recent meta-analysis on self-instruction, Hatzigeorgiadis et al. (2011) examined the effects of self-talk on sport performance. The overall findings of 32 studies that yielded 62 effect sizes, indicated that self-talk had a positive and significant effect on a wide range of skills and various levels of performance (d = 0.48, 95% CI = 0.38 – 0.58). The largest effect size reported by Hatzigeorgiadis et al. was for individuals who trained self-talk, suggesting that PST specifically for cognitive strategies is effective at improving sport performance.

Review of multi-faceted sport psychology interventions. While the literature reviewed in the previous sections provides support for interventions targeting specific variables in applied sport psychology, interventions using multiple strategies have also proven effective in improving performance. In a comprehensive review of intervention research, Greenspan and Feltz (1989) examined 19 studies of the effects of psychological skills on athletic performance. The authors identified causality in 11 of the 23 interventions, with eight yielding positive results. Although interventions producing

performance enhancing results were classified by relaxation (n=2), behavioral (n=2), and cognitive restructuring (n =4) techniques, the majority of these interventions were multifaceted. In the studies classified as relaxation interventions, Weinberg, Seabourne, and Jackson (1981, 1982) conducted 12 sessions of relaxation immediately followed by imagery training with university karate club members (n = 32 and 18, respectively). Furthermore the cognitive interventions consisted of: (a) relaxation, cognitive restructuring, and imagery (Hamilton & Fremouw, 1985); (b) hypnosis and systematic desensitization (Heyman, 1987); (c) relaxation, planning, imagery, and self-monitoring (Kirscehnbaum & Bale, 1980); and (d) relaxation, systematic desensitization, imagery, and self-instructions (Meyers, Schleser, & Okwumabua, 1982). The meta-analysis conducted by Meyers et al. (1996) also support these results in that multicomponent interventions yielded a larger effect on performance (d = 1.01, 95% CI = 0.56 – 1.46) than any of the single component interventions.

In a more recent review, Martin, Vause, and Shwartzman (2005) examined 15 intervention studies, six of which were included in the Greenspan and Feltz (1989) review. While Martin et al. criticized the small number of well-controlled intervention studies in sport psychology, they reported positive results in 14 of the 15 studies. Of the 15 studies reviewed, however, only two studies included a follow-up assessment. One such study (Lanning & Hisanaga, 1983) examined the effects of relaxation on serving percentage in volleyball, and included a two-week follow-up assessment, while the other study (Savoy & Beitel, 1996) examined the effects of imagery on free throw shooting, and included follow-up assessments occurring between intervention periods of a multiple baseline design. It should be noted that neither Lanning and Hisanaga (1983) nor Savoy

and Beitel (1996) successfully demonstrated maintenance effects, a result which is in stark contrast to the positive outcomes measured immediately following many of the interventions. Similarly, Greenspan and Feltz (1989) acknowledged that because maintenance effects beyond immediate post-test were not examined, the long-term benefits of performance enhancement interventions are not known. So while the literature reviewed provides palpable support for the use of PST for sport performance, post-intervention maintenance effects remain a notable issue in applied sport psychology.

Summary. Research to date provides support for the use of PST to improve sport performance. Whether interventions target specific psychological skills and strategies (i.e., intensity regulation, goal setting, imagery, self-talk) or are multifaceted approaches to improving psychological skills, a consistent positive effect has been demonstrated in the literature. The research reviewed above highlights two possible limitations to PST – issues with ongoing maintenance of intervention effects, and the underlying assumption of participant readiness to engage in an intervention. These limitations may be linked to one another, as scholars have noted that failure to maintain the benefits of an intervention may be tied to readiness to engage in the intervention in the first place (Miller & Rollnick, 2002). As mentioned previously, there is recent data to suggest readiness to change remains an issue in applied sport psychology (Anderson, 2005; Martin, 2005; Massey et al., 2011). Therefore, perceptions of applied sport psychology will be discussed next, in order to examine how these beliefs may play a role in readiness for behavior change.

Perceptions of Applied Sport Psychology

Research has demonstrated that stigmatization of mental health issues remains a notable concern as well as a barrier to counseling services (Vogel, Wade, & Hackler, 2007). Since individuals seeking help for mental health issues are perceived as less stable, less interesting, and less confident than individuals seeking help for physical health issues (Ben-Porath, 2002), those who may benefit from mental health services may avoid seeking help. Such biases and avoidance behaviors may be even more prevalent in sport, where attending to physical injuries remains normative and athletes are expected to be mentally tough in the face of physical pain and stressful situations (Jones, Hanton, & Connaughton, 2002). For example, in a study of undergraduate student perceptions, researchers found that athletes who had worked with a sport psychologist to improve performance consistency were rated as less emotionally stable ($p < .02$) and less likely to work well with management ($p < .002$) than athletes who had not worked with a sport psychologist (Linder, Pillow, & Reno, 1989). Similarly, the undergraduate student participants were less likely ($p < .05$) to recommend a player for the NFL draft if he had worked with a sport psychologist. Thus, it appears that stigmatization towards athletes who consult with a sport psychologist is similar to stigmatization toward the general population consulting with a psychologist, and may impact an athlete's decision to work with a sport psychologist.

In addition to identifying biases *against* individuals who consult a sport psychologist, research has also identified that athletes themselves have biases about working with a general psychologist for sport related issues. Van Raalte, Brewer, Brewer, and Linder (1992) surveyed 111 National Collegiate Athletic Association

(NCAA) Division II college football players to investigate their opinions of other athletes who consult with a helping professional. The football players recorded no difference in their perceptions of athletes who consulted with a coach and a sport psychology consultant, yet their perceptions of athletes who worked with a psychotherapist were significantly less favorable ($p < .02$). Similar results were reported in a sample of British athletes (Van Raalte, Brewer, Matheson, & Brewer, 1996), where athletes' perceptions of sport psychologists were significantly correlated with the perceptions of the football players in the Van Raalte et al. (1992) study.

More recently, Martin (2005) examined stigma tolerance, confidence in sport psychology consultation, personal openness, and cultural preference in a sample of 793 high school and college athletes. Results of a one-way multivariate analysis of variance (MANOVA) were significant, suggesting that individuals who had previously worked with a sport psychologist had higher levels of confidence in sport psychology consultation, and individuals who had not previously consulted with a sport psychologist had a greater stigma toward sport psychology. Results of a multivariate analysis of covariance (MANCOVA) were also significant, suggesting that: (a) males were more likely than females to stigmatize sport psychology consultants and identify with their own culture, ethnicity, or race; (b) contact sport athletes were more likely than non-contact sport athletes to have a stigma toward sport psychology consultation; and (c) high school athletes were more likely than college athletes to have a stigma toward sport psychology consultation. The results of these studies suggest that athletes also hold a bias towards psychological services, which is likely to affect their own decision to engage in PST.

The literature presented above indicates that a bias exists regarding athletes' use of helping professionals, yet others have noted the perceived effectiveness of sport psychology services to improve athletic performance (Gould, Murphy, Tammen, & May, 1991). Thus, findings remain equivocal as to why a large majority of athletes do not take advantage of psychological services for sport performance. Perhaps a more plausible explanation, one that is theoretically congruent with research literature in other helping professions, may have to do with an athlete's readiness to change their current behavioral practices. The TTM is a theoretical framework that has been applied by both researchers and practitioners to a range of health-related behavior changes. Pertinent to the study of behavior change in sport performance is the focus on motivational readiness to change by proponents of the TTM. Therefore, in an effort to examine the transferability of this theoretical paradigm to sport performance, the literature pertaining to the TTM in two health-related behavior change fields – smoking cessation and exercise adoption – will be reviewed next.

Transtheoretical Model of Behavior Change

The TTM of behavior change is based on the premise that an individual progresses through five hierarchical stages (i.e., precontemplation, contemplation, preparation, action, maintenance) as he or she intentionally tries to modify a problematic behavior (e.g., cessation from smoking; Everson, Taylor, & Ussher, 2010), or adopt a positive behavior (e.g., adherence to a PST routine; Leffingwell et al., 2001). Developers of the TTM also proposed that individuals utilize 10 processes of change as they progress through the stages of change, and that decisional balance and self-efficacy help mediate the change process (Prochaska & DiClemente, 1982; Prochaska,

DiClemente, & Norcorss, 1992). Originally developed to explain and predict cessation of addictive behaviors (e.g., smoking, drinking, drug abuse), the TTM has also been utilized as a behavior change paradigm to adopt healthy behaviors (e.g., diet, exercise). Therefore, it seems plausible to expand the TTM as a behavior change paradigm to applied sport psychology, in an effort to encourage athletes to engage in PST for peak performance in sport.

In the following sections, research examining the TTM will be discussed. A historical perspective will be presented first as it outlines the development of the TTM and the utility of an integrated approach to consultation. Additionally, research literature will be discussed as it relates to several behavior change domains, including smoking cessation, exercise adherence, and finally sport performance.

Transtheoretical model: Theory development. The TTM originated out of an effort to identify commonalities among over 200 systems of psychotherapy (Prochaska, 1979). Given that no system of therapy appeared to hold a clinical advantage over the rest, Prochaska conducted a comparative analysis of the 18 leading systems of therapy, specifically examining the processes of therapeutic change. Upon reviewing the 18 leading systems, Prochaska identified five processes through which therapeutic change occurs (i.e., consciousness raising, choosing, catharsis, conditional stimuli, contingency control). Each of these five processes of change contained an experiential level and an environmental level. Prochaska also proposed that commitment to change marked the beginning of the therapeutic process. Once a commitment had been established, consciousness raising was essential in that both the therapist and client need to raise their awareness of the presenting problem, and the factors causing or maintaining the

presenting problem. Following this, a therapist would proceed by utilizing appropriate processes of change to address the client's presenting concerns. Thus, while common processes of change were identified, the original conceptualization of the TTM did not take into account readiness for change, as it was assumed the client had already committed to the process.

In the first study to utilize the process of change paradigm, DiClemente and Prochaska (1982) examined whether change processes were different between individuals who utilized therapy programs to initiate behavior change and individuals who were self-changers. Results of the study indicated that regardless of treatment (i.e., behavioral management therapy, aversion therapy, no therapy) individuals who successfully stopped smoking utilized the five processes of change. The authors also conducted a one-way ANOVA to test for group differences in the use of processes of change. The authors reported that: (a) self-quitters rated feedback, stimulus control, and social management as less important than those in the behavioral management and aversion therapy groups ($p < .05$); (b) individuals in the aversion therapy group rated self-liberation as more important than self-quitters and those in the behavioral-management group ($p < .05$); and (c) individuals in the behavioral-management group rated counterconditioning as more important than those in the aversion and self-quitter groups ($p < .05$). At a five-month follow up there were no significant differences in the behavioral maintenance of smoking cessation between groups. These results suggest that self-quitters were as effective as individuals receiving psychological treatment when accounting for utilization of the processes of change, thereby illustrating that common change processes are more salient than any specific treatment program during the behavior change process.

In a subsequent report, Prochaska and DiClemente (1982) expanded the TTM to include four stages of change. As illustrated in Figure 6, en route to permanent behavior change, individuals progress from contemplation, to determination, to action, and finally to maintenance. While Figure 6 displays a linear representation of change, the authors proposed that the change process is cyclical and that relapse should be considered as a part of this process. Additionally, Prochaska and DiClemente proposed that certain processes were more likely to occur at different stages of change (Figure 7). Broadly, verbal processes of change (i.e., consciousness raising, catharsis, choosing) are thought to take place prior to behavioral action, while behavioral processes are thought to take place during the action and maintenance stages of change (i.e., contingency control, conditional stimuli).

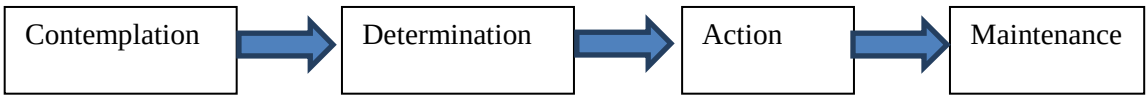

Figure 6. A linear schema of the stages of change. Adopted from Prochaska and DiClemente (1982). Copyright *Psychotherapy Theory, Research, and Practice.*

In an effort to examine the interaction of processes of change and stage of change over time, Prochaska and DiClemente (1983) conducted a two-year analysis of 872 individuals who smoked cigarettes or had given up smoking cigarettes. While previous reports had identified four stages of change and five processes of change, Prochaska and DiClemente utilized five stages of change and 10 processes of change in the conceptualization of this study. Given a lack of a published report outlining this change, it is possible that the authors' database went through further iterations in-between publications (i.e., between Prochaska & DiClemente, 1982 and Prochaska & DiClemente,

1983). The stages of change included precontemplation, contemplation, action, maintenance, and relapse. The processes of change included consciousness raising, self-liberation, social liberation, self-reevaluation, environmental reevaluation, counter conditioning, stimulus control, reinforcement management, dramatic relief, and helping relationships. Participants in this study completed process of change questionnaires, gave saliva samples, provided self-report smoking data, and participated in an interview once every 6 months throughout the duration of the study. To determine differences in processes of change across stage of change, the authors conducted a multivariate analysis of variance (MANOVA). The results of the MANOVA were significant ($F[1, 40] = 11.199$, $p < .001$) prompting the authors to conduct follow-up ANOVA and Newman-Keuls comparisons to examine differences across stages. Results of these analyses revealed that precontemplators utilized eight of the 10 processes of change significantly less than individuals in other stages. Furthermore, results supported previous research in that verbal processes were utilized more in the contemplation stage of change, while behavioral processes were utilized more in the action and maintenance stages of change. These results support the notions that experiential processes are used prior to action, while behavioral processes are used once action has occurred.

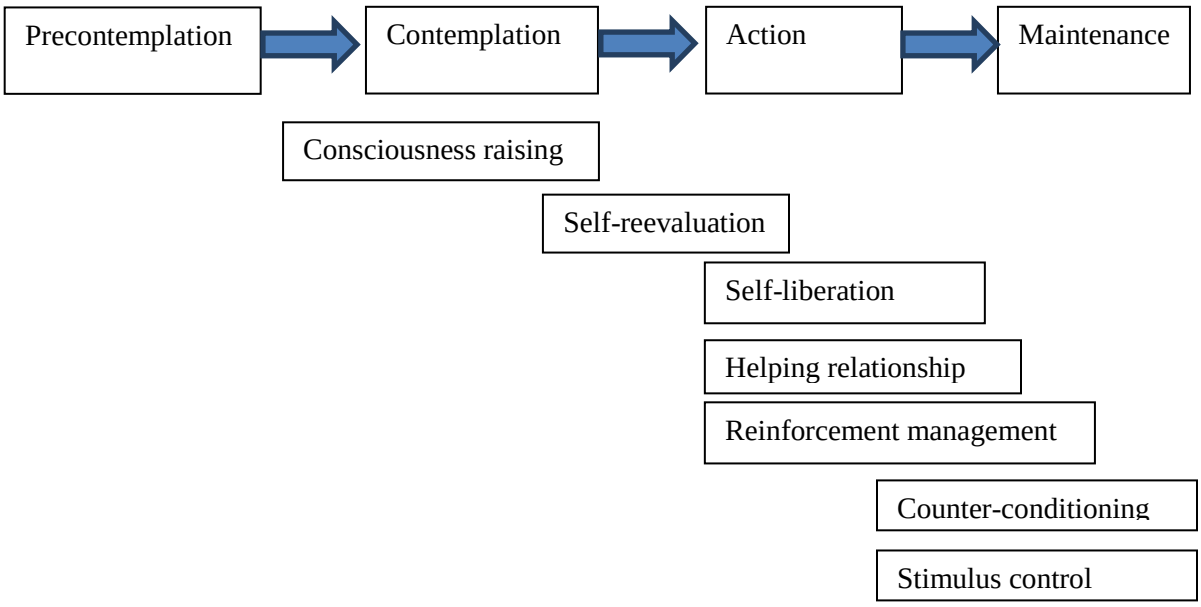

Figure 7. Revised integration of the stages and processes of change. Adopted from Prochaska and DiClemente (1983). Copyright *Journal of Consulting and Clinical Practice.*

Transtheoretical model: Cessation from addictive behaviors. Following the initial work of Prochaska and colleagues, a critical mass of research was conducted utilizing the TTM and expanding its application. In general, results have shown that having no intention of changing behavior in the foreseeable future is characteristic of the *precontemplation* stage of change. This stage of change is unique to the TTM in that precontemplators are not separate from the behavior change process, but rather, are individuals for whom change is not yet a choice. Individuals in this stage are generally uninformed about the benefits of a change in behavior, or have unsuccessfully tried to change and have become frustrated with recurring failures (Prochaska et al., 1992).

During the *contemplation* stage of change, an individual intends to change but has not yet taken the necessary action steps to adopt a new behavior. The person recognizes

the importance of making a change, however has not yet made a commitment. Previous research has suggested a large proportion of individuals remain stuck in contemplation, with evidence to support the contemplation stage can last longer than two years (DiClemente & Prochaska, 1985; Prochaska & DiClemente, 1984).

A person who is ready for an action-oriented treatment plan has entered the *preparation* stage of change. Individuals in this stage have made the choice to change their current behavior, often by taking steps toward, or creating plans to, achieve the more desired behavior (Prochaska, 2008). Individuals who are observed making specific changes to their behavior, and have met a set criterion for this behavior, are classified as being in the *action* stage of change. During this stage, action-oriented processes are used to aid in the process of behavior change. A person is considered in the action stage of change having successfully changed a problematic behavior for a period of one day to six months. Once an individual has maintained this behavior for a period of at least six months, has become confident in their new behavior, and has no imminent threat of relapse, the individual has reached the *maintenance* stage of change. While not completely free from risk of relapse, these individuals are characterized as more stable in their new behavioral patterns and are not using action-oriented processes of change as heavily as those who are in the action stage.

While initially conceptualized as a linear model, research has consistently shown relapse to be the rule, rather than the exception, resulting in a cyclical pattern of change (Prochaska et al., 1992). For example, smoking cessation generally takes three to four attempts prior to successful behavior change (Schacher, 1982), while New Year's resolutions can take up to five years to actualize (Norcross & Vangarelli, 1989). In an

effort to conceptualize this process, Prochaska et al. proposed a spiral model of movement through the stages. In this way, individuals cycle through the stages of change as many times as needed en route to permanent behavior change.

Central to the TTM is also a decision-making process that considers the pros and cons of change as well as self-efficacy as it relates to the new behavior (Prochaska, 2008). Movement through the stages on the way to one's ultimate goal is mediated by motivation and readiness to change (Marshall & Biddle, 2001). Thus when an individual is confronted with new information (e.g., a lack of concentration is causing performance decrements) or new alternatives (e.g., practicing concentration skills can increase on-and-off field performance), he or she must engage in a decision-making process. Previous TTM research (Prochaska et al., 1994) suggests that perceived gains involved in changing or maintaining one's behaviors (e.g., a decrease in stress as a result of learning new coping techniques) must outweigh perceived losses associated with change (e.g., loss of free time due to practice devoted to meditation) before an individual decides that action towards a new behavior is warranted. Concurrently, as an individual progresses toward a permanent change in behavior, self-efficacy for the new behavior increases with the largest gain thought to take place after action occurs (e.g., daily practice of mental skills; Sarkin, Johnson, Prochaska, & Prochaska, 2001).

Since its introduction into both research and clinical practice, scholars have utilized the TTM to inform studies of behavior change in diverse areas such as smoking and addictive behaviors (e.g., Prochaska & DiClemente, 1982; Sun, Prochaska, Velicer, & Laforge, 2007), exercise and physical activity (e.g., Marshall & Biddle, 2001), nutrition (e.g., Di Noia, Schinke, Prochaska, & Contento, 2006), HIV prevention (e.g.,

Hacker, Brown, Cabral, & Dodds, 2005), and stress reduction (e.g., Evers et al., 2006**)**. While initially developed to study the cessation of unhealthy or dangerous behaviors, the TTM has also been applied to the adoption of positive behaviors such as a regular exercise routine. Given that smoking cessation involves the elimination of a behavior, and the purpose of the current project is to examine the adoption of a behavior (i.e., PST), the literature examining exercise behavior change will be reviewed next.

Transtheoretical Model: Adherence to exercise behavior. Given the successful implementation of the TTM in cessation from addictive behaviors, Bess Marcus and colleagues (1992) were among the first to apply the TTM to the adoption of a positive behavior, exercise. As a result of the breadth and depth of the research literature examining the TTM in exercise behavior change, several reviews have been conducted to synthesize the research. Marshall and Biddle (2001) were among the first to conduct a meta-analysis examining the TTM and exercise behavior. The authors conducted an extensive search for published articles and abstracts from 1983-2000 and included 91 independent samples from 71 published reports in their analysis. Of the 91 samples, the authors reported 80 contained usable data for the meta-analysis. For these 80 samples, meta-analyses were conducted across stage transition for all of the TTM related constructs (i.e., self-efficacy, pros of change, cons of change, experiential processes of change, behavioral processes of change) as well as level of physical activity. Results supported the concurrent validity of the stage of change construct, as effect sizes for physical activity increased across stage transitions until action was reached, with the largest effect taking place between preparation and action (d = .85, 95% CI = 0.64 – 1.07). Support was also found for theoretical predictions of self-efficacy across stage of

change, as effect sizes were all positive and significant across the stage transitions. However, the pattern of self-efficacy across stage of change does not appear to be linear, as predicted by the TTM, in that effect sizes for the transition from precontemplation to contemplation (*d* = .60, 95% CI = 0.41 – 0.77) appear larger than the transition from contemplation to preparation (*d* = .36, 95% CI = 0.24 – 0.47). In regard to the pros of behavior change, the effects for each stage transition were positive and significant with the exception of contemplation to preparation. Thus, at all other stage transitions there is an increase in the perceived benefits of change, with the largest increase taking place between precontemplation and contemplation (*d* = .97, 95% CI = 0.66 – 1.28). Similarly, effect sizes for the cons of behavior change were significant and negative at each stage transition, suggesting a decrease in the perceived costs of behavior change takes place at each transition, with the largest decrease taking place between precontemplation and contemplation (*d* = -.46, 95% CI = 0.76 – -0.16). The use of the processes of change was also supported, with the largest effects for all processes taking place between precontemplation and contemplation (*d* range = 0.55 – 1.18), and the second largest effect reported for the transition from preparation to action (*d* range = 0.27 – 0.72).

The findings of the Marshall and Biddle (2001) meta-analysis generally support the applicability of the TTM in exercise and physical activity behavior change. While support for the original model is reported, it also appears exercise behavior change differs from smoking cessation as self-efficacy does not appear to progress in a linear fashion across stage transitions, and the pattern of process of change use differs from research in smoking cessation. Specifically, experiential processes are used more frequently in action during exercise behavior change than smoking cessation, and there does not appear

to be a decline in the use of behavioral processes as an individual progresses from action to maintenance. Furthermore, it appears the utilization of the TTM is most salient in helping individuals progress from precontemplation to contemplation, and from preparation to action. That said the nature of the studies reviewed raises questions regarding the efficacy of TTM-based interventions. In their review, Marshall and Biddle reported that 54 of the 71 studies employed a cross-sectional design, while only one study conducted a randomized control trial, and only three studies utilized all aspects of the TTM. Therefore, when conducting research utilizing the TTM as a paradigm, scholars should be advised to use all aspects of the TTM (i.e., stages of change, processes of change, decisional balance, self-efficacy) rather than pick and choose theoretical variables.

In a subsequent review of the literature, Spencer, Adams, Malone, Roy, and Yost (2006) examined 150 studies investigating the TTM and exercise behavior change. Of these, the authors reported 38 intervention studies, 70 population studies, and 42 validation studies. Of the 38 interventions, the authors reported 17 studies displayed a positive outcome, eight studies displayed a short-term positive outcome, five studies were inconclusive, and three studies did not support the use of a stage-matched intervention. Using qualitative comparison of the intervention studies, Spencer et al. noted that interventions that did not support the TTM "often had single-contact, single strategy interventions, while completely supportive studies tended to include multiple strategies with either single or multiple contacts" (p. 433). Furthermore, Spencer et al. examined 15 studies that employed both stage-matched and traditional interventions. Nine of the 15 interventions demonstrated that stage-matched interventions are superior to traditional

action-oriented interventions. Therefore, it appears that well designed, stage-matched interventions utilizing all components of the TTM (i.e., stage of change, processes of change, decisional balance, self-efficacy) are effective in increasing exercise and physical activity, and promoting health behavior change.

Given the cross-sectional design of the majority of studies in the Marshall and Biddle (2001) review, Lowther, Mutrie, and Scott (2007) conducted a longitudinal analysis examining use of processes of change across stage transition. Stage of change and process of change data were collected on 370 participants at baseline, one month, three months, six months, and one year following an intervention or control condition. The authors reported that: (a) the use of the behavioral processes were most predictive of stage transition from contemplation to preparation (odds ration [OR] = 1.16, 95% CI = 1.05 – 1.27); (b) both behavioral (OR = 1.21, 95% CI = 1.11 – 1.31) and experiential (OR = 1.11, 95% CI = 1.03 – 1.21) processes were predictive of transition from contemplation to action; (c) the transition from preparation to action was mediated by an increase in self-liberation (OR = 1.56, 95% CI = 1.32 – 1.85); (d) the transition from action to maintenance was mediated by an increase in social liberation, counter-conditioning, helping relationships, and self-liberation (OR range = 1.11 – 1.36); and (e) regression from maintenance was predicted by decreased use in the behavioral processes (OR = 0.82, 95% CI = 0.77 – 0.88). The results of this longitudinal study support the analysis conducted by Marshall and Biddle (2001) as it relates to processes of change use in exercise behavior change. The results of this study also highlight the importance of continued use of behavioral processes of change in the maintenance stage, as well as the use of self-liberation across all stage transitions.

Collectively, the research examining exercise behavior supports the use of the TTM as a paradigm to increase behavior change. Given this successful implementation of the TTM, it is logical to consider the application of the TTM to another positive behavior: adoption of a PST routine designed to increase sport performance. In the following section the literature to date examining the TTM in applied sport psychology will be reviewed, thereby highlighting the gaps in our understanding of this theoretical framework for use in studying behavior change in sport and providing a rationale for the current study.

Transtheoretical model: Sport performance. In the first known TTM study conducted in the sport performance domain, researchers (Grove, Norton, Van Raalte, & Brewer, 1999) used a stage of change assessment to evaluate the effectiveness of a PST intervention in a sample of competitive youth baseball players (N=37). Participants in the experimental group (n = 20) participated in a mandatory six-week mental skills training program, while those in the control group (n = 17) participated in a six-week strength training program. Results of Kruskal-Wallis tests indicate no significant differences between athletes in the experimental and control groups on stage of change classification at pre-test ($p < .60$). However, at post-test ($p < .001$) and at a three-month follow-up ($p < .04$), athletes in the experimental group recorded significantly higher scores on the action and maintenance subscales than athletes in the control group, suggesting that exposure to mental skills training may increase readiness to participate in a sample of youth baseball players.

In a second study examining the TTM and PST, Leffingwell et al. (2001) developed assessment inventories (i.e., stage of change, self-efficacy, decisional balance)

to test whether the TTM could be applied to PST consultation. The assessment inventories were cross-validated on two samples of collegiate athletes (n = 149, 159 respectively), at institutions offering both group and individual PST sessions via the athletics department. In the development of the stage of change measure, the authors modeled a 4-factor (precontemplation, contemplation, action, maintenance) structure. Using confirmatory factor analysis (CFA), the first model indicated a poor fit between the model and the data in the first sample (CFI = .75, RMSEA = .06). Following an exploratory factor analysis (EFA) of the data and elimination of 12 items, follow-up CFA yielded an appropriate fit for the data (CFI = .99, RMSEA = .024). Employing a cross-validation CFA to sample two, the authors reported an adequate fit for the data (CFI = .91, RMSEA = .071). Similarly, initial CFA of the decisional balance scale yielded an inadequate fit of the 2-factor model (CFI = .81, RMSEA = .063). Following an EFA and the removal of eight scale items the 2-factor model yielded an adequate fit in sample one (CFI = .94, RMSEA = .072) and sample two (CFI = .92, RMSEA = .072). In the development of a one-factor self-efficacy scale, initial CFA yielded an adequate fit for the data (CFI = .98, RMSEA = .064). Cronbach's alpha coefficients were then calculated for each subscale in order to assess internal reliability of the scales. The authors reported adequate levels of reliability for precontemplation (αs = .79, .54), contemplation (αs = .73, .64), action (αs = .84, .83), and maintenance (αs = .52, .51). Despite low alpha levels reported for precontemplation, contemplation, and maintenance, the authors assumed lower alpha levels were acceptable given the short (i.e., three questions) nature of the scales. The authors also reported appropriate alpha levels for the pros of change

scale (αs = .92, .94), cons of change scale (αs = .90, .82), and the self-efficacy scale (αs = .88, .85).

To assess construct validity of their TTM measures, Leffingwell et al. (2001) examined history of mental training, patterns of pros, cons, and self-efficacy across stage of change, and the predictive validity of the SOC measure. Chi-square analyses indicated that athletes in the contemplation, action, and maintenance stages were significantly ($p < .01$) more likely to seek sport psychology information (i.e., read a book) or consult with a sport psychologist than athletes in the precontemplation stage. Additionally, results of ANOVA calculations indicated that athletes in the precontemplation stage reported significantly ($p < .01$) higher levels of cons associated with PST (i.e., it might hurt my performance) than those in the action stage, and significantly ($p < .01$) lower levels of pros (i.e., my self-confidence would increase) than athletes in any of the other stages. Consistent with previous TTM work, ANOVA results also indicated that individuals in the action stage reported significantly ($p < .01$) higher levels of self-efficacy than athletes in any other stage. Finally, chi-square analysis revealed that a significantly ($p < .01$) higher percentage of athletes in the contemplation and action stages consulted with a sport psychologist than athletes in the precontemplation and maintenance stages.

In a subsequent study utilizing the TTM to adopt a PST routine, Zizzi and Perna (2003) conducted a brief workshop with 14 athletic teams ($n = 220$) to discuss the possible application of PST to sport performance. Results indicated the workshop was successful in raising awareness of the benefits of PST, as contemplation scores and pros of change scores increased ($p < .001$), and precontemplation scores and cons of change

scores decreased ($p < .001$), after the workshop. However, stage distribution remained virtually unchanged before (precontemplation = 44% of sample; contemplation = 30% of sample; action = 26% of sample) and after the workshop (precontemplation = 44% of sample; contemplation = 29% of sample; action = 27% of sample). This finding, in conjunction with low reported reliability coefficients in the study, prompted the authors to question the utility of the Leffingwell et al. (2001) stage of change instrument.

In an effort to continue to expand the TTM in applied sport psychology, Massey et al. (2011) utilized the measures created by Leffingwell et al. (2001) to examine TTM-related constructs in a sample of 203 athletes with no previous exposure to a sport psychology professional. In their study, Massey and colleagues excluded individuals who had prior involvement with a sport psychology consultant. Thus, it was deemed theoretically appropriate to only analyze data from scores in the precontemplation and contemplation stages of change. The authors reported significant differences for pros of change [$t(201) = -7.02$, $p < .001$], cons of change [$t(201) = 7.71$, $p < .001$], and self-efficacy [$t(199) = -5.82$, $p < .001$] across stage. Given that 66% of the sample reported by Massey et al. were classified in the precontemplation stage, it is possible that athletes with no prior exposure to a sport psychology consultant may not be ready for traditional action-oriented programs. Thus, results of this study support the utilization of the TTM as a framework for researchers to study readiness for change in applied sport psychology settings.

In an additional study utilizing the Leffingwell et al. (2001) measures to examine the TTM in applied sport psychology, Keeler and Watson (2011) measured stage of change, self-efficacy, and processes of change at four different time points among 45

female rugby players. While the stages of change and self-efficacy measures were those developed in the Leffingwell et al. study, Keeler and Watson used a checklist and an open answer question form to identify the processes of change reported in non-sport related behavior change. In their examination of self-efficacy across stage of change, the authors reported that self-efficacy was positively correlated with action (T1 r = .657, T2 r = .591, T3 r = .584, T4 r = .703) and negatively correlated with precontemplation scores (T1 r = -.525, T2 r = -.609, T3 r = -.637, T4 r = -.431) at all four time periods ($p < .01$). The authors also reported that all 10 processes of change were used across the sample, suggesting the need to further explore the use of processes of change in applied sport psychology.

While the results of the previously mentioned studies (i.e., Keeler & Watson, 2011; Leffingwell et al., 2001; Massey et al., 2011) appear to support the use of the TTM to study behavior change in applied sport psychology, the lack of a processes of change measure has had it impossible to conduct a comprehensive study utilizing the TTM in a sport context.

In his dissertation, in which the instruments reported by Leffingwell et al. (2001) were originally reported, Rider (1997) identified six steps that are necessary to successfully apply the TTM in applied sport psychology:

1. The development of instruments to measure TTM constructs.
2. Exploration of the relationships between stage of change and other TTM constructs (i.e., decisional balance, self-efficacy, processes of change).
3. Exploration of TTM constructs and their relation to behavioral measures (e.g., stage of change and hours of PST practice per week).

4. Stage-based interventions in applied sport psychology with stage progression as an outcome measure.
5. Stage-based interventions in applied sport psychology compared against traditional sport psychology interventions.
6. Longitudinal studies that measure TTM-based constructs, adherence to PST, and objective performance outcomes.

While Rider partially addressed the first three steps mentioned above, considerable work needs to be done in identifying the processes of change and how they interact with an individual's stage of change. Without this knowledge, the stages of change construct offers little more than a classification system for applied sport psychologists. As such, the purposes of the current study were to examine the TTM as a framework to study behavior change in applied sport psychology settings by: (a) developing and validating a psychometrically sound processes of change questionnaire for use in applied sport psychology, and (b) examining processes of change use across stage of change in applied sport psychology.

Chapter III: Methodology

The primary purpose of the current study was to examine the Transtheoretical Model of Behavior Change (TTM) as a framework to study behavior change in applied sport psychology research and practice. This purpose was achieved by constructing and validating a processes of change measure for use in applied sport psychology research.

Research Design

The current study relied on self-report data and therefore the PI operated under the assumption that all participants responded accurately and honestly. In an effort to achieve the objectives identified above, data were collected from two independent samples (i.e., sample one, sample two). In sample one, exploratory structural equation modeling (ESEM) was used as an analytic strategy to identify the most appropriate factor structure for the processes of change measure. In consideration of alternative data analysis strategies, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were ruled out as an appopriate choice for sample one, as EFA structures are often not supported by subsequent CFA (Marsh et al., 2009), and CFA requires each item to load on only one factor and may have been too restrictive in model development. Specifically, by fixing all cross-loadings to a value of zero, CFA often leads to misspecified factor loadings. This can cause the model to be rejected, in which researchers must rely on model modifications – a process that is more exploratory than confirmatory – to achieve model fit (Browne, 2001). According to Browne, the problem of model fit associated with CFA is better solved by rotating the factor matrix, a process associated with EFA. The ESEM method (Asparouhov & Muthén, 2009) was developed

to combine CFA and EFA approaches. Thus, by using ESEM, items are free to cross-load on multiple factors, rotation of the factor matrix is possible, and the researcher is able to calculate goodness of fit statistics typically associated with CFA (Marsh et al., 2010).

Following the selection of the most appropriate structural model for data in sample one, a second sample of data were collected to test the measurement model. To accomplish this objective, CFA was utilized as an analytic strategy to determine if the model structure could be replicated in the second sample. Taken together, the ESEM in sample one and CFA in sample two were used to demonstrate the psychometric properties of the Processes of Change in Sport Questionnair (PCSQ). In addition, tests of concurrent validity, construct validity, and scale reliability were conducted to examine the processes of change measure.

Procedures

Prior to data collection, procedures were approved by the Institutional Review Board at the University of Wisconsin-Milwaukee (see appendix A; approval # 13.012).

Participants. The participants in the current study (N = 559; M_{age} = 20.06 years old, SD = 2.92 years) were practicing for, or participating in a National Collegiate Athletic Association (NCAA) Division I sanctioned sport (n = 523), Canadian intercollegiate sport (n = 1), professional sport (n = 5), or Olympic sport (n = 28). In the total sample, 30 sports were represented, with the most prevalent being track and field (n = 82) and swimming (n = 57). A chi square test of independence was conducted to examine any potential dependencies in demographic variables and sample (i.e., sample

one, sample two). Results indicated non-significant chi square values for gender, level of sport, and stage of change, indicating these variables were independent across the two samples. Significant chi square values were found for race ($\chi^2 = 14.570$, $p = .024$) and sport season ($\chi^2 = 60.462$, $p > .001$) indicating a possible dependency between sample group and the above mentioned variables. Additional demographic data for participants in sample one ($n = 201$) and sample two ($n = 358$) are presented in Table 1.

Eligibility criteria. In order to be eligible for participation in the current study, athletes must have met the following criteria: (a) currently practicing for or participating in an NCAA Division I sanctioned sport, professional sport, or Olympic sport; (b) over the age of 18 years old; and (c) fluent in speaking and writing English. Participants were excluded from the proposed study if: (a) they did not meet all three eligibility criteria, or (b) they were unable or unwilling to give their informed consent to participate in the study.

Recruitment and screening. In sample one, recruitment took place primarily through word of mouth and personal contacts of the principal investigator (PI). Specifically, players, coaches, athletic directors, and/or sport psychology consultants at various universities and organizations were contacted to aid in recruitment. In sample two, list of NCAA Division I coach's email addresses were compiled from the website www.collegiatedirectories.com. Recruitment letters were then sent via email, with follow-up emails sent two weeks after the initial contact. Given the recruitment strategy, in conjunction with the eligibility criteria, post-hoc screening procedures were used whereby data from participants not meeting the eligibility criteria would be eliminated. See Appendix B for a sample recruitment letter.

Table 1

Demographic Information for Sample 1 and Sample 2

Demographic Variable	Sample 1	Sample 2
Gender	Male = 37.4% Female = 61.6%	Male = 31.0% Female = 68.4%
Race	White/Caucasian = 85.2% African American = 6.4% Asian = 2.0% Hispanic = 0.5% Native American = 1.0% Multi-racial or self-identified "other" = 3.9%	White/Caucasian = 79.6% African American =4.5% Asian = 2.8% Hispanic = 3.1% Native American = 0.6% Multi-racial or self-identified "other" = 8.9%
Level of sport	NCAA DI = 90.1% Olympic = 7.9% Professional = 1.0%	NCAA DI = 95.8% Olympic = 3.4% Professional = 0.8%
Season	In Season = 48.8% Preseason = 40.4% Off Season = 9.9%	In Season = 38.3% Preseason = 20.9% Off Season = 40.2%
Stage of change	Precontemplation = 36.9% Contemplation = 26.6% Action = 9.9% Maintenance = 20.7%	Precontemplation = 35.5% Contemplation = 23.5% Action = 14.2% Maintenance = 22.3%

Data management. Previous research suggests that online research is equivalent if not superior to traditional offline (i.e., paper-pencil) methods (Buchanan & Smith, 1999; Lonsdale, Hodge, & Rose, 2006; Meyer, Cashin, & Massey, 2012; Meyerson & Tryon, 2003; Preckel & Thiemann, 2003); therefore, all participants completed an online version of the questionnaires used in the current study. In an effort to protect confidentiality, data were uploaded into a university sponsored, password protected

database. Within 30 days, data were removed from the online database and stored inside a password-protected database, on a password-protected computer inside of Pavilion 375 at the University of Wisconsin-Milwaukee. Missing data were handled with the default approach in Mplus 6.0 (Muthén & Muthén, 2011) under the assumption of missing completely at random.

Measures

Participants in the current study completed a battery of five questionnaires that took approximately 10-15 minutes to complete. The measures used in the current study included a demographic questionnaire, the PCSQ, the Exercise Processes of Change (PCQ) questionnaire, a modified version of the University of Rhode Island Change Assessment (URICA), and a short form of the Marlowe Crown Social Desirability Scale (MCSDS). These measures are described below.

Demographic questionnaire. A demographic questionnaire was completed by each participant, and included questions related to the following: (a) gender, (b) ethnicity, (c) age, (d) sport played, (e) length of sport involvement, (f) career and sport goals, (g) injury history, and (h) psychological skills training experiences. The demographic questionnaire can be found in Appendix C.

Processes of change in sport questionnaire. In an effort to develop the PCSQ, an initial pool of 114 items was generated after reviewing the literature (e.g., Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Marcus & Simkin, 1993) and reflecting on the experiences of the PI and his primary advisor as sport performance consultants. The initial pool contained items representing each of the 10 proposed processes of change

(i.e., consciousness raising, dramatic relief, self-revaluation, environmental reevaluation, social liberation, self-liberation, helping relationships, counter-conditioning, stimulus control, contingency management; Table 2). Content validity was established by consensus agreement of three judges who had expertise or experience in elite sport. The judges included a former Olympic athlete, a physiotherapist with extensive experience at the Olympic level, and a certified athletic trainer and Ph.D. level researcher with extensive experience in professional sport. The judges were chosen for their expertise in elite level performance, in conjunction with a lack of expertise in TTM research. It was assumed that judges who were novice as it relates to TTM literature would have a less biased view of the instrument items and respond in ways more similar to potential participants than individuals with extensive theoretical knowledge.

After reviewing the judges scoring, it was determined that items created to represent consciousness raising and social liberation had considerable overlap, suggesting these processes would not empirically discriminate from one another. Furthermore, after elimination of all items without 100% agreement between the judges, only two of the original 12 reward management items remained. The reward management items were then re-written and sent to three separate judges. These judges included a National Collegiate Athletic Association (NCAA) Division I football player, a certified athletic trainer with experience at the NCAA Division I level, and a physical therapist with experience at the Olympic level. Items without 100% agreement were eliminated, resulting in a final scale of 65 items. The 65-item PCSQ can be found in Appendix E.

Table 2

Description of the processes of change

Process of Change	Description
Consciousness raising (CR)	Increasing information about self and problem
Self-reevaluation (SR)	Assessing how one feels and thinks about oneself with respect to a problem
Self-liberation (SELF)	Choosing and commitment to act or belief in ability to change
Counter-conditioning (CC)	Substituting alternatives for problem behaviors
Stimulus control (SC)	Avoiding or countering stimuli that elicit problem behaviors
Reinforcement management (RM)	Rewarding oneself or being rewarded by others for making changes
Helping relationships (HR)	Being open and trusting about problems with someone who cares
Dramatic relief (DR)	Experiencing and expressing feelings about one's problems and solutions
Environmental reevaluation (ER)	Assessing how one's problem affects the physical environment
Social liberation (SL)	Increasing alternatives for non-problem behaviors available in society

Exercise processes of change questionnaire. The Exercise Processes of Change Questionnaire (PCQ) is a 39-item measure developed by Marcus et al. (1992) that assesses the use of processes of change during adherence to an exercise routine. The PCQ represents participants scores on the 10 processes of change, as well as two hierarchical factors of experiential processes of chance (i.e., CR, DR, SL, ER, SR) and behavioral processes of change (i.e., CC, HR, SELF, RM, SC). Marcus and colleagues cross-validated the PCQ in a sample of participants in a worksite health promotion study, and reported an adequate fitting model for the measure. In the current study, the PCQ has been modified to fit the target population (i.e., words associated with exercise have been

change to words associated with mental training for sport performance) and can be found in Appendix F.

University of Rhode Island Change Assessment (URICA). The URICA (McConnaughy, Prochaska, & Velicer, 1983) is a 32-item self report scale that measures precontemplation, contemplation, action, and maintenance subscales as it relates to behavior change. Previous researchers have modified the URICA to apply to a sport psychology context (Leffingwell, Rider, & Williams, 2001; Rider, 1997), reporting acceptable levels of model fit in two samples of collegiate athletes (Sample one: CFI = .99, RMSEA = .024; Sample two: CFI = .91, RMSEA = .071). However, consistently low reliability coefficients (Keeler & Watson, 2011; Leffingwell et al., 2001; Massey, Meyer, & Hatch, 2011) and problems reported with the maintenance subscale (Zizzi, 2000) have called into question the validity and reliability of this measure. As such, data were collected on the Leffingwell et al. (2001) measure as well as a measure with a modified maintenance subscale (see Table 3). Analysis of data in the current study (N = 547) demonstrates a better model fit for the revised measure (CFI = .923, RMSEA = .078) as opposed to the Leffingwell et al. measure (CFI = .898, RMSEA = .080) and a more reliable maintenance subscale (α = .786) than the Leffingwell et al. instrument (α = .597). Therefore, in the current study, the modified version of the scale was utilized to assess construct validity of the PCSQ. The stage of change questionnaire used in the current study can be found in Appendix D.

Table 3

Maintenance Subscale of Leffingwell et al. (2001) stage of change measure and proposed revisions to each item

Maintenance subscale (Leffingwell et al., 2001)	**Maintenance subscale (proposed revisions)**
I have been successful working on my mental skills, but I'm not sure I can keep up the effort on my own.	I have been successful working on my mental skills for at least the last 6 months.
I'm not following through with the mental skills I have already changed as well as I would have hoped, and I would like to continue working on them.	I have used the mental skills I have learned for at least 6 months and plan to continue working on them.
After all I've done to try to change my mental skills, every now and again I slip back into old habits.	After all I have done to improve my mental skills, I feel confident in my new habits.

Marlowe-Crowne social desirability scale. In the current study the short-form of the Marlowe-Crowne social desirability scale (MC; Appendix G) was used, which contains 13 items that describe socially desirable, yet relatively unlikely behavior (Reynolds, 1982). A high score on the MC is conceptualized to reflect socially desirable responding, while a high correlation between the MC and any given questionnaire can raise doubts to the validity of a measure.

Statistical Analysis

Analyses in the current study were conducted using Mplus 6.0 (Muthén & Muthén, 2011), and SPSS 20 (Armonk, NY, 2011). In the subsections below, a description is provided of how the factor structure, concurrent validity, construct validity, and scale reliability of the PCSQ were analyzed.

Exploratory structural equation modeling. In the current study, ESEM with maximum liklihood estimation and Geomin roatation was used to assess the factor structure of the data collected in sample one. Previous literature has suggested multiple indices of fit be used in evaluating a model structure (Hu & Bentler, 1999; Jackson, Gillaspy, & Purc-Stephenson, 2009). The chi-squared (χ^2) statistic is the most commonly reported measure used in establishing model fit (Jackson et al., 2009). However, this value is sensitive to sample size, and a non-significant χ^2 value is often difficult to obtain even when the model is a good fit using other criteria or assessment (Marsh, Hau, & Wen, 2004). Furthemore, RMSEA has been shown to decrease (i.e., improve model fit) as the number of variables increase, while CFI has been shown to decrease (i.e., worsen model fit) as the number of variables increase (Kenny & McCoach, 2003). Therefore, the multiple indices of fit were used in the proposed study, including χ^2, CFI, RMSEA, and the Tucker-Lewis Index (TLI). Previous literature has suggested cut-off values near .95 for the CFI and TLI, and .06 for the RMSEA (Hu & Bentler, 1999; Marsh et al., 2004).

Confirmatory factor analysis. Following model development in sample one, CFA was conducted to validate the model structure of the PCSQ in sample two. Using the procedures outlined above, and recommendations of past research, χ^2 , CFI, RMSEA, and TLI were used as measures of model fit.

Concurrent Validity. To examine the concurrent validity of the PCSQ in the current study, model based correlations were computed for the two higher order factors (i.e., experiential processes of change, behavioral processes of change) of the PCQ and the processes of change measure in developed in the current study.

Construct validity. To examine the construct validity of PCSQ, differences in processes of change use were examined across athlete's stage of change. To determine statistical significance an alpha level of .05 was used. Based on the literature examining exercise behavior change (e.g., Lowther et al., 2007; Marcus et al., 1992; Marshall & Biddle, 2001) a series of one-way ANOVAs were conducted with Sheffé *post hoc* comparisons to examine the following hypotheses:

1. Use of the processes of change will be significantly less in precontemplation than in any other stage of change.
2. Use of the behavioral processes of change will be significantly greater in action and maintenance than in pre-action stages of change (i.e., precontemplation, contemplation).
3. Use of the experiential processes of change will be significantly less in maintenance than in action.
4. Use of the experiential processes of change will peak in the action stage.

Scale reliability. To assess the internal structure and reliability of the scores from the PCSQ, model-based reliability coefficients were calculated with standardized estimates using McDonald's (1999) omega (ω) coefficient in sample one and sample two. This coefficient measures the common variance in the scale as proportional to the total variance (Zinbarg, Yovel, Revelle, & McDonald, 2006).

Chapter IV: Results

In an effort to examine the Transtheoretical Model (TTM) as a theory to examine behavior change in a sport psychology context, the primary purpose of the current study was to create and validate an instrument to measure the processes of behavior change in regards to adopting and adhering to a psychological skills training (PST) routine. To facilitate this process, data were collected in two independent samples. In the first sample, exploratory structural equation modeling (ESEM) was used to determine an appropriate factor structure for the processes of change measure. In the second sample, confirmatory factor analysis (CFA) was used to examine the psychometric properties of the measurement model. Additionally, tests of construct validity, concurrent validity, and scale reliability were conducted and are discussed below.

Sample One Statistical Modeling

An exploratory approach to data analysis was taken in sample one. An *a priori* model was depicted from past research examining the processes of change proposed in the TTM (Figure 8). As the model was being tested in a new domain (i.e., sport performance as opposed to health behavior change), a CFA was deemed too restrictive for initial testing. In an effort to test the structural validity of the 10 latent variable solution proposed by Marcus, Rossi, Selby, Niaura, and Abrams (1992), an ESEM was conducted in which 10 sequential models were computed, with each model increasing the number of factors (*m)* and the fit of the model being considered. None of the 10 models were accepted as possible solutions as they failed to achieve adequate levels of model fit (see Table 4). Given the inadequate model structure of the 10-factor model, in

conjunction with a lack of discriminant validity for the social liberation subscale in the item development phase, the social liberation subscale was removed from further analysis. Additionally, given lack of a solution in preliminary analysis, the structural validity of each latent variable was examined.

Table 4

Indices of Model Fit for Exploratory Analysis

Solution	χ^2	CFI	TLI	RMSEA
Model 1	4366.10*	0.565	0.551	0.076
Model 2	3836.03*	0.651	0.628	0.069
Model 3	3531.44*	0.696	0.665	0.066
Model 4	3239.16*	0.738	0.702	0.062
Model 5	2946.23*	0.781	0.742	0.058
Model 6	2788.17*	0.800	0.755	0.056
Model 7	2646.61*	0.815	0.766	0.055
Model 8	2502.37*	0.831	0.778	0.054
Model 9	2512.51*	0.818	0.753	0.056
Model 10	2717.70*	0.807	0.728	0.059

Note: * $p < .001$

Structural validity of each latent variable. To examine the structure of each latent variable, a CFA was conducted and indices of model fit were examined. *Post hoc* examinations of modification indices (M.I.) were conducted to determine possible locations of model misspecifications. Following analysis, latent variables that failed to achieve an acceptable model solution were eliminated from further analysis. Additionally, items that failed to load > .50 on their intended factor were eliminated from further analysis.

***Consciousness raising CFA*.** The consciousness raising scale was deemed an acceptable model fit with a non-significant χ^2 test ($\chi^2 = 3.316$, $p = .6515$), a Comparative Fit Index (CFI) of 1.000, a Tucker Lewis Index (TLI) of 1.032, and a Root Mean Square

Error of Approximation (RMSEA) > .001. Analysis of the individual items indicated one of the five items (i.e., CR4) failed to load > .50 and was eliminated from further analysis. A follow-up CFA was conducted to examine the new four-item subscale and resulted in an acceptable fit (see Table 5 for indices of model fit).

Dramatic Relief CFA. Initial analysis of the dramatic relief scale failed to achieve an acceptable fit (χ^2 = 19.898, p < .01; CFI = .879; TLI = .758; RMSEA = .122). Analysis of the individual items indicated two of the five items (i.e., DR2, DR4) failed to load > .50. Additionally, model M.I. indicated overlap between DR4 and DR1 (M.I. = 13. 597). The model was then specified to include correlations between these variables. Results indicated an acceptable model fit (χ^2 = 5.953, p = .202; CFI = .984; TLI = .960; RMSEA = .049). Analysis of the individual items indicated that one of the 5 items failed to load > .50 (i.e., DR4). As such these items were eliminated from further analysis. A follow-up CFA was conducted on the remaining four items. Results indicated an acceptable model fit (see Table 5 for indices of model fit).

Environmental re-evaluation CFA. Initial analysis of the environmental re-evaluation scale yielded an acceptable fit (χ^2 = 7.914, p = .1610; CFI = .980; TLI = .960; RMSEA = .054). Analysis of the individual items indicated two of the five items (i.e., ER2, ER4) failed to load > .50, and were eliminated from further analyses.

Self-reevaluation CFA. Initial analysis of the self-reevaluation scale failed to achieve an acceptable fit (χ^2 = 32.757, p < .01; CFI = .878; TLI = .796; RMSEA = .115). Model M.I. indicated overlap between SR4 and SR3 (M.I. = 15.045), and SR5 and SR6 (M.I. = 13.963). The model was then specified to include correlations between these variables. A follow-up CFA revealed that SR1 contained a residual variance greater than

1.0, thereby rendering an improper solution for the self-reevaluation scale. As such, the self-reevaluation scale was removed from further analysis.

Counter conditioning CFA. Initial analysis of the counter conditioning scale yielded an acceptable model fit ($\chi^2 = 52.749$, $p < .01$; CFI = .930; TLI = .902; RMSEA = .090. Analysis of the individual items indicated two of the eight items (i.e., CC1; CC7) failed to load > .50 and were eliminated from further analysis. A follow-up CFA was conducted to examine the new six-item subscale and resulted in an acceptable model fit (see Table 5 for indices of model fit).

Helping relationships CFA. Initial analysis of the helping relationships scale failed to achieve an acceptable model fit ($\chi^2 = 80.615$, $p < .01$; CFI = .838; TLI = .785; RMSEA = .099). Model modification indices indicated overlap between HR4 and HR2 (M.I. = 14.110), between HR6 and HR5 (M.I. = 35.840), and between HR9 and HR8. The model was then specified to include correlations between these variables. Results indicated an acceptable model fit ($\chi^2 = 38.982$, $p = .0274$; CFI = .955; TLI = .932; RMSEA = .056). Analysis of the individual items indicated that five of the nine items failed to load > .50 (i.e., HR2, HR3, HR4, HR7, HR8). As such these items were eliminated from further analysis. A follow-up CFA was conducted to examine the new four-item subscale and resulted in an acceptable model fit (see Table 5 for indices of model fit).

Reinforcement management CFA. Initial analysis of the reinforcement management scale failed to achieve an acceptable model fit ($\chi^2 = 78.532$, $p < .01$; CFI = .853; TLI = .804; RMSEA = .097). Model modification indices indicated overlap between RM4 and RM5 (M.I. = 28.352). The model was then specified to include

correlations between these variables. Results indicated an acceptable model fit (χ^2 = 50.787, p < .01; CFI = .929; TLI = .902; RMSEA = .069). Analysis of the individual items indicated that three of the nine items failed to load > .50 (i.e., RM1, RM2, RM4). As such these items were eliminated from further analysis. A follow-up CFA was conducted on the remaining six items. Results indicated an acceptable model fit (χ^2 = 23.264, p < .01; CFI = .941; TLI = .901; RMSEA = .089). Model modification indices indicated overlap between RM8 and RM5 (M.I. = 17.193). The model was then specified to include correlations between these variables. Results indicated an acceptable model fit (χ^2 = 6.678, p = .5718; CFI = 1.000; TLI = 1.010; RMSEA < .001). Analysis of the individual items indicated that one of the six items failed to load > .50 (i.e., RM5). This item was eliminated from further analysis. A follow-up CFA was conducted to examine the new five-item subscale and resulted in an acceptable model fit (see Table 5 for indices of model fit).

Self-liberation CFA. Initial analysis of the self-liberation scale yielded an acceptable model fit (χ^2 = 2.598, p = .7617; CFI = 1.000; TLI = 1.015; RMSEA < .001. Analysis of the individual items indicated one of the five items (i.e., SELF5) failed to load > .50 and was eliminated from further analysis. A follow-up CFA was conducted to examine the new four-item subscale and resulted in an acceptable model fit (see Table 5 for indices of model fit).

Stimulus control CFA. Initial analysis of the stimulus control scale failed to achieve an acceptable model fit (χ^2 = 76.391, p < .01; CFI = .835; TLI = .768; RMSEA = .118). Model modification indices indicated overlap between SC6 and SC3 (M.I. = 21.307), between SC7 and SC1 (M.I. = 11.461), between SC7 and SC5 (M.I. = 16.415),

between SC7 and SC6 (M.I. = 13.496) and between SC8 and SC4 (M.I. = 10.182). The model was then specified to include correlations between these variables. Results indicated an acceptable model fit (χ^2 = 23.477, p = .0745; CFI = .975; TLI = .954; RMSEA = .053). Analysis of the individual items indicated that two of the eight items failed to load > .50 (i.e., SC1, SC2) and were removed from further analysis. Given that areas of model misspecification remained in the stimulus control scale, a content analysis of the scale items was conducted to determine any potential sources of measurement error. It was determined that items SC3 and SC7 were redundant, and thus these items were eliminated from further analysis. A subsequent CFA was conducted on the remaining four-item scale and yielded an acceptable model fit (see Table 5 for indices of model fit).

Table 5

Indices of Model Fit for Individual Latent Variables

Subscale	χ^2	CFI	TLI	RMSEA
Consciousness raising	3.090 (p = .213)	0.994	0.981	0.052
Dramatic relief	5.571 (p = .062)	0.954	0.862	0.094
Environmental re-evaluation	3.164 (p = .206)	0.991	0.973	0.054
Counter-conditioning	25.977 (p < .001)	0.956	0.927	0.097
Helping relationships	3.402 (p = .183)	0.992	0.975	0.059
Reinforcement management	2.526 (p = .773)	1	1.028	<.001
Self-liberation	0.729 (p = .695)	1	1.016	< .001
Stimulus control	2.814 (p = .245)	0.993	0.980	0.045

Revised exploratory structural equation model. Following analysis of the individual subscales, the 34 remaining items, representing eight latent variables (social liberation and self-reevaluation were excluded), were tested (Figure 9). An ESEM was

conducted in which eight sequential models were computed, with each model increasing *m* and the fit of the model being considered. An 8-factor model solution was accepted (CFI = .945; TLI = .902; RMSEA = .049). In examining the individual item loadings, all 4 items on the dramatic relief scale failed to discriminate as a distinct factor (i.e., all items loaded on the environmental re-evaluation factor). As such, dramatic relief was eliminated for further analyses. Additionally, HR1, CC8, CR2, SELF1, RM8, contained secondary pattern coefficients (i.e., cross-loadings) that were higher than the item loadings on the intended factor, and CC6 failed to load > .3 on its intended factor. These items were eliminated from further analysis.

Accepted model solution. The remaining 24-items, representing seven latent variables were once again tested. An ESEM was conducted in which seven sequential models were computed, with each model increasing *m* and the fit of the model being considered. The 7-factor solution was accepted as an appropriate structural model (χ^2 = 117.719, p = .003; CFI = .973; TLI = .942; RMSEA = .043).

Sample Two Statistical Modeling

In an effort to validate the measurement model accepted in sample one, data were collected on an independent sample of participants (n = 358). *Post hoc* examinations of M.I. were conducted to determine possible locations of model misspecifications. A CFA analysis was conducted and results in an acceptable model fit (χ^2 = 372.588, p < .001; CFI = .949; TLI = .937; RMSEA = .043). Final scale items and factor loadings can be found in Table 6. In addition to the latent variables representing the processes of behavior change, researchers have proposed two higher order factors – experiential

processes (consciousness raising, environmental re-evaluation) and behavioral processes (counter conditioning, helping relationships, reinforcement management, self-liberation, stimulus control) – that separate the various latent variables (Marcus, Rossi, Selby, Niaura, & Abrams, 1992; Prochaska, Velicer, DiClemente, & Fava, 1988). In an effort to test whether or not the two higher order factors were plausible in a sport setting, both a one higher order factor and a two higher order factor model was tested. The 1-factor model showed a slight improvement in model fit ($\chi^2 = 36.056$, $p = .001$; CFI = .969; TLI = .953; RMSEA = .066) over the 2-factor model ($\chi^2 = 35.423$, $p < .001$; CFI = .968; TLI = .949; RMSEA = .070). Additionally, in the 2-factor model, the higher order factors (i.e., behavioral, experiential) displayed a correlation of .950, suggesting that a two higher order factor model may not be meaningful in the current population. As such, the two higher order factors were eliminated from the *a priori* model, and the accepted model represents seven correlated factors model (Figure 10). A correlation matrix to assess to relationship amongst latent variables in the model can be found in Table 7.

Table 6

Final Scale Items and Factor Loadings on Individual Items

Items	Factor Loading
Consciousness Raising	
I read about mental skills training in an attempt to learn more about it (CR1)…	0.696
I look for information on mental skills training (CR3)…	0.799
I think about information I have read in articles and books about how to do mental skills training (CR5)…	0.769
Environmental Re-evaluation	
I consider that working on my mental game would help improve the performance of my team/organization (ER1)…	0.707
Some of my teammates might work with a sport psychologist if I did (ER3)…	0.448
I believe I would be a better role model for my teammates if I participated in mental skills training (ER5)…	0.559
Self-liberation	
Since mental training is so important, I will do whatever it takes and am confident I can incorporate it into my daily routine (SELF2)...	0.752
Like physical training, I am committed to doing mental skills training consistently to maximize my potential as an athlete (SELF3)...	0.744
I am committed to working on my mental skills and I know I can keep improving them (SELF4)…	0.770
Counter Conditioning	
Rather than viewing mental skills training as simply another task to get out of the way, I try to enjoy it and use it as time to sharpen my skills (CC2)…	0.770
I incorporate mental skills training as an important part of my preparation routine (CC3)…	0.697
Rather than viewing mental training as a chore, I now see that it is helpful in achieving my goals (CC4)...	0.642
Rather than thinking of mental training as something for athletes with problems, I use it as a way to enhance my strengths (CC5)...	0.792

(Table 6 Continued)

Helping Relationships	
I can be open with at least one person about the struggles I am having (HR5)...	0.722
I have someone who listens when I need to vent (HR6)...	0.768
I have someone I can depend on when I am struggling in my sport (HR9)...	0.786
Reinforcement Management	
Winning in my sport is a reward for working on my mental skills (RM3)…	0.519
Being able to play as well in practice as I do in games in a reward I get from working on my mental skills training (RM6)…	0.772
Winning against teams/players that used to beat me in competition is a reward I receive from working on my mental skills (RM7)...	0.709
That I am not longer stressed out is a reward from working on my mental skills training (RM9)…	0.582
Stimulus Control	
I keep things in the athletic facilities to remind me to work on my mental game (SC4)...	0.599
I have an alarm set on my phone that reminds me to work on my mental training (SC5)…	0.408
I avoid environments that are not receptive to improving your mental game (SC6)...	0.460
I put things in my house to remind me of working on my mental game (SC8)…	0.686

Table 7

Correlations Among Latent Variables

Process of Change	CR	ER	CC	HR	RM	SELF	SC
CR	***	0.643	0.635	0.066	0.699	0.730	0.610
ER		***	0.754	0.319	0.744	0.734	0.527
CC			***	0.290	0.727	0.707	0.496
HR				***	0.260	0.253	0.065
RM					***	0.800	0.762
SELF						***	0.761
SC							***

Note: CR = consciousness raising; ER = environmental reevaluation; HR = helping relationships; CC = counter conditioning; RM = reinforcement management; SELF = self-liberation; SC = stimulus control

Construct Validity

To examine the construct validity of the Processes of Change in Sport Questinnaire (PCSQ), a series of one-way analyses of variance (ANOVA) and Sheffé *post hoc* comparisons were conducted to examine differences in processes of change use across stage of change. Results indicated a significant difference in process of change use across stage of change for all seven processes, as well as total processes of change (Table 8).

The results of Sheffé *post hoc* comparisons indicated there were significant differences in: (a) consciousness raising between precontemplation and contemplation ($p < .001$), action ($p < .001$), and maintenance ($p < .001$); (b) environmental reevaluation between precontemplation and contemplation ($p < .001$), action ($p < .001$), and maintenance ($p < .001$); (c) counter conditioning between precontemplation and contemplation ($p < .001$), action ($p < .001$), and maintenance ($p < .001$), contemplation

and action ($p < .001$), and contemplation and maintenance ($p = .006$); (d) helping relationships between precontemplation and maintenance ($p = .015$); (e) reinforcement management between precontemplation and contemplation ($p = .024$), action ($p < .001$), and maintenance ($p < .001$), contemplation and action ($p = .024$), and contemplation and maintenance ($p = .012$); (f) self-liberation between precontemplation and contemplation ($p < .001$), action ($p < .001$), and maintenance ($p < .001$), contemplation and action ($p < .001$), and contemplation and maintenance ($p = .015$); (g) stimulus control between precontemplation and action ($p < .001$) and maintenance ($p < .001$), contemplation and action ($p = .002$) and maintenance ($p < .001$); (h) and total processes of change between precontemplation and contemplation ($p < .001$), action ($p < .001$), and maintenance ($p < .001$), contemplation and action ($p = .003$), and contemplation and maintenance ($p = .018$). Results of post-hoc comparisons can be found in Table 9 and Figure 11.

Table 8

ANOVA Source Table for Difference in Processes of Change use Across Stage of Change

Source	*df*	*SS*	*MS*	*F*	*p*	η^2
Consciousness Raising						
Between Groups	3	67.748	22.583	31.169	< .001	0.15
Within Groups	526	381.096	.725			
Environmental Reevaluation						
Between Groups	3	35.876	11.959	31.725	< .001	0.15
Within Groups	528	199.029	.377			
Counter Conditioning						
Between Groups	3	71.573	23.858	60.927	< .001	0.26
Within Groups	528	206.752	.392			
Helping Relationships						
Between Groups	3	6.313	2.104	4.287	.005	0.02
Within Groups	523	256.700	.491			
Reinforcement Management						
Between Groups	3	28.035	9.345	19.324	< .001	0.11
Within Groups	524	253.403	.484			

(Table 8 Continued)

Source	*df*	*SS*	*MS*	*F*	*p*	η^2
			Self-liberation			
Between Groups	3	80.530	26.853	51.628	< .001	0.23
Within Groups	531	274.527	.520			
			Stimulus Control			
Between Groups	3	17.357	5.786	13.880	< .001	0.07
Within Groups	527	219.677	.417			
			Processes of Change, Total			
Between Groups	3	34.605	11.535	54.076	< .001	0.24
Within Groups	512	109.218	.213			

Table 9

Post Hoc Comparisons for Processes of Change Difference Across Stage of Change

Process of Change	Scheffé comparisons across Stage of Change (α = .05)
Consciousness Raising	PC < CO, AX, MN
Environmental Re-evaluation	PC < CO, AX, MN
Helping Relationships	PC < MN
Counter Conditioning	PC < CO, AX, MN CO < AX, MN
Reinforcement Management	PC < CO, AX, MN CO < AX, MN
Self-Liberation	PC < CO, AX, MN CO < AX, MN
Stimulus Control	PC < AX, MN CO < AX, MN
Processes of Change Total	PC < CO, AX, MN CO < AX, MN

Note: PC = precontemplation; CO = contemplation; AX = action; MN = maintenance

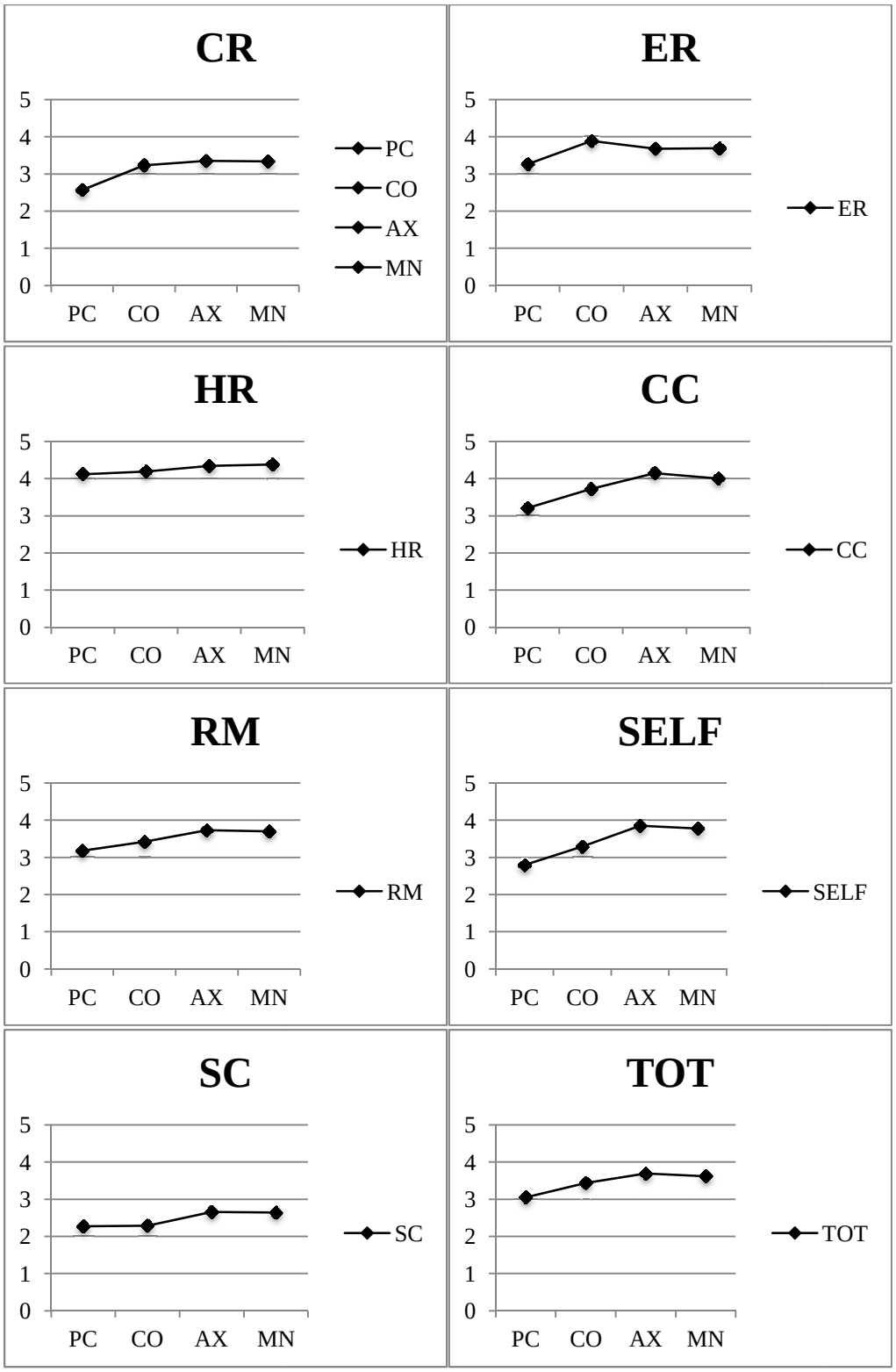

Figure 11. Use of processes of change across stage of change.

Note: CR = consciousness raising; ER = environmental reevaluation; HR = helping relationships; CC = counter conditioning; RM = reinforcement management; SELF = self-liberation; SC = stimulus control; TOT = total process of change; PC = precontemplation; CO = contemplation; AX = action; MN = maintenance

Concurrent Validity

A modified version of the Exercise Processes of Change Questionnaire (PCQ) was used to examine the concurrent validity of the PCSQ in the current study. Data on the PCQ were available for 183 participants in sample one. Confirmatory factor analysis of the 10 latent variable model of the PCQ in the current study resulted in a non-identified model structure (χ^2 = 1745.512, p > .01; CFI = .702; TLI = .664; RMSEA = .098) as the latent variable covariance matrix was not positive definite. Given that the 10 latent variable model failed to converge, the two higher order factors (i.e., experiential processes of change, behavioral processes of change) for both the PCQ and the PCSQ were examined. A composite model was developed to represent the experiential and behavioral processes of change in both measures. Results of a CFA yielded an acceptable model fit for the composite model (χ^2 = 243.738, p > .01; CFI = .924; TLI = .908; RMSEA = .080). Model based correlations were calculated to examine the relationship between the experiential processes of change and the behavioral processes of change on the two measures. Results indicated a correlation of 0.856 for the experiential processes of change between the two measures, and a correlation of 0.826 for the behavioral processes between the two measures.

Scale reliability

To assess the internal structure and reliability of the processes of change measure, model-based reliability coefficients were calculated with standardized estimates using McDonald's (1999) omega (ω) coefficient in sample one (n = 201) and sample two (n = 358). Reliability coefficients for each subscale and the total scale for sample one and sample two can be found in Table 10.

Social Desirability

Data on socially desirable responding were retained for 178 participants in sample one using the Marlowe-Crowne Social Desirability Scale (MC; Reynolds, 1982). The total processes of change scale, as well as all of the subscales with the exception of stimulus control yielded non-significant correlations with the MC. The stimulus control subscale yielded a correlation of .218 ($p < .01$) with the MC, however there was only 4.75% shared variance between the two measures.

Table 10

Scale Reliability Coefficients in Sample 1 and Sample 2

Subscale	**Sample 1**	**Sample 2**
Consciousness raising	ω = 0.80	ω = 0.80
Environmental re-evaluation	ω = 0.70	ω = 0.60
Counter-conditioning	ω = 0.85	ω = 0.83
Helping relationships	ω = 0.85	ω = 0.80
Reinforcement management	ω = 0.76	ω = 0.74
Self-liberation	ω = 0.85	ω = 0.80
Stimulus control	ω = 0.71	ω = 0.62

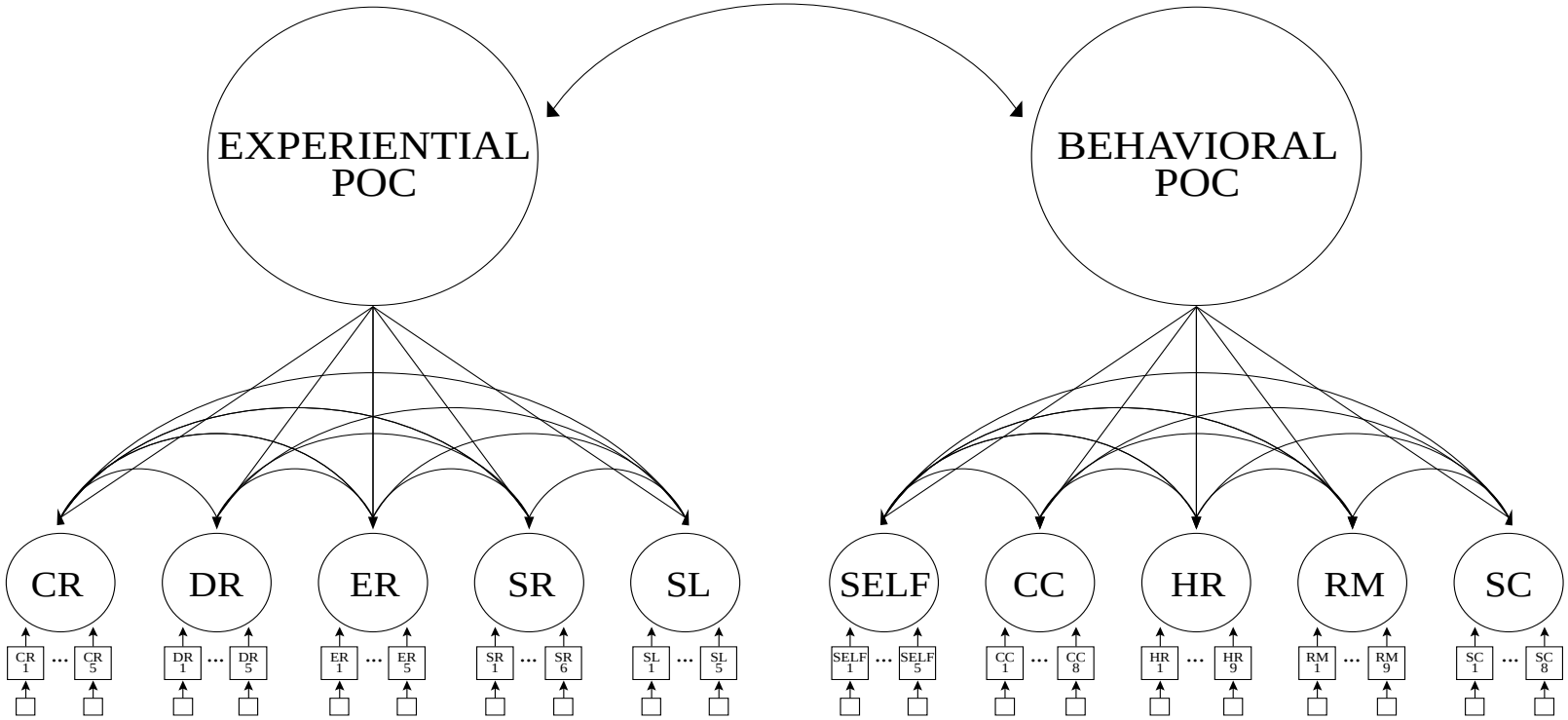

Figure 8. A priori model of the processes of change.

Note: CR = consciousness raising; DR = dramatic relief; ER = environmental reevaluation; SR = self-reevaluation; SL = social liberation; SELF = self-liberation; CC = counter conditioning; HR = helping relationships; RM = reinforcement management; SC = stimulus control.

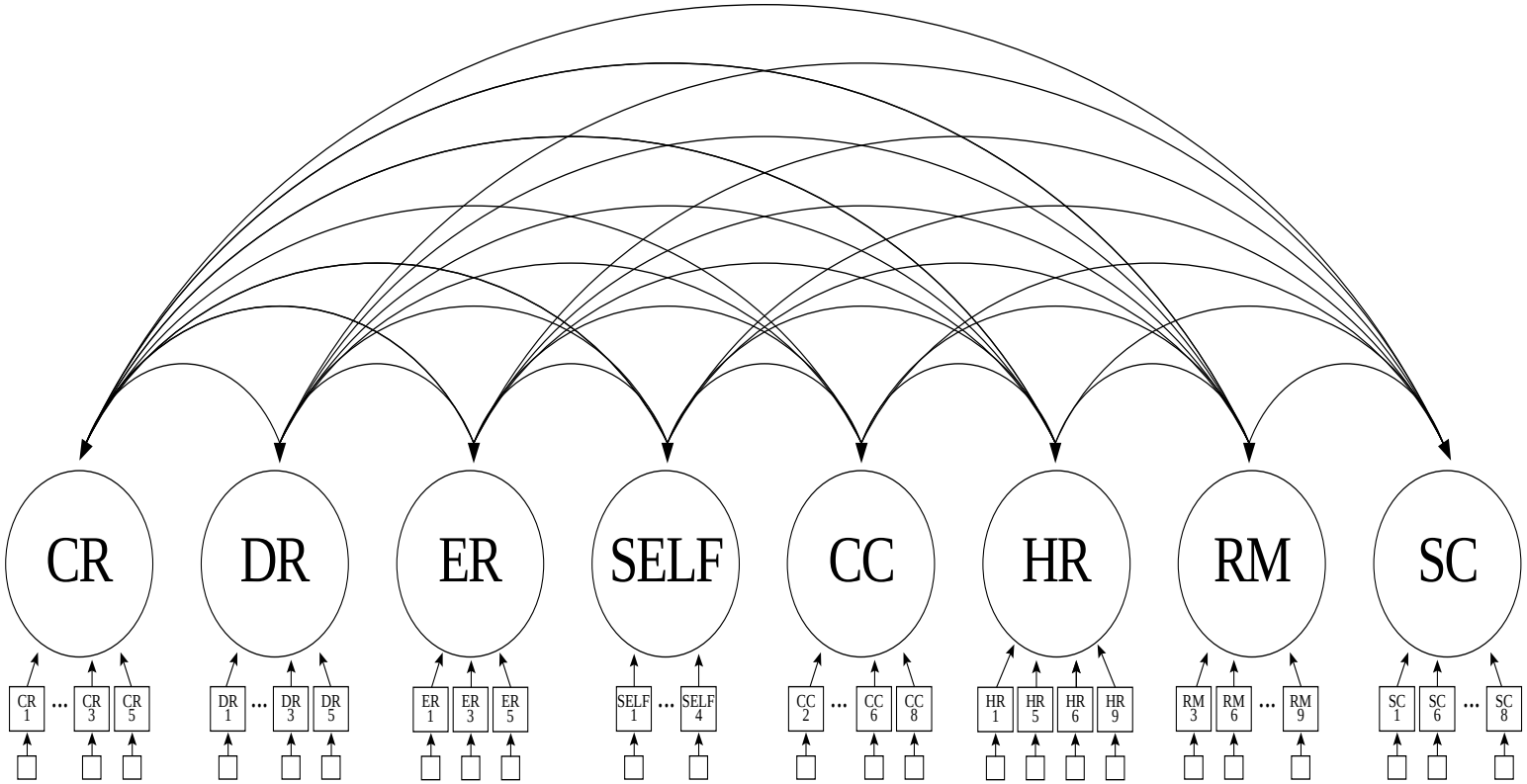

Figure 9. Model of the processes of change based on exploratory analysis

Note: CR = consciousness raising; DR = dramatic relief; ER = environmental reevaluation; SELF = self-liberation; CC = counter conditioning; HR = helping relationships; RM = reinforcement management; SC = stimulus control.

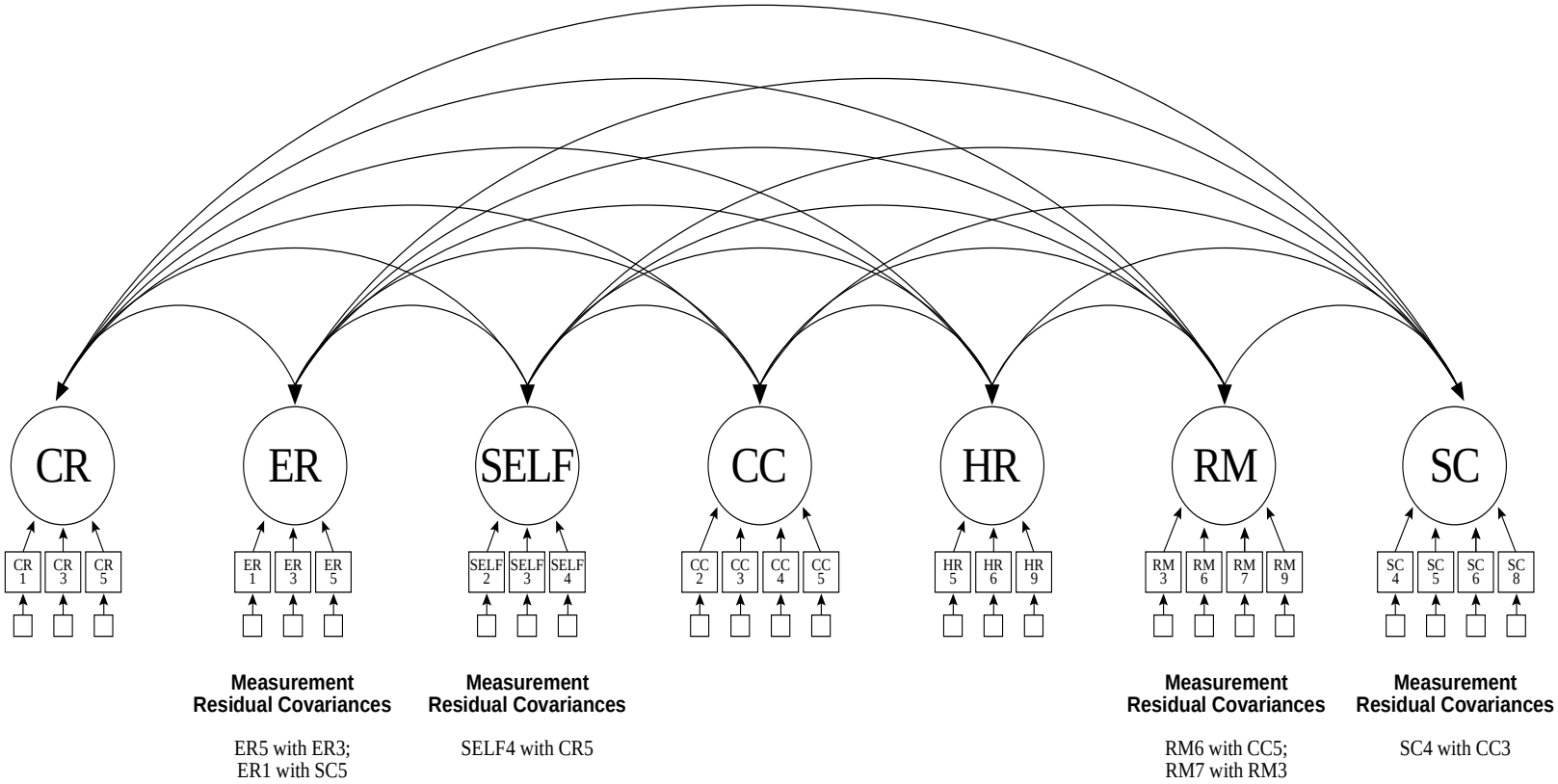

Figure 10. Accepted measurement model of the processes of change applied to psychological skills training in sport.

Note: CR = consciousness raising; ER = environmental reevaluation; SELF = self-liberation; CC = counter conditioning; HR = helping relationships; RM = reinforcement management; SC = stimulus control.

Chapter V: Discussion

Behavior change remains a notable issue and area of study in multiple health- and performance-related domains, and the Transtheoretical Model (TTM) continues to be utilized as a popular measurement and intervention tool for researchers and practitioners alike (Nigg et al., 2011). Despite this, there is limited research examining the validity of the processes of change in various behavior change domains (Geller, Nigg, Motl, Horwath, & Dishman, 2012; Marcus, Rossi, Selby, Niaura, & Abrams, 1992; O'Connor, Carbonari, & DiClemente, 1996; Paxton et al., 2008; Pruitt et al., 2010). As such, the purpose of the current study was to create and validate an instrument to measure the processes of behavior change related to adopting and adhering to a psychological skills training (PST) routine in sport. Results of the current study supported a valid factor structure to measure the processes of change related to PST. Results also indicated support for construct validity of the processes of change, as theoretically consistent patterns of processes of change use across stage of change were reported. In the following sections, the factorial validity, construct validity, and scale reliabilities of the Processes of Change in Sport Questionnaire (PCSQ) will be discussed. A discussion of the significance of the current study, limitations of the current study, as well as areas for future research will then ensue.

Factorial Validity

To examine the factor structure of the PCSQ in the current study, data were collected in two independent samples. In sample one, validity evidence provided support for a 7-factor processes of change measure using exploratory structural equation modeling (ESEM). Throughout the analysis, three processes of change – social

liberation, dramatic relief, and self-reevaluation –were removed as the results indicated a lack of discriminant validity (i.e., social liberation, dramatic relief) or lack of a valid factor structure (i.e., self-reevaluation). While a 7-factor model diverges from the original 10 processes of change proposed by Prochaska, Velicer, DiClemente, and Fava (1988), more recent studies have also proposed eliminating processes of change that do not pertain to a specific behavior. For example, Paxton et al. (2008) showed factorial validity for a two higher-order processes of change model that represented nine of the original 10 processes of change, in which self-reevaluation was removed from the model and self-liberation and reinforcement management were combined onto a single factor. Additionally, Paxton and colleagues tested and showed factorial validity for a hypothesized model that contained only five factors, in which: (a) self-reevaluation, self-liberation, and reinforcement management were combined onto one factor; (b) dramatic relief and environmental re-evaluation were combined onto one factor; and (c) stimulus control and social liberation were eliminated from the model due to a lack of a simple structure. The validity of this 5-factor model supports the findings of the current study in that self-reevaluation, social liberation, and dramatic relief failed to emerge as unique constructs in both studies.

In sample two, validity evidence was provided for the more restrictive measurement model of the PCSQ using confirmatory factor analysis (CFA). While the indices of model fit reported in the current study met generally acceptable levels (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004), results of the CFA revealed measurement residual covariances among item indicators for the latent variables, suggesting potential areas of model misspecifications. One, possible explanation for sources of residual

covariance identified in the CFA is measurement or respondent error. For example, residual covariance was identified between the two items "*Some of my teammates might work with a sport psychologist if I did"* and "*I believe I would be a better role model for my teammates if I participated in mental skills training"* on the environment re-evaluation scale. Similarly, the item "*Winning against teams/players that used to beat me in competition is a reward I receive from working on my mental skills"* on the reinforcement management scale shared residual variance with the item *"Winning in my sport is a reward for working on my mental skills.*" It is plausible that participants perceived these items as having similar meanings, thereby suggesting possible redundancy in the items. Given these findings, future research should continue to investigate possible areas of redundancy or model misspecifications in an effort to create a more parsimonious approach to measuring the processes of change in applied sport psychology settings.

Construct Validity

To examine the construct validity of PCSQ, differences in processes of change use were examined across athlete's stage of change. Based on the literature examining exercise behavior change (e.g., Lowther et al., 2007; Marcus et al., 1992; Marshall & Biddle, 2001) the following hypotheses were made:

1. Use of the processes of change will be significantly less in precontemplation than in any other stage of change.

2. Use of the behavioral processes of change will be significantly greater in action and maintenance than in pre-action stages of change (i.e., precontemplation, contemplation).
3. Use of the experiential processes of change will be significantly less in maintenance than in action.
4. Use of the experiential processes of change will peak in the action stage.

Hypothesis 1. Results of the current studied supported the hypothesis that athletes' use of processes of change would be significantly less in the precontemplation stage than in the contemplation stage, the action stage, or the maintenance stage. Precontemplators used five of the processes of change significantly less than all other participants. Precontemplators also used helping relationships significantly less than individuals in maintenance, and stimulus control significantly less than individuals in action and maintenance. Researchers have previously reported similar findings related to processes of change use across stage. For example, Marcus et al. (1992) reported that exercise precontemplators used all 10 theoretical processes of change less than individuals in any other stage of change. In a meta-analysis of the TTM and physical activity behavior, Marshall and Biddle (2001) reported the largest effect size across all processes of change came in the transition from precontemplation to contemplation, with all effects ranging from moderate to large. The results of the current study support these findings, as it appears processes of change use has a substantial increase as an individual moves out of the precontemplation stage. In a more recent study, Pruitt et al. (2010) develop a 4-factor processes of change measure for mammography which included *commitment to regular screening, information sharing and communication, thinking*

beyond oneself, and *avoids contact with the health care system*. While these processes do not represent the original hypothesized processes of change, the authors reported that precontemplators used the first three processes (i.e., commitment, communication, thinking beyond oneself) significantly less than all other individuals, and used the last process (i.e., avoids contact) significantly more than all other individuals. Thus, it appears that movement out of the precontemplation stage of change may be facilitated by an increase use in the processes of change. However, a limitation of the current study, as well as much of the aforementioned research, is that the cross-sectional nature of the data collection makes it impossible to determine if increased use of processes of change helps mediate the transition out of the precontemplation stage, or is a byproduct of the stage transition. While previous research has demonstrated that the behavioral processes of change are a significant mediator of increased physical activity behavior (Napolitano et al., 2008), more research is necessary to better understand this relationship during early stage transitions.

Hypothesis 2. Results of the current study also supported the hypothesis that use of the behavioral processes of change would be significantly greater in action and maintenance than in pre-action (i.e., precontemplation and contemplation) stages of change. In the current study, individuals in the action and maintenance stage used counter conditioning, reinforcement management, self-liberation, and stimulus control, more than individuals in a pre-action stage of change. Additionally, individuals in maintenance used helping relationships significantly more than individuals in precontemplation. Results of the current study support previous TTM research in the exercise domain, as the use of the behavior processes generally increased through the

action stage before leveling off at the maintenance stage (Marcus et al., 1992; Marshall & Biddle, 2001). Similarly, Fallon, Hausenblas, and Nigg (2005) examined TTM variables to assess predictors in later stage transitions (i.e., action and maintenance) for men and women aiming to adhere to an exercise program. The authors reported that the behavioral processes of change were not significant predictors between the action and maintenance stage. In contrast to the results of the current study, Lowther, Mutrie, and Scott (2007) conducted a longitudinal study to examine key processes of change through stage transition in exercise behavior. The authors reported counter conditioning, helping relationships, and self-liberation to be significant predictors of the transition from action to maintenance. Concomitantly, Lowther et al. (2007) reported that a decrease in the use of the behavioral processes of change was predictive of relapse in the exercise domain. Given the longitudinal nature of the study conducted by Lowther and colleagues, in conjunction with multiple post-intervention follow-up data collections, future research in the sport domain should utilize controlled interventions with multiple post-intervention follow-up data collections to examine which processes of change are germane to stage transitions.

Hypothesis 3. Results of the current study did not support the hypothesis that the use of experiential processes of change would be less in the maintenance stage of change than in the action stage of change, as no differences were noted in process use between the action and maintenance stages. In contrast to the results of the current study, researchers studying exercise behavior change have previously reported significant decreases in the use of experiential processes between individuals in the action stage of change and the maintenance stage of change (Marcus et al., 1992). Moreover,

Lowther et al. (2007) reported that decreasing the use of environmental re-evaluation and self-reevaluation were predictive of transitioning from action to maintenance with regard to exercise behavior change. Conversely, Fallon et al. (2005) reported that increased use of environmental re-evaluation was an important predictor in transitioning from action to maintenance for women, and avoiding relapse from maintenance for men as it relates to lifelong exercise adherence. Given the conflicting reports in the exercise adherence literature, in conjunction with a dearth of TTM literature in PST, future research should continue to examine the role of processes of change in stage transitions, particularly the role of environmental re-evaluation as it relates to long-term maintenance of engaging in PST.

Hypothesis 4. The results of the current study did not support the hypothesis that the experiential processes of change would peak in the action stage, as the only significant increase was seen between the precontemplation and contemplation stages. While Marcus et al. (1992) reported increases in the experiential processes of change into the action stage, results of the current study are more congruent with the recommendation of Prochaska, DiClemente, and Norcross (1992), in that it may be most appropriate to emphasize consciousness raising and environmental re-evaluation in helping athletes transition from the precontemplation to the contemplation stage of change. Furthermore, Marshall and Biddle (2001) reported the largest effect sizes for all processes occurred between the precontemplation and contemplation stages of change. Thus increasing awareness of PST, in conjunction with having athletes consider the effects of their behavior on the performance of the team, might be particularly salient strategies in early stage transitions for adopting a PST routine. For example, Zizzi and Perna (2003)

conducted a brief workshop to introduce PST to 14 athletic teams. Results suggested that scores representing the contemplation stage of change and scores examining the pros of PST increased after the workshop, while scores representing the precontemplation stage of change and the cons of PST decreased after the workshop. Therefore, it is possible that raising awareness of PST, and its application to sport performance, may help with the transition from the precontemplation stage to the contemplation stage of change. As such, future research should continue to examine the effect of increased use of processes of change on early stage transitions as it relates to adopting a PST routine.

Scale Reliabilities

To examine the internal structure and reliability of the PCSQ, model-based reliability coefficients were calculated with standardized estimates using McDonald's (1999) omega (ω) coefficient. In the current study, acceptable levels of reliability were reported for 5 of the 7 subscales, with less than optimal reliability coefficients for environmental re-evaluation and stimulus control. Given the low factor loadings for two items on the environmental re-evaluation scale, in conjunction with residual covariance between the items, future research should examine replacing ER3 (i.e., *Some of my teammates might work with a sport psychologist if I did*) as an item on the subscale. Additionally, with regard to the stimulus control subscale, the (a) low factor loadings for multiple items, (b) high residual variance for multiple items, and (c) less than optimal level of internal consistency call into question the validity of this subscale. As such, future research should examine whether stimulus control has a valid factor structure that can be measured reliably in a sport context.

Conclusions

Results of the current study support the use of the TTM as a theoretical paradigm to study behavior change processes related to adopting and adhering to a PST routine in sport. In particular, it appears that the processes of behavior change reported across multiple behavior change domains might also be viable for sport psychology professionals. While research to date provides support for the use of PST to improve sport performance, maintenance of PST intervention effects (Martin, Vause, & Shwartzman, 2005) and readiness to engage in a PST intervention (Massey, Meyer, & Hatch, 2011) remain notable concerns in the sport psychology literature. Common to both of these limitations is the notion that failure to maintain the benefits of an intervention may be tied to readiness to engage in the intervention in the first place (Miller & Rollnick, 2002). By examining the processes involved in *how* an athlete may change his or her behavior, results of the current study contribute to both the behavior change and sport psychology literatures.

Significance. While support for the TTM has been established across a multitude of behavior change domains (Hall & Rossi, 2008), and the generalizability of TTM constructs has been reported (Wright, Velicer, & Prochaska, 2009), the current investigation was the first of its kind to empirically examine the processes of behavior change in a sport performance context. In addition, the current study is one of relatively few studies utilizing CFA to examine the factor validity of the processes of change construct (Geller, Nigg, Motl, Horwath, & Dishman, 2012; Marcus, Rossi, Selby, Niaura, & Abrams, 1992; O'Connor, Carbonari, & DiClemente, 1996; Paxton et al., 2008; Pruitt et al., 2010). Furthermore, given the applications of the TTM in both measurement and

intervention research, the development and continued testing of psychometrically sound instruments should remain at the forefront of theory testing in a new behavior change domain (Nigg et al., 2011). As such, results of the current study contribute to the behavior change and sport performance literatures, as it is the first to show validity for the processes of change construct as related to adopting and adhering to a PST routine for improved sport performance.

While authors of previous studies have reported initial support for TTM constructs (Keeler & Watson, 2011; Leffingwell, Rider, & Williams, 2001; Massey, et al., 2011; Zizzi & Perna, 2003), the lack of a valid and reliable processes of change measure has prevented a robust examination of the TTM in this domain. Given that the stage construct of the TTM provides data on an athlete's readiness to engage in a PST intervention, results of the current study make a significant contribution to the sport psychology literature as it is the first the explore the processes by which researchers and practitioners might aim to change an athlete's readiness (i.e., progress to a more action-oriented stage of change). In particular, the moderate to large effect sizes (Cohen, 1988) reported in the current study for six of the seven processes of change support the theoretical notion that increasing the use of processes of change will aide in the behavior change process. Thus, while measuring the long-term effects of psychological intervention on sport performance remains a difficult task given the multitude of variables that may account for sport performance in any given contest, the TTM provides a framework for sport psychology professionals to address another key issue in the field – whether or not they are successful in helping athletes change and maintain more productive behaviors.

Limitations and areas for future research. Results of the current study make several contributions to the literature, yet limitations exist which need to be addressed in future research. First, given the low reliability coefficients for two of the seven subscales, in addition to possible areas of model misspecification, researchers should continue to investigate the validity of the processes of change construct in a sport setting. Additionally, the small sample size and unequal distribution of participants across stage of change, sport level, and sport season preclude the researcher from testing whether or not the factor structure of the PCSQ is invariant across stage of change or in various groups. As such, researchers should continue to examine the validity of the PCSQ, by testing for structural invariance across stages and groups.

In considering a future line of research to examine the TTM applied to PST, sport scientists may consider other notable lines of research utilizing the TTM. In particular, researchers should consider: (a) exploring possible moderation and mediation relationships between various TTM constructs; (b) utilizing latent-growth modeling to examine predictors of behavior change over time; and (c) conducting stage-matched, mismatched, and non-matched (i.e., other theory approaches) interventions (Nigg et al., 2011). In doing so, it is recommended that researchers incorporate all TTM constructs (i.e., stage of change, processes of change, decisional balance, self-efficacy) into research designs in an effort to test the relationships between theoretical variables in an athlete population. For example, identifying how decisional balance and self-efficacy play a role in the use of processes of change might aid in the design of interventions aimed at changing behavior in an athletic population. Such an approach would be beneficial to the field of sport psychology broadly, and the implementation of PST specifically, as

researchers could better identify how to individualize PST training programs based on an athlete's readiness for change.

While results of the current study provide a starting point to better understand behavior change in athletes, more work needs to be done in order to better understand the behavior change process in this population. As the field of applied sport psychology continues to grow, ongoing behavior change will assist sport psychology practitioners in the design, implementation, and effectiveness of sport psychology interventions. Thus, while a disconnect between research demonstrating the effectiveness of PST for sport performance and athletes' willingness to engage in PST still exists, a better understanding of the behavior change process may be useful in bridging the gap from research to practice in applied sport psychology.

References

Anderson, M.B. (2005). *Sport psychology in practice.* Champaign, IL: Human Kinetics.

Annesi, J.J. (1998). Applications of the individual zone of optimal functioning model for the multimodal treatment of precompetitive anxiety. *The Sport Psychologist, 12,* 300-316.

Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling, 16,* 397-438.

Bandura, A. (1986). *Social cognitive theory of human thought and action.* New York, NY: Freeman.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Barnett, N.P., Smoll, F.L., & Smith, R.E. (1992). Effects of enhancing coach-athlete relationships on youth sport attrition. *The Sports Psychologist, 6,* 111-128.

Ben-Porath, D. D. (2002). Stigmatization of individuals who receive psychotherapy: An interaction between help-seeking behavior and the presence of depression. *Journal of Social & Clinical Psychology, 21,* 400–413.

Bloom, B.S. (1985). *Developing talent in young people*. New York, NY: Ballantine.

Brewer, B.W., & Van Raalte, J.L. (2008). Introduction to sport and exercise psychology. In J.L. Van Raalte, & B.W. Brewer (Eds.), *Exploring sport and exercise psychology* (pp. 3-10). Washington D.C.: American Psychological Association.

Brobst, B., & Ward, P. (2002). Effects of public posting, goal setting, and oral feedback on the skills of female soccer players. *Journal of Applied Behavior Analysis, 35,* 247-257.

Brown, J.L. (2011). Cognitive-behavioral strategies. In J.K Luiselli, & D.D. Reed (Eds.), *Behavioral sport psychology: Evidence-based approaches to performance enhancement* (pp. 113-126). New York, NY: Springer.

Brown, L.J., Malouff, J.M, & Schutte, N.S. (2005). The effectiveness of a self-efficacy intervention for helping adolescents cope with sport-competition loss. *Journal of Sport Behavior, 28,* 136-150.

Browne, M.W. (2001). An overview of analytic rotation in exploratory factor analysis. *Multivariate Behavioral Research, 36,* 111–150.

Buchanan, T., & Smith, J.L. (1999). Using the Internet for psychological research: Personality testing on the World Wide Web. *British Journal of Psychology, 90,* 125-144.

Callow, N., & Hardy, L. (2001). Types of imagery associated with sport confidence in netball players of varying skill levels. *Journal of Applied Sport Psychology, 13,* 1-17.

Callow, N., Hardy, L., & Hall, C. (2001). The effects of a motivational general mastery imagery intervention on sport confidence of high-level badminton players. *Research Quarterly for Exercise and Sport, 72,* 389-400.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Erlbaum.

Corey (2009). *Theory and Practice of Counseling and Psychotherapy*. Belmont, CA: Thomson Brooks/Cole.

Coté, J. (1999). The influence of family in the development of talent in sport. *The Sport Psychologist, 13,* 395-417.

Cox, R. (2007). *Sport psychology: Concepts and applications.* New York, NY: McGraw-Hill Companies.

Craft, L.L., Magyar, T.M., Becker, B.J., & Feltz, D.L. (2003). The relationship between the Competitive State Anxiety Inventory-2 and sport performance: A meta-analysis. *Journal of Sport and Exercise Psychology, 25*, 44-65.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. New York: Cambridge.

DiClemente, C.C., & Prochaska, J.O. (1982). Self-change and therapy change of smoking behavior: A comparison of processes of change in cessation and maintenance. *Addictive Behaviors, 7,* 133-142.

DiClemente, C.C, & Prochaska, J.O. (1985). Processes and stages of change: Coping and competence in smoking behavior change. In S. Shiffman & T.A. Wills (Eds.), *Coping and substance abuse* (pp. 319-343). San Diego, CA: Academic Press.

Di Noia, J., Schinke, S.P., Prochaska, J.O., & Contento, I.R. (2006). Application of the transtheoretical model to fruit and vegetable consumption among economically disadvantaged African-American adolescents: Preliminary findings. *American Journal of Health Promotion, 20,* 342- 348.

Duda, J.L. (1992). Motivation in sport settings: A goal perspective approach. In G.C. Roberts (Ed.), *Motivation in sport and exercise* (pp. 57-91). Champaign, IL: Human Kinetics.

Durand-Bush, N., & Salmela, J.H. (2002). The development and maintenance of expert athletic performance: Perceptions of world and Olympic champions. *Journal of Applied Sport Psychology, 14,* 154-171.

Easterbrook, J.A. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review, 66,* 183-201.

Ericsson, K.A., Krampe, R.T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100,* 363-406.

Evans, L., Jones, L., & Mullen, R. (2004). An imagery intervention during the competitive season with an elite rugby union player. *The Sport Psychologist, 18,* 252-271.

Evers, K.E., Prochaska, J.O., Johnson, J.L., Mauriello, L.M., Padula, J.A., & Prochaska, J.M. (2006). A randomized clinical trial of a population- and transtheoretical model-based stress-management intervention. *Health Psychology, 25,* 521-529.

Everson, E.S., Taylor, A.H., & Ussher, M. (2010). Determinants of physical activity promotion by smoking cessation advisors as an aid for quitting: Support for the transtheoretical model. *Patient Education and Counseling, 78,* 5-56.

Fallon, E.A., Hausenblas, H.A., Nigg, C.R. (2005). The transtheoretical model and exercise adherence: Examining construct associations in later stages of change. *Psychology of Sport and Exercise, 6,* 629-641.

Feltz, D., & Landers, D. (1983). The effects of mental practice on motor-skill learning and performance: A meta-analysis. *Journal of Sport Psychology, 2,* 210-220.

Gauron, E.F. (1984). *Mental training for peak performance.* Lansing, NY: Sport Science Associates.

Geller, K.S., Nigg, C.R., Motl, R.W., Horwath, C.C., & Dishman, R.K. (2012). Transtheoretical model constructs for physical activity behavior are invariant across time among ethnically diverse adults in Hawaii. *Psychology of Sport and Exercise, 13,* 606-613.

Gould, D., Eklund, R.C., & Jackson, S.A. (1992a). 1988 U.S. Olympic wrestling excellence: I. Mental preparation, precompetitive cognition, and affect. *The Sport Psychologist, 6,* 358-382.

Gould, D., Eklund, R.C., & Jackson, S.A. (1992b). U.S. Olympic wrestling excellence: II. Thoughts and affect occurring during competition. *The Sport Psychologist, 6,* 383-402.

Gould, D., Murphy, S., Tammen, V., & May, J. (1991). An evaluation of U.S. Olympic sport psychology consultant effectiveness. *The Sport Psychologist, 5,* 111-127.

Gould, D., Petlichkoff, L., Simons, J., & Vevera, M. (1987). Relationship between Competitive State Anxiety Inventory-2 Subscale Scores and pistol shooting performance. *Journal of Sport Psychology, 9,* 33-42.

Gould, D., Weiss, M., & Weinberg, R. (1981). Psychological characteristics of successful and nonsuccessful Big Ten wrestlers. *Journal of Sport Psychology, 3,* 69-81.

Greenleaf, C., Gould, D., & Dieffenback, K. (2001). Factors influencing Olympic performance: Interviews with Atlanta and Nagano US Olympians. *Journal of Applied Sport Psychology, 13,* 154-184.

Greenspan, M.J., & Feltz, D. L. (1989). Psychological interventions with athletes in competitive sports: A review. *The Sport Psychologist, 3,* 219-236.

Grove, J.R., Norton, P.J., Van Raalte, J.L., & Brewer, B.W. (1999). Stages of change as an outcome measure in the evaluation of mental skills training programs. *The Sport Psychologist, 13,* 107-116.

Guan, J., Xiang, P., McBride, R., & Bruene, A. (2006). Achievement goals, social goals, and students' reported persistence and effort in high school physical education. *Journal of Teaching Physical Education, 25,* 58-74.

Gucciardi, D. F. (2010). Mental toughness profiles and their relations with achievement goals and sport motivation in adolescent Australian footballers. *Journal of Sports Sciences, 28,* 615-625.

Hacker, K., Brown, E., Cabral, H., & Dodds, D. (2005). Applying a transtheoretical behavioral change model to HIV/STD and pregnancy prevention in adolescent clinics. *Journal of Adolescent Health, 37,* S80-S93.

Hale, B., & Whitehouse, A. (1998). The effects of imagery-manipulated appraisal on intensity and direction of competitive anxiety. *The Sport Psychologist, 12,* 40-51.

Hall, H.K. (1990). *A social-cognitive approach to goal setting: The mediating effects of achievement goals and perceived ability.* Unpublished doctoral dissertation. University of Illinois.

Hall, K.L., & Rossi, J.S. (2008). Meta-analytic examination of the strong and weak principles across 48 health behaviors. *Preventive Medicine, 46,* 266-274.

Hamilton, S., & Fremouw, W. (1985). Cognitive-behavioral training for college free-throw performance. *Cognitive Therapy* and *Research, 9,* 479-483.

Hanin, Y.L. (1989). Interpersonal and intragroup anxiety: Conceptual and methodological issues. In D. Hackfort & C.D. Spielberger (Eds.), *Anxiety in sports: An international perspective* (pp. 19-28). Washington, D.C.: Hemisphere Publishing Corporation.

Hatzigeorgiadis, A., Zourbanos, N., Galanis, E., & Theodorakis, Y. (2011). Self-talk and sports performance: A meta-analysis. *Perspectives on Psychological Science, 6,* 348-356.

Heyman, S.R. (1987). Research and interventions in sport psychology: Issues encountered in working with an amateur boxer. *The Sport Psychologist, 1*, 208-223.

Hinshaw, K. (1991). The effects of mental practice on motor skill performance: Critical evaluation and meta-analysis. *Imagination, Cognition, and Personality, 11,* 3-35.

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.

Hull, C.L. (1943). *Principles of behavior*. New York, NY: Appleton-Century-Crofts, Inc.

IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.

Jackson, D.L., Gillaspy, J.A., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14,* 6-23.

Jerome, G.J., & Williams, J.M. (2000). Intensity and interpretation of competitive state anxiety: Relationship to performance and repressive coping. *Journal of Applied Sport Psychology, 12,* 236-250.

Jones, G., Hanton, S., & Connaughton, D. (2002). What is this thing called Mental Toughness? An investigation with elite performers. *Journal of Applied Sport Psychology, 14,* 211–224.

Jowdy, D.P, & Harris, D.V. (1990). Muscular responses during mental imagery as a function of motor skill level. *Journal of Sport and Exercise Psychology, 12,* 191-201.

Keeler, L.A., & Watson, J.C. II (2011). The transtheoretical model and psychological skills training. Application and implications with elite female rugby players. *Athletic Insight, 13*(2).

Kenny, D.A., & McCoach, D.B. (2003). Effect of the number of variables on measurement of fit in structural equation modeling. *Structural Equation Modeling, 10,* 333-351.

Kirschenbaum, D., & Bale, R. (1980). Cognitive-behavioral skills in golf: Brain power golf. In R. Suinn (Ed.), *Psychology in sports: Methods and applications* (pp. 275-287). Minneapolis, MN: Burgess.

Kleingeld, A., van Mierlo, H., & Arends, L. (2011). The effect of goal setting on group performance: A meta-analysis. *Journal of Applied Psychology, 96,* 1289-1304.

Krampe, R.T., & Ericsson, K.A. (1996). Maintaining excellence: Deliberate practice and elite performance in young and older pianists. *Journal of Experimental Psychology: General, 125,* 331-359.

Krane, V., & Williams, J.M. (2009). Psychological characteristics of peak performance. In J.M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (pp. 207-227). New York, NY: McGraw-Hill.

Kreiner-Phillips, K., & Orlick, T. (1993). Winning after winning: The psychology of ongoing excellence. *The Sport Psychologist, 7*, 31-48.

Kyllo, L.B, & Landers, D.M. (1995). Goal setting in sport and exercise: A research synthesis to resolve the controversy. *Journal of Sport and Exercise Psychology, 17*, 117-137.

Lanning, W., & Hisanaga, B. (1983). A study of the relation between the reduction of competition anxiety and an increase in athletic performance. *International Journal of Sport Psychology, 14*, 219-227.

Leffingwell, T.R., Rider, S.P., & Williams, J.M. (2001). Application of the transtheoretical model to psychological skills training. *The Sport Psychologist, 15,* 168–187.

Linder, D. E., Pillow, D. R., & Reno, R. R. (1989). Shrinking jocks: Derogation of athletes who consult a sport psychologist. *Journal of Sport and Exercise Psychology, 11,* 270–280.

Locke, E.A., & Latham, G.P. (1985). The application of goal setting to sports. *Journal of Sport Psychology, 7*, 205-222.

Locke, E.A., & Latham, G.P. (1990). *A theory of goal setting and task performance.* Englewood Cliffs, NJ: Prentice Hall.

Locke, E.A., & Latham, G.P. (2006). New directions in goal setting theory. *Current Directions in Psychological Science, 15*, 265-268.

Lonsdale, C., Hodge, K., & Rose, E.A. (2006). Pixels vs. paper: Comparing online and traditional survey methods in sport psychology. *Journal of Sport & Exercise Psychology, 28,* 100-108.

Lowther, M., Mutrie, N., & Scott, E.M. (2007). Identifying key processes of exercise behavior change associated with movement through the stages of exercise behaviour change, *Journal of Health Psychology, 12,* 261-272.

MacNamara, A., Button, A., & Collins, D. (2010a). The role of psychological characteristics in facilitating the pathway to elite performance part I: Identifying mental skills and behaviors. *The Sport Psychologist, 24,* 52-73.

MacNamara, A., Button, A., & Collins, D. (2010b). The role of psychological characteristics in facilitating the pathway to elite performance part II: Examining environmental and stage-related differences in skills and behaviors. *The Sport Psychologist, 24,* 74-96.

MacNamara, A., Holmes, P., & Collins, D. (2006). The pathway to excellence: The role of psychological characteristics in negotiating the challenges of musical development. *British Journal of Music Education, 23,* 285-302.

MacNamara, A., Holmes, P., & Collins, D. (2008). Negotiating transitions in musical development: The role of psychological characteristics of developing excellence. *Psychology of Music, 38,* 335-352.

Mamassis, G., & Doganis, G. (2004). The effects of a mental training on juniors pre-competitive anxiety, self-confidence, and tennis performance. *Journal of Applied Sport Psychology, 16,* 118-137.

Marcus, B.H., Rossi, J.S., Selby, V.C., Niaura, R.S., & Abrams, D.B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology, 11,* 386-395.

Marcus, B.H., & Simkin, L.R. (1993). The stages of exercise behavior. *Journal of Sport Medicine and Physical Fitness, 33,* 83-88.

Marsh, H.W., Hau, K.T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler. *Structural Equation Modeling, 11,* 320-341.

Marsh, H.W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A.J.S., Trautwein, U., & Nagengast, B. (2010). A new look at the big five factor structure through exploratory structural equation modeling. *Psychological Assessment, 22,* 471-491.

Marsh, H.W., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A.J.S., & Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and EFA: Applications to students' evaluations of university teaching. *Structural Equation Modeling, 16,* 439-476.

Marshall, S.J., & Biddle, S.J.H. (2001). The transtheoretical model of behavior change: A meta-analysis of application to physical activity and exercise. *Annals of Behavioral Medicine, 23,* 229-246.

Martens, R., Burton, D., Vealey, R.S., Bump, L.A., & Smith, D.E. (1990). Development and validation of the competitive state anxiety inventory-2 (CSAI-2). In R. Martens, R.S. Vealey, & D. Burton (Eds.), *Competitive anxiety in sport* (pp. 117–213). Champaign, IL: Human Kinetics.

Martin, S.B. (2005). High school and college athletes' attitudes toward sport psychology consulting. *Journal of Applied Sport Psychology, 17,* 127-139.

Martin, K., & Hall, C. (1995). Using mental imagery to enhance intrinsic motivation. *Journal of Sport and Exercise Psychology, 17,* 54-69.

Martin, G.L., Vause, T., & Schwartzman, L. (2005). Experimental studies of psychological interventions with athletes in competition: Why so few? *Behavior Modification, 29,* 616-641.

Massey, W.V., Meyer, B.B., & Hatch, S.J. (2011). The transtheoretical model: Examining readiness for psychological skills training. *Journal of Performance Psychology, 2,* 3-22.

McConnaughy, E.A., Prochaska, J.O., & Velicer, W.F. (1983). Stages of change in psychotherapy: Measurement and sample profiles. *Psychotherapy: Theory, Research, and Practice, 20,* 368-375.

McDonald, R.P. (1999). *Test theory: A unified treatment*. Mahwah: NJ: Lawrence Erlbaum Associates, Inc.

McKenzie, A., & Howe, B. (1997). The effect of imagery on self-efficacy for a motor skill. *International Journal of Sport Psychology, 28,* 196-210.

Meyer, B.B., Cashin, S.E., & Massey, W.V. (2012). The validity of online and paper-pencil measure of emotional intelligence. In A. Di Fabio (Ed.), *Emotional Intelligence* (pp. 183-194). Rijeka, Croatia: InTech.

Meyers, A., Schleser, R., & Okwumabua, T. (1982). A cognitive behavioral intervention for improving basketball performance. *Research Quarterly for Exercise and Sport, 53,* 344-347.

Meyers, A.W., Whelan, J.P., & Murphy, S.M. (1996). Cognitive behavioral strategies in athletic performance enhancement. In M. Hersen, R.M. Miller, & A.S. Belack (Eds.), *Handbook of behavior modification* (pp. 137-164). Pacific Grove, CA: Brooks/Cole.

Meyerson, P., & Tryon, W.W. (2003). Validating Internet research: A test of the psychometric equivalence of Internet and in-person samples. *Behavior Research Methods, Instruments, & Computers, 35*, 614-620.

Miller, W.R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change.* New York , NY: The Guilford Press.

Morris, R.L., & Kavassanu, M. (2009). The role of approach-avoidance versus task and ego goals in enjoyment and cognitive anxiety in youth sport. *International Journal of Sport and Exercise Psychology, 7*, 185-202.

Muthén, L., & Muthén, B. (2011). *Mplus user's guide [Computer software and manual]*. Los Angeles: Muthén & Muthén.

Napolitano, M.A., Lewis, B.A., Williams, D.M., Bock, B.C., Pinto, B., Papandonatos, G.D., Whiteley, J.A., King, A.C., & Marcus, B.H. (2008). Mediators of physical activity behavior change: A multivariate approach. *Health Psychology, 27*, 409-418.

Nicholls, J.G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press.

Nigg, C.R., Geller, K.S., Motl, R.W., Horwath, C.C., Wertin, K.K., & Dishman, R.K. (2011). A research agenda to examine the efficacy and relevance of the Transtheoretical Model for physical activity behavior. *Psychology of Sport and Exercise, 12,* 7-12.

Norcross, J.C., & Vangarelli, D.J. (1989). The resolution solution: Longitudinal examination of New Year's change attempts. *Journal of Substance Abuse, 1,* 127-134.

O'Connor, E.A., Carbonari, J.P., & DiClemente, C.C. (1996). Gender and smoking cessation: A factor structure comparison of processes of change. *Journal of Consulting and Clinical Psychology, 64,* 130-138.

Orlick, T., & Partington, J. (1988). Mental links to excellence. *The Sport Psychologist, 2,* 105-130.

Otten, M. (2009). Choking vs. clutch performance: A study of sport performance under pressure. *Journal of Sport and Exercise Psychology, 31,* 583-601.

Page, S., Sime, W., & Nordell, K. (1999). The effects of imagery on female collegiate swimmers' perceptions of anxiety. *The Sport Psychologist, 13,* 458-469.

Paxton, R.J., Nigg, C.R., Motl, R.W., McGee, K., McCurdy, D., Horwath-Matthai, C., & Dishman, R.K. (2008). Are constructs of the transtheoretical model for physical activity measured equivalently between sexes, age groups, and ethnicities? *Annals of Behavioral Medicine, 35,* 308-318.

Pinto, B.M., Goldstein, M.G., Papandonatos, G.D., Farrell, N., Tilkemeier, P., Marcus, B.H., & Todaro, J.F. (2011). Maintenance of exercise after phase II cardiac rehabilitation: A randomized controlled trial. *American Journal of Preventive Medicine, 41,* 274-283.

Plantania, J., & Moran, G.P. (2001). Social facilitation as a function of the mere presence of others. *The Journal of Social Psychology, 141,* 190-197.

Prapavessis, H., & Grove, R. (1991). Precompetitive emotions and shooting performance: The mental health and zone of optimal function models. *The Sport Psychologist, 5,* 223-234.

Preckel, F., & Thiemann, H. (2003). Online- versus paper-pencil-version of a high potential intelligence test. *Swiss Journal of Psychology, 62,* 131-138.

Prochaska, J.O. (1979). *Systems of psychotherapy: A transtheoretical analysis*. Homewood, IL: Dorsey Press.

Prochaska, J.O. (2008). Decision making in the transtheoretical model of behavior change. *Medical Decision Making, 28, 845-849.*

Prochaska, J.O., & DiClemente, C.C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice, 19,* 276-288.

Prochaska, J.O. & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51,* 390-395.

Prochaska, J.O, & DiClemente, C.C. (1984). *The transtheoretical approach: Crossing traditional boundaries of change.* Homewood, IL: Dorsey Press.

Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change: Applications to the addictive behaviors. *American Psychologist, 47,* 1102-1114.

Prochaska, J.O., Velicer, W.F., DiClemente, C.C., & Fava, J.L. (1988). Measuring processes of change: *Applications to the cessation of smoking. Journal of Consulting and Clinical Psychology, 56,* 520-528.

Prochaska, J.O., Velicer, W.F., Rossi, J.S., Goldstein, M.G., Marcus, B.H., Rakowski, W., Fiore, C., Harlow, L.L., Redding, C.A., Rosenbloom, D., & Rossi, S.R. (1994). Stage of change and decisional balance for 12 problem behaviors. *Health Psychology, 13,* 39-46.

Pruitt, S.L., McQueen, A., Tiro, J.A., Rakowski, W., DiClemente, C.C., & Vernon, S.W. (2010). Construct validity of a mammography processes of change scale and invariance by stage. *Journal of Health Psychology, 15,* 64-74.

Raglin, J.S., & Turner, P.E. (1993). Anxiety and performance in track and field athletes: A comparison of the Inverted-U Hypothesis with Zone of Optimal Function Theory. *Personality and Individual Differences, 14,* 163-171.

Reynolds, W.M. (1982). Development of valid and reliable short forms of the Marlowe-Crown social desirability scale. *Journal of Clinical Psychology, 38,* 119-125.

Rider, S.P. (1997). *Application of the transtheoretical model of change to psychological skills training in intercollegiate athletes*. Unpublished doctoral dissertation. University of Arizona.

Rovio, E., Eskola, J., Kozub, S. A., Duda, J. L., & Lintunen, T. (2009). Can high group cohesion be harmful?: A case study of a junior ice-hockey team. *Small Group Research, 40,* 421-435.

Rowe, D., & Gilmour, C. (2010). Sport, media, and consumption in Asia: A merchandised milieu. *American Behavioral Scientist, 35,* 1530-1548.

Ryan, E.D., & Simons, J. (1981). Cognitive demand imagery and frequency of mental practice as factors influencing the acquisition of mental skills. *Journal of Sport Psychology, 15,* 1-15.

Sarkin, J.A., Johnson, S.S., Prochaska, J.O., & Prochaska, J.M. (2001). Applying the transtheoretical model to regular moderate exercise in an overweight population: Validation of a stages of change measure. *Preventative Medicine, 33,* 462-469.

Savoy, C., & Beitel, P. (1996). Mental imagery for basketball. *International Journal of Sport Psychology, 27,* 454-462.

Schachter, S. (1982). Recidivism and self-cure of smoking and obesity. *American Psychologist, 37,* 436-444.

Slade, J.M., Landers, D.M., & Martin, P.E. (2002). Muscular activity during real and imagined movements: A test of inflow explanations. *Journal of Sport and Exercise Psychology, 24,* 151-167.

Smith, D., & Collins, D. (2004). Mental practice, motor performance and the late CNV. *Journal of Sport and Exercise Psychology, 26,* 412-426.

Smith, R.E., & Smoll, F.L. (1990). Self-esteem and children's reactions to youth sport coaching behaviors: A field study of self-enhancement process. *Developmental Psychology, 26,* 987-993.

Smith, R.E., Smoll, F.L., & Barnett, N.P. (1995). Reduction of children's sport performance anxiety through social support and stress-reduction training for coaches. *Journal of Applied Developmental Psychology, 16,* 125-142.

Smith, R.E., Smoll, F.L., & Curtis, B. (1979). Coach effectiveness training: A cognitive behavioral approach to enhancing relationship skill in youth sport coaches. *Journal of Sport Psychology, 1,* 59-75.

Smith, R.E., Smoll, F.L., & Hunt, E.B. (1977). A system for the behavioral assessment of athletic coaches. *Research Quarterly, 48,* 401-407.

Smoll, F.L, & Smith, R.E. (2006). Coach-parent relationships in youth sport. In J.M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (pp. 150-161). New York, NY: McGraw-Hill.

Smoll, F.L., Smith, R.E., Barnett, N.P., & Everett, J.J. (1993). Enhancement of children's self-esteem through social support training for youth sport coaches. *Journal of Applied Sport Psychology, 78,* 602-610.

Spencer, L., Adams, T.B., Malone, S., Roy, L., & Yost, E. (2006). Applying the transtheoretical model to exercise: A systematic and comprehensive review of the literature. *Health Promotion Practice, 7,* 428-443.

Suinn, R. (1972). Behavioral rehearsal training for ski racers. *Behavior Therapy, 3,* 519-520.

Sun, X., Prochaska, J.O., Velicer, W.F., & Laforge, R.G. (2007). Transtheoretical principles and processes for quitting smoking: A 24-month comparision of representative sample of quitters, relapsers, and non-quitters. *Addictive Behaviors, 32,* 2707-2726.

Turner, P.E., & Raglin, J.S. (1996). Variability in precompetition anxiety and performance in college track and field athletes. *Medicine and Science in Sports and Exercise, 28,* 378-385.

Van Raalte, J.L., Brewer, B.W., Brewer, D.D., & Linder, D.E. (1992). NCAA Division II college football players' perceptions of an athlete who consults a sport psychologist. *Journal of Sport & Exercise Psychology, 14,* 273–282.

Van Raalte, J.L., Brewer, D.D., Matheson, H., & Brewer, B.W. (1996). British athletes' perceptions of mental health practitioners. *Journal of Applied Sport Psychology, 8,* 102-108.

Vogel, D.L., Wade, N.G., & Hackler, A.H. (2007). Perceived public stigma and the willingness to seek counseling: The mediating roles of self-stigma and attitudes toward counseling. *Journal of Counseling Psychology, 54,* 40-50.

Walen, S.R., DiGiuseppe, R., & Dryden, W. (1992). *A practitioner's guide to rational-emotive therapy.* Oxford University Press.

Ward, P., & Karnes, M. (2002). Effects of posting self-set goals on collegiate football players' skill execution during practice and games. *Journal of Applied Behavior Analysis, 35,* 1-12.

Weinberg, R.S. (2008). Does imagery work? Effects on performance and mental skills. *Journal of Imagery Research in Sport and Physical Activity, 3,* 1-21.

Weinberg, R.S., & Gould, D. (2011). *Foundations of sport and exercise psychology*. Champaign, IL: Human Kinetics.

Weinberg, R.S., Seabourne, T., & Jackson, A. (1981). Effects of visuo-motor behavior rehearsal, relaxation, and imagery on karate performance. *Journal of Sport Psychology,* 3, 228-238.

Weinberg, R.S., Seabourne, T., & Jackson, A. (1982). Effects of visuo-motor behavior rehearsal on state-trait anxiety and performance: Is practice important? *Journal of Sport Behavior,* 5, 209-219.

Wilson, K., & Brookfield, D. (2009). Effect of goals setting on motivation and adherence in a six-week exercise program. *International Journal of Sport and Exercise Psychology, 6,* 89-100.

Wright, J.A., Velicer, W.F., & Prochaska, J.O. (2009). Testing the predictive power of the transtheoretical model of behavior change applied to dietary fat intake. *Health Education Research, 24,* 224-236.

Zajonc, R. B. (1965). Social facilitation. *Science, 149,* 269-274.

Zinbarg, R., Yovel, I., Revelle, W., & McDonald, R. (2006). Estimating generalizability to a universe of indicators that all have one attribute in common: A comparison of estimators to omega. *Applied Psychological Measurement, 30,* 121-144.

Zizzi, S.J. (2000). *The effectiveness of traditional and web-based interventions on utilization of sport psychology services: Exploring the stages of change.* Unpublished doctoral dissertation. West Virginia University.

Zizzi, S.J., & Perna, F.M. (2003). Impact of a brief workshop on the stages of change profiles in athletes. *Athletic Insight, 5*(4).

Appendices

Appendix A

Human Subjects

New Study Form

Instructions: Each Section must be completed unless directed otherwise. Incomplete forms will delay the IRB review process and may be returned to you. Enter your information in the **colored boxes** or place an **"X"** in front of the appropriate response(s).

SECTION A: Title & Date
Section Notes… • Study title must be the same on all study documents (e.g., consents, advertisements, grants, etc.). If not, a reason must be given in the Protocol Summary Form. • Mismatched titles between what the IRB approves and what is on the grant application may delay funding.

A1. Study Title: The Transtheoretical model in applied sport psychology: The development of stages of change, processes of chance, and self-efficacy instruments

A2. Today's Date: 5/28/12

SECTION B: Investigators & Study Personnel
Section Notes… • IRB correspondence (e.g., Approval Letters, IRB revisions, etc.) will be emailed to the email addresses listed under the PI and contact person (B1 and B2). • Only UWM faculty and staff may be listed as PI. However, students may be listed as a Student PI in B2.

B1. Principal Investigator (P.I.) (UWM faculty and staff only):

Name:	Barbara B. Meyer	**Degree(s):**	PhD
Title/Position:	Professor	**Department:**	Kinesiology
Telephone:	414.229.4591	**Email:**	bbmeyer@uwm.edu

B2. Student Principal Investigator (S.P.I.) or Other Contact than PI:

Name:	William V. Massey	**Degree(s):**	MS
Telephone:	414.344.8036	**Email:**	wvmassey@uwm.edu

B3. Co-Investigators and Research Personnel and identify their role in the study (e.g., Co-PI, Research Assistant, Graduate Student, etc) (if applicable). Add additional rows or attach addendum if more personnel requires listing than space provided**:**

Name:		**Study Role:**	
Name:		**Study Role:**	
Name:		**Study Role:**	
Name:		**Study Role:**	

SECTION C: Review Type Requested

Section Notes…

- C1: "Minimal Risk" is when the probability and magnitude of harm or discomfort anticipated in the proposed research are not greater, in and of themselves, than the harm and discomfort ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. For example, the risk of drawing a small amount of blood from a healthy individual for research purposes is no greater than the risk of doing so as part of routine physical examination.
- C3: The most common Exempt Category for a social science study is 2. To help determine if your study qualifies for Exempt Status, see the checklist the IRB Reviewer uses.
- C4: The most common Expedited Category for a social science study is 7.
- Upon review, the IRB office may change the requested type of review. Disqualifiers from exempt or expedited may include but not limited to: use of deception; studies involving minors, prisoners, pregnant women, impaired adults, or students; study of illegal activities like drug use; or study of private activities like sexual behavior.

C1. Are the human subjects at <u>more than</u> "minimal risk"? More than minimal risk will require Full Board Review. Place an "X" next to the appropriate response.

[__] Yes

[_x_] No

C2. Will the study involve deception or incomplete disclosure to human subjects? Place an "X" next to the appropriate response.

[__] **Yes**

[_x_] **No**

C3. I am requesting the following review by the IRB: (Select "a", "b", or "c". If "b" or "c" is selected, continue by selecting the appropriate category.) Place an "X" next to the appropriate response.

[__] **a. Full Board Review** (e.g., greater than minimal risk, the combination of a vulnerable population and sensitive information being collected, invasive procedures excluding blood draws); **OR**

[__] **b. Exempt Review where there is no more than "minimal risk" under** (select all that apply)**… OR**

[__] **Category 1** Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as **(i)** research on regular and special education instructional strategies, or **(ii)** research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

[__] **Category 2** Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: **(i)** information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and **(ii)** any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

[__] **Category 3** Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt if: **(i)** the human subjects are elected or appointed public officials or candidates for public office; or **(ii)** federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

[__] **Category 4** Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

[__] **Category 5** Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to

study, evaluate, or otherwise examine: **(i)** Public benefit or service programs; **(ii)** procedures for obtaining benefits or services under those programs; **(iii)** possible changes in or alternatives to those programs or procedures; or **(iv)** possible changes in methods or levels of payment for benefits or services under those programs.

[__] **Category 6** Taste and food quality evaluation and consumer acceptance studies.

[_x_] **c. Expedited Review under where there is no more than minimal risk and** (select all that apply)**…**

[__] **Category 1** Clinical studies of drugs and medical devices only when condition (a) or (b) is met. **(a)** Research on drugs for which an investigational new drug application (21 CFR Part 312) is not required. (Note: Research on marketed drugs that significantly increases the risks or decreases the acceptability of the risks associated with the use of the product is not eligible for expedited review.) **(b)** Research on medical devices for which (i) an investigational device exemption application (21 CFR Part 812) is not required; or (ii) the medical device is cleared/approved for marketing and the medical device is being used in accordance with its cleared/approved labeling.

[__] **Category 2** Collection of blood samples by finger stick, heel stick, ear stick, or venipuncture as follows: **(a)** from healthy, nonpregnant adults who weigh at least 110 pounds. For these subjects, the amounts drawn may not exceed 550 ml in an 8 week period and collection may not occur more frequently than 2 times per week; or **(b)** from other adults and children, considering the age, weight, and health of the subjects, the collection procedure, the amount of blood to be collected, and the frequency with which it will be collected. For these subjects, the amount drawn may not exceed the lesser of 50 ml or 3 ml per kg in an 8 week period and collection may not occur more frequently than 2 times per week.

[__] **Category 3** Prospective collection of biological specimens for research purposes by noninvasive means.

Examples: (a) hair and nail clippings in a nondisfiguring manner; (b) deciduous teeth at time of exfoliation or if routine patient care indicates a need for extraction; (c) permanent teeth if routine patient care indicates a need for extraction; (d) excreta and external secretions (including sweat); (e) uncannulated saliva collected either in an unstimulated fashion or stimulated by chewing gumbase or wax or by applying a dilute citric solution to the tongue; (f) placenta removed at delivery; (g) amniotic fluid obtained at the time of rupture of the membrane prior to or during labor; (h) supra- and subgingival dental plaque and calculus, provided the collection procedure is not more invasive than routine prophylactic scaling of the teeth and the process is accomplished in accordance with accepted prophylactic

techniques; (i) mucosal and skin cells collected by buccal scraping or swab, skin swab, or mouth washings; (j) sputum collected after saline mist nebulization.

[__] **Category 4** Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing. (Studies intended to evaluate the safety and effectiveness of the medical device are not generally eligible for expedited review, including studies of cleared medical devices for new indications.)

Examples: (a) physical sensors that are applied either to the surface of the body or at a distance and do not involve input of significant amounts of energy into the subject or an invasion of the subject's privacy; (b) weighing or testing sensory acuity; (c) magnetic resonance imaging; (d) electrocardiography, electroencephalography, thermography, detection of naturally occurring radioactivity, electroretinography, ultrasound, diagnostic infrared imaging, doppler blood flow, and echocardiography; (e) moderate exercise, muscular strength testing, body composition assessment, and flexibility testing where appropriate given the age, weight, and health of the individual.

[__] **Category 5** Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

[__] **Category 6** Collection of data from voice, video, digital, or image recordings made for research purposes.

[_x_] **Category 7** Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

SECTION D: Study Funding

Section Notes…

- D1: Federally funded studies (e.g., NIH, CDC, etc.) requires IRBs to review the grant application for consistency in human protections. Submit 2 copies of the grant application.

D1. This study's funding source is or will be:

[__] a. Federally Funded (e.g., NIH, CDC, FDA, NIOSH, DOE, DOJ, etc.)

[__] b. Industry, Foundation, Commercial, or Private

[__] c. Internal – Research Growth Initiative

[__] d. Internal – **not** Research Growth Initiative (e.g., department)

[_x_] e. Not Funded (SKIP TO SECTION E)

D2. If "a," "b," "c," or "d" was selected in D1, complete this section:

a. Name of funding source(s):	
b. Address of funding source(s):	
c. UWM Proposal/ grant # (if applicable):	

D3. If "a" or "b" was selected in D1, and the sponsor requires notification directly from the IRB, complete this section. Provide the name and the method of transmission (address/ fax/ email) of the individual who requested the notification. A letter will be prepared and forwarded.

SECTION E: Study Locations

Section Notes…

Federal regulations require all institutions engaged in human subjects research that is not exempt from the regulations and has adopted the Common Rule be covered by an OHRP approved assurance of compliance. The Federalwide Assurance (FWA) is the only type of assurance accepted and approved by OHRP.

In general, an institution is considered to be engaged in human subjects research when its employees or agents:

(1) obtain data about living individuals for research purposes through intervention or interaction with them, or

(2) obtain individually identifiable private information for research purposes (45 CFR 46.102(d),(f))

http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm#46.102

Simply informing potential subjects about a research study is not considered engagement in research. Also, providing written information about a research study, including how to contact the investigators for information and enrollment, and seeking and obtaining prospective subjects' permission for investigators to contact them are not considered engagement in research. **However, seeking or obtaining informed consent from a research participant is considered engagement in research.**

1. The Principal Investigator must contact the collaborating performance site to determine whether the site has an active FWA. If they do not he/she should provide them with a copy of the IRB-appropriate template (see below) and the link to the OHRP website (http://www.hhs.gov/ohrp/assurances/assurances_index.html).
2. If a site does not have a registered IRB and the site requests to use UWM's IRB as the IRB of Record, the Principal Investigator is responsible for obtaining appropriate local authorization. **Contact the IRB office.**

SECTION F: Study Duration

F1. What is the expected start date? *No study related activities (e.g., screening, recruitment, or enrollment) can begin until IRB approval has been granted. Format: January 25, 2007*

June 21, 2012

F2. What is the expected end date? *Expected end date should take into account data analysis, queries, and paper write-up. Format: July 1, 2009*

June 21, 2014

SECTION G: Subject Population

G1. Does the study involve direct human subject participation? Place an "X" next to the appropriate response.

[_x_] Yes

[__] No (e.g., secondary data analysis)

G2. State the subject group and total number to be enrolled for each group. For example, teachers-50, students-200, parents-25, parent's children-25, student control-30, student experimental-30, medical charts-500, dataset of 1500, etc. If this is a multi-center study, enter the total number of subjects to be enrolled for UWM. Total enrollment from all sites should be explained in the Protocol Summary Form.

Subject Group	**Number**
NCAA Division I Athletes	700
TOTAL:	700

G3. This study involves (place an "X" next to all that apply)**…**

[__] a. Not Applicable (e.g., de-identified datasets)

OR

[_x_] b. Students of PI or study staff

[_x_] c. Students to be recruited in their educational setting, i.e. in class or at school.

[__] d. UWM Staff or Faculty

[__] e. Minors

[__] f. Prisoners

[__] g. Diagnosable Psychological Disorder

[__] h. Institutionalized

[__] i. Poor/uninsured

[__] j. Pregnant women

[__] k. Fetuses

[__] l. Nursing home residents recruited in the nursing home

[__] m. Cognitively impaired

[__] n. Psychiatrically impaired

[__] o. Limited or non-readers

[__] p. Wards of the state (e.g., foster children)

[__] q. Terminally ill

[__] r. Others vulnerable to coercion (Specify in the box below):

[__] s. Normal healthy subjects not requiring special protections

[__] t. Other (Specify in the box below):

SECTION H: Study Involvement
Section Notes… • Internet Research is subject to additional guidelines. See IRB website.

H1. This study involves (place an "X" next to all that apply)**…**

[__] a. Datasets

[__] b. Interviews/Focus Groups

[_x_] c. Questionnaires/Surveys

[__] d. Observations

[__] e. Videotaping

[__] f. Audiotaping

[__] g. Photography

[_x_] h. Internet research

[__] i. Records Review (e.g., medical, educational tests/scores, etc.)

[__] j. Collection of Blood/ Blood Products

[__] k. Genetic Material

[__] l. Diagnostic imaging (e.g., MRI, fMRI, X-Rays, etc.) Ionizing radioactive materials or radiation producing devices located here on campus requires the review and approval from the Radiation Safety Program.

[__] m. Exposure to psychological stress

[__] n. Surgery

[__] o. Electrical Shock

[__] p. Chemical or Biological Agent (clinical)

[__] q. FDA for "off label" use

[__] r. Investigational New Device (clinical)

[__] s. Investigational Drug Exemption (clinical)

[__] t. Other invasive procedure (Specify in the box below):

SECTION I: Informed Consent Documents/ Assents

Section Notes…

- Whenever possible, obtaining and documenting subject's signed (can be written or electronic) informed consent is required.
- A **waiver to obtain informed consent** can be requested for to studies with no direct contact or involvement with human subjects. Examples:
  - secondary analysis of identifiable dataset;
  - reviewing a large number of patient charts; and
  - research on identifiable specimens;
- A **waiver to alter the required elements of the informed consent** document means that consent is still obtained. However, the consent does not contain all the required elements (http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm#46.111). Examples:
  - disclosing the true purpose (a required element) of the study in the consent document would bias what they are testing;
- A **waiver to document informed consent** can be requested to studies where the subject's signature is not obtained. Waiving documentation still requires that a written consent document be presented to the subject. However, the subject's signature is not obtained. Most often, the subject is presented with a consent letter (on computer screen or on paper) explaining that by clicking the "continue button" or completing and returning the survey means they are consenting to participate. Examples:
  - anonymous survey conducted on paper and pencil;
  - confidential online survey; and
  - studies where privacy and confidentiality would be compromised by having a signed document linking the subject to the study. E.g., interviews on illegal activities or HIV status.

- A request to **obtain verbal consent** for **Exempt** research will require the IRB to approve a summary/script of what is to be said to the subject. Example:
  - cases where subjects are not able to receive a written consent ahead of time, such as a random digit dialing for telephone surveys where subjects are read a brief consent script.
- A request to **obtain verbal consent** for **Expedited** and **Full Board** research will require: (1) the IRB to approve a summary/script containing the required elements of consent that is to be verbally presented to the subject, (2) a witness to the verbal presentation of this information, (3) the subject signs a brief document giving consent for participation, (4) the witness signs both the brief document and the summary/script, (6) the researcher obtaining consent signs the summary/script, (7) the researcher keeps all signed documents (summary/script signed by witness and researchers, and brief document signed by witness and subject), and (8) the subject keeps copies (either signed or unsigned) of the brief document. Examples:
  - subject populations where many are illiterate
  - it is against one's culture to sign one's name to a document

I1. How will the consenting of subjects take place? (place an "X" next to all that apply)**…**

[_x_] a. Written informed consent with the subject's or legal representative's signature. Use IRB Template and attach to IRB submission. **Go to Section L.**

[__] b. Request **waiver to obtain informed consent.** See Section Notes. **Complete Section J,** then **Go to Section L.**

[__] c. Request **waiver to the required elements of informed consent.** See Section Notes. **Complete Section J,** then **Go to Section L.**

[__] d. Request **waiver to documentation of informed consent**. See Section Notes. **Complete Section k,** then **Go to Section L.**

[__] e. Request to **obtain verbal consent.** See Section Notes. **Complete J, K or both** then **Go to Section L.**

SECTION J: Request to Waive Informed Consent/ Request to Alter Informed Consent

Section Notes…

- Complete this section if you are requesting a Waiver to Obtain Consent or requesting to Alter Informed Consent.
- Skip this section if you are **not** requesting a Waiver to Obtain Consent or requesting to Alter Informed Consent.

J1. Answer all A's OR B's

[__] A1. The research or demonstration project is to be conducted by, or subject to the approval of, state or local government officials, and is designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs; and

Explain:

[__] A2. The research could not practicably be carried out without the waiver or alteration.

Explain:

[__] B1. The research involves no more than minimal risk to the subjects;

Explain:

[__] B2. The waiver or alteration will not adversely affect the rights and welfare of the subjects;

Explain:

[__] B3. The research could not practicably be carried out without the waiver or alteration; and

Explain:

[__] B4. Whenever appropriate, the subjects will be provided with additional pertinent information after participation.

Explain:

SECTION K: Request to Waive Documentation of Informed Consent

Section Notes…
• Complete this section if you are requesting a Waiver to Document Informed Consent.
  o I.E., the research participant is not signing the consent form.
• Skip this section if you are **not** requesting a Waiver to Document Informed Consent.
• Answer all A's **OR** all B's
  o If A1, A2, or A3 is marked "No", a request to waive documentation of informed consent cannot be granted.
  o If B1 or B2 is marked "Yes", a request to waive documentation of informed consent cannot be granted.

K1. Answer A's OR B's

A1. If consent was documented, would the only record linking the subject and the research be the informed consent form?

[__] Yes

[__] No

A2. If consent was documented, would the principal risk to the subject be the potential harm from a breach of confidentiality?

[__] Yes

[__] No

A3. Will each subject be asked whether he/she wants documentation linking the subject with the research, and the subjects wishes will govern?

[__] Yes

[__] No

B1. Does the research present more than minimal risk of harm to subjects?

[__] Yes

[__] No

B2. Are any procedures involved for which written consent is normally required outside of the research context?

[__] Yes

[__] No

SECTION L: Minors
Section Notes… • Permission (consent) of a parent or legally authorized representative and assent from the minor must be obtained. The IRB website has examples of parental consent and minor assent forms. • A request must be made for a **waiver to obtain informed consent** (see section I) If the IRB determines that a research protocol is designed to study conditions in children or a subject population for which parental or guardian permission is not a reasonable requirement to protect the subjects (for example, neglected or abused).

L1. Are any of the human subjects minors?

[__] Yes

[_x_] No

L2. If subjects are minors, are any of the minors wards of the state or other agency?

[__] Yes

[_x_] No

SECTION M: Subject Incentives/ Compensations

Section Notes…

- If you intend to submit to the Travel Management Office for reimbursement purposes make sure you understand what each level of payment confidentiality means **(click here for additional information).**
  - **Level 1:**
    - The payee's name, address, and social security number and the amount paid must be recorded.
    - When Level 1 is selected, a formal notice is not issued by the IRB and the Travel Management Office assumes Level 1.
    - Level 1 payment information will be retained in the extramural account folder at UWM/Research Services and attached to the voucher in Accounts Payable. These are public documents, potentially open to public review.
  - **Level 2:**
    - A list of names, social security numbers, home addresses and amounts paid.
    - When Level 2 is selected, a formal notice will be issued by the IRB.
    - Level 2 payment information, including the names, are attached to the PIR and become part of the voucher in Accounts Payable. The records retained by Accounts Payable are not considered public record.
  - **Level 3:**
    - Payments are made to the research subjects by either personal check or cash.
    - Gift cards are considered cash.
    - If a cash payment is made, the PI must obtain signed receipts.
    - The PI shall maintain a record of the research subject's name and corresponding coded identification. This will be the only record of payee names, and it will stay in the control of the PI.

M1. Does this study involve incentives or compensation to the subjects? For example cash, class extra credit, gift cards, or items.

[__] Yes

[_x_] No

M1a. If cash or gift cards, select the appropriate confidentiality level for payments (see section notes):

[__] Level 1 indicates that confidentiality of the subjects is not a serious issue, e.g., providing a social security number or other identifying information for payment would not pose a serious risk to subjects.

[__] Level 2 indicates that confidentiality is an issue, but is not paramount to the study, e.g., the participant will be involved in a study researching sensitive, yet not illegal issues. For example, a study of individuals with contagious diseases would fall into this category.

[__] Level 3 indicates that confidentiality of the subjects must be guaranteed. In this category, identifying information such as a social security number would put a subject at increased risk. An example of this type of study would be any research involving illegal activity.

SECTION N: HIPAA and Protected Health Information (PHI)

What is it?

The Health Information Portability and Accountability Act (HIPAA) Privacy Rule is Federal legislation which regulates the way certain health care groups, organizations, or businesses, handle the individually identifiable health information known as **protected health information (PHI)**. The Privacy Rule establishes the conditions under which covered entities can use or disclose PHI for many purposes, including for research. Researchers seeking to use PHI from a UWM Covered Department or an external covered entity as part of their research study must comply with HIPAA. Compliance typically requires either obtaining a HIPAA Authorization during the informed consent process or obtaining a Waiver of such Authorization from the IRB.

What is PHI?

Protected health information **(PHI)** includes information relating to an individual's past, present or future physical or mental health or condition, the provision of health care services or the past, present or future payment for such services. It only covers information that is individually identifiable. There are 18 identifiers under the Privacy Rule, some of which include: names, dates, geographic locations, telephone numbers, medical record numbers, account numbers, biometric identifiers, and other unique identifying number or code.

What are UWM's Covered Departments?

UWM is considered a "hybrid entity" under HIPAA because it has some departments and units that are covered by HIPAA and some that are not. All employees and volunteers in UWM's Covered Departments must comply with the Privacy and Security Rules, including in connection with research.

UWM's Covered Departments are currently comprised of the following entities:

A. Provider Units:

1. Athletics Trainers (Division of Student Affairs)
2. Hearing Evaluation Center (College of Health Science)
3. Norris Student Health Center (Division of Student Affairs)
4. Psychology Clinic (College of Letters and Sciences)
5. Speech and Language Clinic (College of Health Sciences)
6. Urban Health Partnerships (College of Nursing)

B. Administrative Units:

1. Bursar's Office (Division of Finance & Administrative Affairs)
2. IT Personnel in Business & Financial Services (Division of Academic Affairs)
3. Information and Media Technologies (I&MT) (Division of Academic Affairs)
4. Institutional Review Board Members and Administrative Staff (Division of Finance & Administrative Affairs)
5. Internal Audit (Division of Finance & Administrative Affairs)
6. Office of Legal Affairs (Division of Finance & Administrative Affairs)
7. Risk Management (Division of Finance & Administrative Affairs)
8. Privacy Officers

How do I know if I am using PHI as part of my research study and have to comply with HIPAA?

If you answer "yes" to any of the below questions, you are using PHI:

Are you accessing or using a participant's health information from a UWM Covered Department or an external covered entity (such as a hospital, clinic or other health care agency)?

Are you conducting research in connection or collaboration with an entity covered by HIPAA?

Are you using information from a database that was created using health care information obtained by a UWM Covered Department or external covered entity?

Note: If you are asking a participant to self-report his medical history outside a clinical/hospital setting and do not wish to see his/her medical record, you do not need to obtain the required HIPAA Authorization or Waiver unless you answer "yes" to one of the above questions.

If you answered yes to any of the questions above, you must either obtain either an "Authorization Form for Research For the Use and Disclosure of Patient Health Information" from your Research Participants or IRB approval of an "Application for IRB Waiver of Authorization or Altered Authorization under the HIPAA Privacy Rule." You also must complete online HIPAA training at www.hipaa.uwm.edu.

Who do I contact to for more information on this?

Contact the UWM Office of Legal Affairs (https://www4.uwm.edu/legal/hipaa/)

SECTION O: Principal Investigator and Student Principal Investigator Assurances

As Principal and Student Principal Investigator, I certify the following:

- I have reviewed this protocol submission and acknowledge my responsibilities as Principal Investigator.
- The information in this submission accurately reflects the proposed research.
- I will not initiate this study until I receive written approval from the IRB.
- I will promptly report to the IRB any unanticipated problems and adverse events, as well as any findings during the course of the study that may affect the risks and benefits to the subjects.
- I will obtain prior written approval for modifications (amendments) to this protocol including, but not limited to, changes in procedures.
- I will make sure all research personnel are properly trained.
- I have completed the UWM Human Subjects Training.
- I have determined whether or not I am accessing protected health information as part of my proposed research, and if so, I accept responsibility for assuring adherence to HIPAA.
- If I am using PHI in my research, I have visited the UWM HIPAA Training website (www.hipaa.uwm.edu) and have completed all required training, and I am complying with HIPAA's requirements for researchers.
- I accept responsibility for assuring adherence to applicable Federal and State research regulations and UWM polices relative to the protection of the rights and welfare of the subjects enrolled in this study.
- I understand that the UWM IRB operates under a Federal Wide Assurance (FWA) from the Department of Health and Human Services.
- Unless given Exempt Status, I understand that this study is subject to continuing review and approval by the IRB.

_____ _____

Principal Investigator (PRINT NAME) DATE

_____ _____

Student Principal Investigator (PRINT NAME) DATE

IRBManager Protocol Form

Instructions: Each Section must be completed unless directed otherwise. Incomplete forms will delay the IRB review process and may be returned to you. Enter your information in the **colored boxes** or place an **"X"** in front of the appropriate response(s). If the section does not apply, write **"N/A."**

SECTION A: Title

A1. Full Study Title: The Transtheoretical model in applied sport psychology: The development of stages of change, processes of chance, and self-efficacy instruments

SECTION B: Study Duration

B1. What is the expected start date? *Data collection, screening, recruitment, enrollment, or consenting activities may not begin until IRB approval has been granted. Format: 07/05/2011*

06/15/2012

B2. What is the expected end date? *Expected end date should take into account data analysis, queries, and paper write-up. Format: 07/05/2014*

06/15/2014

SECTION C: Summary

C1. Write a brief descriptive summary of this study in Layman Terms (non-technical language):

The primary purpose of the proposed study is to examine the Transtheoretical Model of Behavior Change (TTM) as a framework in applied sport psychology research and practice.

This purpose will be achieved by constructing three psychometrically sound TTM instruments (i.e., processes of change, stage of change, self-efficacy), and confirming one previously developed TTM instrument (decisional balance; Leffingwell, Rider, & Williams, 2001) that demonstrate construct validity for use in applied sport psychology.

C2. Describe the purpose/objective and the significance of the research:

The proposed study addresses several gaps in the applied sport psychology research literature. First, as readiness to change remains a notable concern among sport psychology practitioners (Anderson, 2005), a paucity of research exists as it relates to readiness to engage in psychological skills training (PST) for peak performance. Second, while TTM related measures have been created previously (Leffingwell et al., 2001), the psychometric properties of these measures suggest the need for more reliable measures. Third, the proposed study will be the first to develop a processes of change questionnaire as it relates to behavior change in applied sport psychology. While the TTM is often referred to as a stage-based model, knowledge of how the processes of change interact with the stage constructs is needed for intervention design. Therefore, the proposed study will advance the scientific literature by developing psychometrically sound instruments to utilize the TTM as an intervention framework in applied sport psychology research.

Practical Significance

Readiness for behavior change remains a notable concern in applied sport psychology practice. Results of the proposed study will provide sport psychologists with psychometrically sound instruments to assess stage of behavior change and self-efficacy towards psychological skills training. Furthermore, results of the proposed study will demonstrate how athletes use processes of change in their pursuit of consistent mental practice. This knowledge will assists

sport psychologists as they work with athletes to increase readiness and motivation to engage in PST.

C3. Cite and relevant literature pertaining to the proposed research:

DiClemente, C.C., & Prochaska, J.O. (1982). Self-change and therapy change of smoking behavior: A comparison of processes of change in cessation and maintenance. *Addictive Behaviors, 7,* 133-142.

DiClemente, C. C, & Prochaska, J. O. (1985). Processes and stages of change: Coping and competence in smoking behavior change. In S. Shiffman & T. A. Wills (Eds.), *Coping and substance abuse* (pp. 319-343). San Diego, CA: Academic Press.

DiClemente, C.C., Prochaska, J.O., and Gibertini, M. (1985). Self-efficacy and the stages of self change of smoking. *Cognitive Therapy and Research, 9,* 181-200.

Di Noia, J., Schinke, S. P., Prochaska, J. O., & Contento, I. R. (2006). Application of the transtheoretical model to fruit and vegetable consumption among economically disadvantaged African-American adolescents: Preliminary Findings. *American Journal of Health Promotion, 20,* 342- 348.

Hatzigeorgiadis, A., Zourbanos, N., Galanis, E., & Theodorakis, Y. (2011). Self-talk and sports performance: A meta-analysis. *Perspectives on Psychological Science, 6,* 348-356.

Hausenblas, H.A., Nigg, C.R., Dannecker, E.A., Downs, D.S., Gardner, R.E., Fallon, E.A., Focht, B.C., & Loving, M.G. (2001). A missing piece to the transtheoretical model applied to exercise: Development and validation of the temptation to not exercise scale.

Psychology and Health, 16, 381-390.

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.

Jackson, D.L., Gillaspy, J.A., & Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14,* 6-23.

Janis, T.L., & Mann, L. (1968). *Decision making: A psychological analysis of conflict, choice, and commitment,* New York: Collier Macmillan.

Kenny, D.A., McCoach, D.B. (2003). Effect of the number of variables on measurement of fit in structural equation modeling. *Structural Equation Modeling, 10,* 333-351.

Keeler, L.A., & Watson, J.C. II (2011). The transtheoretical model and psychological skills training. Application and implications with elite female rugby players. *Athletic Insight, 13.*

Leffingwell, T. R., Rider, S. P., & Williams, J. M. (2001). Application of the transtheoretical model to psychological skills training. *The Sport Psychologist, 15,* 168–187.

Marcus, B.H., Rakowski, W., & Rossi, J.S. (1992). Assessing motivational readiness and decision making for exercise. *Health Psychology, 11,* 257-261.

Marcus, B.H., Rossi, J.S., Niaura, R.S., Abrams, D.B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology, 11,* 386-395.

Marcus, B. H., Selby, V. C., Niaura, R. S., & Rossi, J. S. (1992). Self-efficacy and the stages of exercise behavior change. *Research Quarterly for Exercise and Sport, 63,* 60-66.

Marcus, B.H., & Simkin, L.R. (1993). The stages of exercise behavior. *Journal of Sport Medicine and Physical Fitness, 33,* 83-88.

Marsh, H.W., Hau, K.T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler. *Structural Equation Modeling, 11,* 320-341.

Marsh, H.W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A.J.S., Trautwein, U., & Nagengast, B. (2010). A new look at the big five factor structure through exploratory structural equation modeling. *Psychological Assessment, 22,* 471-491.

Marsh, H.W., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A.J.S., & Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and EFA: Applications to students' evaluations of university teaching. *Structural Equation Modeling, 16,* 439-476.

Marshall, S.J., & Biddle, S.J.H. (2001). The transtheoretical model of behavior change: A meta-analysis of application to physical activity and exercise. *Annals of Behavioral Medicine, 23,* 229-246.

Martens, R., & Burton, D. (1982). *Psychological skills training for athletes.* Unpublished manuscript. University of Dlinois.

Martin, S.B. (2005). High school and college athletes' attitudes toward sport psychology consulting. *Journal of Applied Sport Psychology, 17,* 127-139.

Martin, K., & Hall, C. (1995). Using mental imagery to enhance intrinsic motivation. *Journal of Sport and Exercise Psychology, 17,* 54-69.

Martin, G.L., Vause, T., & Schwartzman, L. (2005). Experimental studies of psychological

interventions with athletes in competition: Why so few? *Behavior Modification, 29,* 616-641.

Massey, W.V., Meyer, B.B., & Gnacinski, S. (under review). The transtheoretical model in applied sport psychology: The need for more reliable measures. *International Journal of Sport Psychology.*

Massey, W.V., Meyer, B.B., & Hatch, S.J. (2011). The transtheoretical model: Examining readiness for psychological skills training. *Journal of Performance Psychology, 2,* 3-22.

Massey, W.V., Hatch, S.J., Mackenzie, J.L., & Meyer, B.B. (2010). *The transtheoretical model and psychological skills training in high school athletes.* Poster presented at the annual meeting of the Association of Applied Sport Psychology, Providence, RI, USA, October 29.

Prochaska, J.O. (1979). *Systems of psychotherapy: A transtheoretical analysis*. Dorsey Press: Homewood, IL.

Prochaska, J. O. (2008). Decision making in the transtheoretical model of behavior change. *Medical Decision Making, 28, 845-849.*

Prochaska, J.O., & DiClemente, C.C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice, 19,* 276-288.

Prochaska, J.O. & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. Journal of *Consulting and Clinical Psychology, 51,* 390-395.

Prochaska, J. Q, & DiClemente, C. C. (1984). *The transtheoretical approach: Crossing*

traditional boundaries of change. Homewood, IL: Dorsey Press.

Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change: Applications to the addictive behaviors. *American Psychologist, 47,* 1102-1114.

Prochaska, J.O., Velicer, W.F., DiClemente, C.C., & Fava, J.L. (1988). Measuring processes of change: *Applications to the cessation of smoking. Journal of Consulting and Clinical Psychology, 56,* 520-528.

SECTION D: Subject Population

Section Notes…

- D1. If this study involves analysis of de-identified data only (i.e., no human subject interaction), IRB submission/review may not be necessary. Visit the Pre-Submission section in the IRB website for more information.

D1. Identify any population(s) that you will be specifically targeting for the study. Check all that apply: (Place an "X" in the column next to the name of the special population.)

	Not Applicable (e.g., de-identified datasets)		Institutionalized/ Nursing home residents recruited in the nursing home
x	UWM Students of PI or study staff		Diagnosable Psychological Disorder/Psychiatrically impaired
x	Non-UWM students to be recruited in their educational setting, i.e. in class or at school		Decisionally/Cognitively Impaired
	UWM Staff or Faculty		Economically/Educationally Disadvantaged
	Pregnant Women/Neonates		Prisoners
	Minors under 18 and ARE NOT wards of the State		Non-English Speaking

	Minors under 18 and ARE wards of the State		Terminally ill
	Other (Please identify):		

D2. Describe the subject group and enter the total number to be enrolled for each group. For example: teachers-50, students-200, parents-25, parent's children-25, student control-30, student experimental-30, medical charts-500, dataset of 1500, etc. Enter the total number of subjects below. If this is a multi-center study, enter the total number of subjects to be enrolled for UWM only. Total enrollment from all sites should be explained in the Protocol Summary Form.

Describe subject group:	**Number:**
NCAA Collegiate Athletes	700
TOTAL # OF SUBJECTS:	700
TOTAL # OF SUBJECTS (If UWM is a collaborating site):	700

D3. List any major inclusion and exclusion criteria (e.g., age, gender, health status/condition, ethnicity, location, English speaking, etc.) and state the justification for the inclusion and exclusion:

Participants for the proposed study will be athletes participating in an NCAA sanctioned sport. In order to be eligible for the proposed study, participants must meet the following criteria: (a) currently practicing for or participating in an NCAA Division I, II, or III sport, (b) over the age of 18 years old, and (c) primarily English-speaking and reading. Participants will be excluded from the proposed study if: (a) they do not meet all three eligibility criteria, or (b) they are unable or unwilling to give their informed consent to

participate in the study.

SECTION E: Informed Consent

Section Notes…

- E1. Make sure to attach any recruitment materials for IRB approval.
- E3. The privacy of the participants must be maintained throughout the consent process.

E1. Describe how the subjects will be recruited: (E.g., through flyers, beginning announcement for X class, referrals, random telephone sampling, etc.)

Recruitment will take place primarily through word of mouth and personal contacts of the primary investigator (PI). Specifically, coaches, athletic directors, and/or sport psychology consultants at various universities will be contacted to help recruit participants for the proposed study. Given the recruitment strategy, in conjunction with the eligibility criteria, post-hoc screening procedures will be used whereby data from participants not meeting the eligibility criteria will be eliminated.

E2. Describe the forms that will be used for each subject group (e.g., short version, combined parent/child consent form, child assent form, verbal script, information sheet): Copies of all forms should be attached for approval. If requesting to waive documentation (not collecting subject's signature) or to waive consent all together, state so and complete the "Waiver to Obtain-Document-Alter Consent" and attach:

UWM IRB Informed consent document

Demographic questionnaire. A demographic questionnaire will be completed by each participant, and included questions related to the following: (a) gender, (b) ethnicity, (c) age, (d) sport played, (e) length of sport involvement, (f) career and sport goals, (g) injury history, and (h) psychological skills training experiences. The demographic questionnaire is attached.

Test of performance strategies 2. The test of performance strategies (TOPS-2; Hardy et al, 2010) will be used to assess psychological skills training (PST) in the proposed sample of athletes. The TOPS-2 will measure the frequency of strategies used for goal setting, emotional control,

automaticity, relaxation, self-talk, imagery, attentional control, and activation. Internal consistencies for the eight subscales have been shown to range from alpha levels of .63 - .94. The TOPS-2 form is attached.

Stages of change questionnaire. An initial pool of 89 items was generated from reviewing the literature (e.g., Leffingwell et al., 2001; Marcus and Colleagues, 1992), and the experiences of the PI and his primary advisor. The initial pool contained items representing each of the five proposed stages of change (i.e., precontemplation, contemplation, preparation, action, maintenance). Content validity was established by consensus agreement of three judges with expertise in elite sport. Items without 100% agreement were eliminated, resulting in a final scale of 35 items. The Stage of Change questionnaire is attached.

Processes of change questionnaire. An initial pool of 114 items was generated from reviewing the literature (e.g., Marcus and Colleagues, 1992), and the experiences of the PI and his primary advisor. The initial pool contained items representing each of the 10 proposed processes of change (i.e., consciousness raising, dramatic relief, self-revaluation, environmental reevaluation, social liberation, self-liberation, helping relationships, counter-conditioning, stimulus control, contingency management). Content validity was established by consensus agreement of three judges with expertise in elite sport. Items without 100% agreement were eliminated, resulting in a final scale of 65 items. The Processes of Change questionnaire is attached.

Decisional balance questionnaire. The Decisional Balance questionnaire will be used to assess the benefits (i.e., pros) and costs (i.e., cons) of participating in PST. The questionnaire developed by Leffingwell et al. (2001) will be utilized to measure decisional balance in the proposed study Leffingwell et al. tested the decisional balance questionnaire in two samples yielding an adequate fit for a two-factor model in both sample one (CFI = .94, RMSEA = .072) and sample two (CFI = .92, RMSEA = .072). Leffingwell et al. also reported acceptable levels of

internal reliability for the decisional balance measure for both the Pros scale (α's = .92, .94) and Cons scale (α's = .90, .82).

Self-efficacy questionnaire. An initial pool of 21 items was generated from reviewing the literature (e.g., Hausenblaus et al., 2001; Leffingwell et al., 2001; Marcus and Colleagues, 1992), and the experiences of the PI and his primary advisor. The initial pool contained items representing self-efficacy and temptation. Content validity was established by consensus agreement of three judges. Items without 100% agreement were eliminated, resulting in a final scale of 19 items. The Stage of Change questionnaire is attached.

Marlowe-Crown social desirability scale. The proposed study will use the short-form of the Marlowe-Crown social desirability scale (MC), which contains 13 items that describe socially desirable, yet relatively unlikely behavior (Reynolds, 1982). A high score on the MC is thought to reflect social desirable responding, while a high correlation between the MC and any given questionnaire can raise doubts to the validity of a measure. The MC is attached.

E3. Describe who, where, and when consent will be obtained. When appropriate (for higher risk and complex study activities), a process should be mentioned to assure that participants understand the information. For example, in addition to the signed consent form, describing the study procedures verbally or visually**.**

The proposed study will take place via pencil-paper and online methods. When completing paper-pencil versions of the questionnaires, consent will be recorded in person. If filling out an online version of the questionnaires, consent will be conducted via the secure online website.

SECTION F: Data Collection and Design

Section Notes…

- F1. Data collection instruments should be attached for IRB review.

F1. In the table below, chronologically describe all study activities.

- In **column A**, give the activity a short name.
- In **column B**, briefly describe activities conducted by the PI (recruitment, audiotaping) and describe in greater detail the activities (surveys, interviews, tasks, etc.) research participants will be engaged in. Address where, how long, and when each activity takes place.
- In **column C,** describe any possible risks (e.g., physical, psychological, social, economic, legal, etc.) the subject may ***reasonably*** encounter. Describe the **safeguards** that will be put into place to minimize possible risks (e.g., interviews are in a private location, data is anonymous, assigning pseudonyms, where data is stored, coded data, etc.) and what happens if the participant gets hurt or upset (e.g., referred to Norris Health Center, PI will stop the interview and assess, given referral, etc.).

A. Activity Name:	**B. Activity Description:**	**C. Activity Risks and Safeguards:**
Recruitment	The PI will contact individuals from universities across the United States to help solicit participants for the study. The PI will disseminate the secure website that contains a link to the study protocol. If paper-pencil methods are preferred, the PI will email a copy of the study protocol and mail self-addressed stamped envelops for participants to place the data in and send back to the PI.	Recruitment involves minimal risk to participants. The PI will verbally and in written form remind all contacts that data is confidential and potential participants are not to be coerced. To protect against confidentiality, participants will place their own data in a stamped envelop to seal and send back to the PI. Consent forms will be separated from data to ensure the data is anonymous.
Collection	Depending on the geographic location of the respective participants as well as the availability of a qualified and approved individual to facilitate data collection, participants will complete either a paper-pencil or an online version of the questionnaires. Participants completing the online version of the questionnaire will have	Data collection involves minimal risk to participants. The PI will verbally and in written form remind all contacts that data is confidential and potential participants are not to be coerced. To protect against confidentiality, participants will place their own data in a stamped envelop to seal and send back to the

	their data uploaded into a university sponsored, password protected database. All paper-pencil data will be stored in a locked cabinet inside of Pavilion 375 at the University of Wisconsin-Milwaukee. Electronic data will be stored inside a password-protected database, on a password-protected computer inside of Pavilion 375 at the University of Wisconsin-Milwaukee.	PI. Consent forms will be separated from data to ensure the data is anonymous. Participants completing the online version of the questionnaire will have their data uploaded into a university sponsored, password protected database
Analysis	Data analysis will be conducted with anonymous data using mPlus 6.0.	Data analysis involved minimal risk. All paper-pencil data will be stored in a locked cabinet inside of Pavilion 375 at the University of Wisconsin-Milwaukee. Electronic data will be stored inside a password-protected database, on a password-protected computer inside of Pavilion 375 at the University of Wisconsin-Milwaukee.

F2. Explain how the data will be analyzed or studied (i.e. quantitatively or qualitatively) and how the data will be reported (i.e. aggregated, anonymously, pseudonyms for participants, etc.):

The data will be analyzed using quantitative methods and will be reported in the aggregate.

SECTION G: Benefits and Risk/Benefit Analysis

Section Notes…

- Do not include Incentives/ Compensations in this section.

G1. Describe any benefits to the individual participants. If there are no anticipated benefits to the subject directly, state so. Describe potential benefits to society (i.e., further knowledge to the area of study) or a specific group of individuals (i.e., teachers, foster children). Describe the ratio of risks to benefits.

There are no benefits other than to further research. The current research will benefit sport psychology practitioners and athletes as it will further research in peak performance for sport. The direct risks and benefits are minimal to participants of the study.

G2. Risks to research participants should be justified by the anticipated benefits to the participants or society. Provide your assessment of how the anticipated risks to participants and steps taken to minimize these risks, balance against anticipated benefits to the individual or to society.

Given the minimal risks to participants (i.e., time cost, confidentiality), in conjunction with the voluntary nature of the study, the benefits of the research will outweigh any perceived risks.

SECTION H: Subject Incentives/ Compensations

Section Notes…

- H2 & H3. The IRB recognizes the potential for undue influence and coercion when extra credit is offered. The UWM IRB, as also recommended by OHRP and APA Code of Ethics, agrees when extra credit is offered or required, prospective subjects should be given the choice of an equitable alternative. In instances where the researcher does not know whether extra credit will be accepted and its worth, such information should be conveyed to the subject in the recruitment materials and the consent form. For example, "The awarding of extra credit and its amount is dependent upon your instructor. Please contact your instructor before participating if you have any questions. If extra credit is awarded and you choose to not participate, the instructor will offer an equitable alternative."
- H4. If you intend to submit to the Travel Management Office for reimbursement purposes make sure you understand what each level of payment confidentiality means **(click here for additional information).**

H1. Does this study involve incentives or compensation to the subjects? For example cash, class extra credit, gift cards, or items.

[__] Yes

[_x_] No [SKIP THIS SECTION]

H2. Explain what (a) the item is, (b) the amount or approximate value of the item, and (c) when it will be given. For extra credit, state the number of credit hours and/or points. (e.g., $5 after completing each survey, subject will receive [item] even if they do not complete the procedure, extra credit will be award at the end of the semester)**:**

H3. If extra credit is offered as compensation/incentive, an alternative activity (which can be another research study or class assignment) should be offered. The alternative activity should be similar in the amount of time involved to complete and worth the same extra credit. If the task is a class requirement/assignment that students would be required to complete.

H4. If cash or gift cards, select the appropriate confidentiality level for payments (see section notes):

[__] Level 1 indicates that confidentiality of the subjects is not a serious issue, e.g., providing a social security number or other identifying information for payment would not pose a serious risk to subjects.

- Choosing a Level 1 requires the researcher to maintain a record of the following: The payee's name, address, and social security number and the amount paid.
- When Level 1 is selected, a formal notice is not issued by the IRB and the Travel Management Office assumes Level 1.
- Level 1 payment information will be retained in the extramural account folder at UWM/Research Services and attached to the voucher in Accounts Payable. These are public documents, potentially open to public review.

[__] Level 2 indicates that confidentiality is an issue, but is not paramount to the study, e.g., the participant will be involved in a study researching sensitive, yet not illegal issues.

- Choosing a Level 2 requires the researcher to maintain a record of the following: A list of names, social security numbers, home addresses and amounts paid.
- When Level 2 is selected, a formal notice will be issued by the IRB.
- Level 2 payment information, including the names, are attached to the PIR and become part of the voucher in Accounts Payable. The records retained by Accounts Payable are not considered public record.

[__] Level 3 indicates that confidentiality of the subjects must be guaranteed. In this category, identifying information such as a social security number would put a subject at increased risk.

- Choosing a Level 3 requires the researcher to maintain a record of the following: research subject's name and corresponding coded identification. This will be the only record of payee names, and it will stay in the control of the PI.
- Payments are made to the research subjects by either personal check or cash.
- Gift cards are considered cash.
- If a cash payment is made, the PI must obtain signed receipts.

SECTION I: Deception/ Incomplete Disclosure (INSERT "NA" IF NOT APPLICABLE)

Section Notes…

- If you cannot adequately state the true purpose of the study to the subject in the informed consent, deceptio incomplete disclosure is involved.

I1. Describe (a) what information will be withheld from the subject (b) why such deception/ incomplete disclosure is necessary, and (c) when the subjects will be debriefed about the deception/ incomplete disclosure.

NA

UNIVERSITY OF WISCONSIN – MILWAUKEE

CONSENT TO PARTICIPATE IN RESEARCH

PARTICIPANT CONSENT

1. General Information

Study title:

The Transtheoretical model in applied sport psychology: The development of stages of change, processes of change, and self-efficacy instruments.

Person in Charge of Study (Principal Investigator):

Barbara B. Meyer, PhD

Professor, Department of Kinesiology, University of Wisconsin-Milwaukee.

2. Study Description

You are being asked to participate in a research study. Your participation is completely voluntary. You do not have to participate if you do not want to.

Study description:

The purpose of this study is to examine the Transtheoretical Model of Behavior Change (TTM) as a framework in applied sport psychology research and practice. By constructing instruments for use in future research and practice, we believe the results of this work will help sport psychologists work with athletes to improve performance in a more efficient way. As a collegiate athlete, we hope the results of this work will directly benefit those working to help improve your performance. Approximately 700 participants will participate in this study from universities across the United States. Your participation in this study will take approximately 90 minutes.

3. Study Procedures

What will I be asked to do if I participate in the study?

If you agree to participate you will be asked to complete a series of questionnaires related to the use of sport psychology to enhance athletic performance. You will have the option to complete the study online or via paper and pencil.

4. Risks and Minimizing Risks

What risks will I face by participating in this study?

There are minimal foreseeable risks for participating in this research study. The greatest risk you will face is that of confidentiality (i.e., others knowing the data you submit to this study). We have taken cautions to ensure your confidentiality, including de-identifying all data and keeping all data in a locked file cabinet.

5. Benefits

Will I receive any benefit from my participation in this study?

- There are no benefits to you other than to further research.

6. Study Costs and Compensation

Will I be charged anything for participating in this study?

You will not be responsible for any of the costs from taking part in this research study.

Are subjects paid or given anything for being in the study?

- You will not be compensated for taking part in this research study.

7. Confidentiality

What happens to the information collected?

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. We may decide to present what we find to others, or publish our results in scientific journals or at scientific conferences. Information that identifies you personally will not be released without your written permission. Only the PI and research team have access to the information. However, the Institutional Review Board at UW-Milwaukee or appropriate federal agencies like the Office for Human Research Protections may review this study's records. Data will be collected anonymously. All paper-pencil data will be stored in a locked cabinet inside of Pavilion 375 at the University of Wisconsin-Milwaukee. Electronic data will be stored inside a password-protected database, on a password-protected computer inside of Pavilion 375 at the University of Wisconsin-Milwaukee. The data will be stored in PAV 375 for 3 years following study completion.

8. Alternatives

Are there alternatives to participating in the study?

There are no known alternatives available to you other than not taking part in this study.

9. Voluntary Participation and Withdrawal

What happens if I decide not to be in this study?

Your participation in this study is entirely voluntary. You may choose not to take part in this study. If you decide to take part, you can change your mind later and withdraw from the study. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with the University of Wisconsin Milwaukee. If you choose to withdraw from the study we will destroy all of your data and not use it in future analysis.

10. Questions

Who do I contact for questions about this study?

For more information about the study or the study procedures or treatments, or to withdraw from the study, contact:

Barbara B. Meyer, PhD

Professor & Associate Chair

Director, Laboratory for Sport Psychology & Personal Excellence

Department of Kinesiology

College of Health Sciences

University of Wisconsin-Milwaukee

PO Box 413

Milwaukee, WI 53201

bbmeyer@uwm.edu

414.229.4591

Who do I contact for questions about my rights or complaints towards my treatment as a research subject?

The Institutional Review Board may ask your name, but all complaints are kept in confidence.

Institutional Review Board

Human Research Protection Program

Department of University Safety and Assurances

University of Wisconsin – Milwaukee

P.O. Box 413

Milwaukee, WI 53201

(414) 229-3173

11. Signatures

Research Subject's Consent to Participate in Research:

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study, you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read or had read to you this entire consent form, including the risks and benefits, and have had all of your questions answered, and that you are 18 years of age or older.

_____

Printed Name of Subject/ Legally Authorized Representative

_____ _____

Signature of Subject/Legally Authorized Representative Date

Principal Investigator (or Designee)

I have given this research subject information on the study that is accurate and sufficient for the subject to fully understand the nature, risks and benefits of the study.

_____ _____

Printed Name of Person Obtaining Consent Study Role

_____ _____

Signature of Person Obtaining Consent Date

University of Wisconsin – Milwaukee

Consent to Participate in Online Research

Study Title: The Transtheoretical model in applied sport psychology: The development of stages of change, processes of change, and self-efficacy instruments.

Person Responsible for Research: Barbara B. Meyer, bbmeyer@uwm.edu; William V. Massey, wvmassey@uwm.edu.

Study Description: The purpose of this study is to examine the Transtheoretical Model of Behavior Change (TTM) as a framework in applied sport psychology research and practice. By constructing instruments for use in future research and practice, we believe the results of this work will help sport psychologists work with athletes to improve performance in a more efficient way. As a collegiate athlete, we hope the results of this work will directly benefit those working to help improve your performance. Approximately 700 participants will participate in this study from universities across the United States. Your participation in this study will take approximately 60 minutes.

Risks / Benefits: Risks to participants are considered minimal. There will be no costs for participating, nor will you benefit from participating other than to further research.

Confidentiality: Your responses are completely confidential and no individual participant will ever be identified with his/her answers. Data from this study will be saved on a password protected computer for 3 years after study completion. Only study staff will have access to the information.

Voluntary Participation: Your participation in this study is voluntary. You may choose to not answer any of the questions or withdraw from this study at any time without penalty. Your decision will not change any present or future relationship with the University of Wisconsin Milwaukee.

Who do I contact for questions about the study: For more information about the study or study procedures, contact William Massey at wvmassey@uwm.edu

Who do I contact for questions about my rights or complaints towards my treatment as a research subject? Contact the UWM IRB at 414-229-3173 or irbinfo@uwm.edu

Research Subject's Consent to Participate in Research:

By completing and submitting the attached survey, you are voluntarily agreeing to take part in this study. Completing the survey indicates that you have read this consent form and have had all of your questions answered, and that you are 18 years of age or older.

Thank you!

Appendix B

Recruitment Letter

Dear Coach/Sport Psychologist, Athlete/Athletic Director,

Thank you for taking time to consider participation in our study.

The purpose of this study is to develop testing instruments that will allow us to understand why some athletes choose to work on mental skills in sport, while others do not. It is our hope that with greater knowledge of why athletes participate in mental skills training (MST) we will be able to create more effective MST programs. The study will take place with collegiate athletes. Approximately 700 participants will be involved in the study. Each athlete will be asked to complete a set of questionnaires that will take approximately 60 minutes.

For ease and convenience we have made the questionnaires available online. In order to access the survey, please go to the following address:

(Will insert once study has been approved)

If you would prefer paper-pencil versions of the questionnaires, please contact the study coordinators below and we will send you copies.

If you have any problems or questions regarding the study, please contact myself at (414) 344-8036 or via email (wvmassey@uwm.edu), or Dr. Barbara Meyer (bbmeyer@uwm.edu)

Thank you again for your consideration of our study!

William Massey, MS, CSCS

Doctoral Candidate

University of Wisconsin-Milwaukee

Appendix C

Demographic Questionnaire

Demographic Information

1. Name: _____Date: _____

2. Age: _____

3. Ethnicity (mark all that apply):

White Caucasian _____ African American_____ Asian _____ Hispanic _____

Native American _____ Pacific Islander _____

Other (specify) _____

4. Primary Sport: _____

5. Highest level of competition (e.g., NCAA DI, Professional, Olympic)

6. I am currently in the following season:’

   a. Preseason/Training camp
   b. In-Season
   c. Off-Season

Appendix D

Stage of Change Questionnaire

Instructions

Mental training is defined as the intentional and systematic practice of mental skills to improve sport performance. This might include goal setting, imagery, deep breathing and relaxation, working on your focus, improving your confidence, or any other training you do to specifically improve your mental game. The questions below are meant to assess your thoughts and experiences towards mental training. Because individuals differ in their approach towards sport, please know that we expect athletes to respond differently, and there is no right or wrong answer. We only ask that you are open and honest of your opinions and experiences.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Mental skills may help me perform, but I don't really think so.	①	②	③	④	⑤
2. It might be worthwhile to work on my mental skills.	①	②	③	④	⑤
3. I am working hard to improve my mental skills.	①	②	③	④	⑤
4. I have been successful working on my mental skills, but I'm not sure I can keep up the effort on my own.	①	②	③	④	⑤
5. I have been successful working on my mental skills for at least the last 6 months.	①	②	③	④	⑤
6. I have difficulties with my mental skills, but so do most other athletes. Why spend time thinking about them?	①	②	③	④	⑤
7. I'm hoping someone could help me improve my mental skills.	①	②	③	④	⑤

8. Anyone can talk about improving their mental skills. I am actually doing something about it.	①	②	③	④	⑤
9. I'm not following through with the mental skills I have already changed as well as I would have hoped, and I would like to continue working on them.	①	②	③	④	⑤
10. I have used the mental skills I have learned for at least 6 months and plan to continue working on them.	①	②	③	④	⑤
11. I would rather try to cope with my mental skills limitations than try to change them.	①	②	③	④	⑤
12. Maybe a sport psychologist will be able to help me.	①	②	③	④	⑤
13. I am actively working on my mental skills.	①	②	③	④	⑤
14. After all I've done to try to change my mental skills, every now and again I slip back into old habits.	①	②	③	④	⑤
15. After all I have done to improve my mental skills, I feel confident in my new habits.	①	②	③	④	⑤

Appendix E

Processes of Change in Sport Questionnaire

Instructions

Mental training is defined as the intentional and systematic practice of mental skills to improve sport performance. This might include goal setting, imagery, deep breathing and relaxation, working on your focus, improving your confidence, or any other training you do to specifically improve your mental game. The questions below are meant to assess your thoughts and experiences towards mental training. Because individuals differ in their approach towards sport, please know that we expect athletes to respond differently, and there is no right or wrong answer. We only ask that you are open and honest of your opinions and experiences.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I read about mental skills training in an attempt to learn more about it	①	②	③	④	⑤
2. I have someone that helps me problem solve when I am dealing with difficult situations	①	②	③	④	⑤
3. Rather than worrying about my performance, I work on my mental skills so that I know I am prepared	①	②	③	④	⑤
4. I notice more talk in the media about the benefits of sport psychology	①	②	③	④	⑤
5. My significant other understands when I need time to work on my mental game	①	②	③	④	⑤

6. I expect my coach to give me more playing time as a reward for working on my mental skills	①	②	③	④	⑤
7. I find that society is more receptive to athletes working on the psychological aspects of their game	①	②	③	④	⑤
8. My family understands that I have a pregame routine and they need to be supportive from a distance	①	②	③	④	⑤
9. Rather than viewing mental skills training as simply another task to get out of the way, I try to enjoy it and use it as time to sharpen my skills	①	②	③	④	⑤
10. I do my mental training at the training facilities so that I am not tempted to skip it at home	①	②	③	④	⑤
11. I incorporate mental skills training as an important part of my preparation routine	①	②	③	④	⑤
12. I get frustrated/upset because I know that thinking this way stands in the way of achieving my goals	①	②	③	④	⑤
13. I expect rewards from working on my mental game	①	②	③	④	⑤

14. I have been fooling myself by thinking I am doing everything to achieve my goals and need to re-evaluate my training	①	②	③	④	⑤
15. There is more I can do to improve as an athlete	①	②	③	④	⑤
16. Rather than viewing mental training as a chore, I now see that it is helpful in achieving my goals	①	②	③	④	⑤
17. Rather than thinking of mental training as something for athletes with problems, I use it as a way to enhance my strengths	①	②	③	④	⑤
18. I constantly evaluate my goals and what it is going to take to reach them	①	②	③	④	⑤
19. I surround myself with people that hold me accountable for practicing my mental skills	①	②	③	④	⑤
20. I consider that working on my mental game would help improve the performance of my team/organization	①	②	③	④	⑤
21. I wonder how my performance affects those who are close to me	①	②	③	④	⑤

22. Winning in my sport is a reward for working on my mental skills	①	②	③	④	⑤
23. I have seen athletes on television thanking their sport psychologist	①	②	③	④	⑤
24. I avoid people that do not encourage me to improve my mental game	①	②	③	④	⑤
25. Some of my teammates might work with a sport psychologist if I did	①	②	③	④	⑤
26. I have read books by famous athletes and coaches who talk about working with a sport psychologist	①	②	③	④	⑤
27. I reward myself for completing mental training exercises	①	②	③	④	⑤
28. My coach would take me more seriously if I started working with a sport psychologist	①	②	③	④	⑤
29. I keep things in the athletic facilities to remind me to work on my mental game	①	②	③	④	⑤
30. I reevaluate what it means to be a great athlete and consider the role mental skills training might play in my development	①	②	③	④	⑤

31. I get upset when I consider I am not living up to the athletic standards I have for myself	①	②	③	④	⑤
32. I believe I would be a better role model for my teammates if I participated in mental skills training	①	②	③	④	⑤
33. I have an alarm set on my phone that reminds me to work on my mental training	①	②	③	④	⑤
34. I avoid environments that are not receptive to improving your mental game	①	②	③	④	⑤
35. My roommates support me when I need time and space to complete my mental training	①	②	③	④	⑤
36. I can be open with at least one person about the struggles I am having	①	②	③	④	⑤
37. It makes so much sense to do mental skills training, but I struggle to do it consistently which frustrates me	①	②	③	④	⑤
38. I do my mental training first thing in the day so there are not distractions that get in the way later in the day	①	②	③	④	⑤

39. I reward myself for achieving my mental training goals	①	②	③	④	⑤
40. I recall information from support staff (physician, physical therapist, athletic trainer, etc.) on the benefits of mental skills training	①	②	③	④	⑤
41. When I am tense of irritated, I use mental skills training as a way to relax and focus on my performance	①	②	③	④	⑤
42. I have someone who listens when I need to vent	①	②	③	④	⑤
43. I have been thinking this way since I started playing sports, and I am frustrated that it is getting in the way of my performance	①	②	③	④	⑤
44. I have at least one coach who is supportive and encouraging	①	②	③	④	⑤
45. Rather than feeling nervous before a game, I use my mental training to channel my energy into feelings of readiness	①	②	③	④	⑤
46. I put things in my house to remind me of working of my mental game	①	②	③	④	⑤

47. Being able to play as well in practice as I do in games in a reward I get from working on my mental skills training	①	②	③	④	⑤
48. I am aware that many other great athletes use mental skills training to improve their performance	①	②	③	④	⑤
49. I create action plans and stick to them to improve my mental skills	①	②	③	④	⑤
50. I look for information on mental skills training	①	②	③	④	⑤
51. Rather than feeling forced to talk to our sport psychologist, I know see it as beneficial to my performance	①	②	③	④	⑤
52. Since mental training is so important, I will do whatever it takes and am confident I can incorporate it into my daily routine	①	②	③	④	⑤
53. I have attended conferences or seminars to learn more about mental skills training	①	②	③	④	⑤
54. I have a friend that encourages me regardless of how well I am performing	①	②	③	④	⑤

55. Reading books about mental training has caused me to re-evaluate what I am doing to achieve my goals	①	②	③	④	⑤
56. Winning against teams/players that used to beat me in competition is a reward I receive from working on my mental skills	①	②	③	④	⑤
57. I do something for myself after a great week of mental training	①	②	③	④	⑤
58. Like physical training, I am committed to doing mental skills training consistently to maximize my potential as an athlete	①	②	③	④	⑤
59. When I think about my current level of performance, and where I would like to be, it affects me emotionally	①	②	③	④	⑤
60. I think about information I have read in articles and books about how to do mental skills training	①	②	③	④	⑤
61. I am committed to working on my mental skills and I know I can keep improving them	①	②	③	④	⑤

62. I think about the athlete I want to be, and how mental skills training can help me reach my goals	①	②	③	④	⑤
63. I have someone I can depend on when I am struggling in my sport	①	②	③	④	⑤
64. That I am not longer stressed out is a reward from working on my mental skills training	①	②	③	④	⑤
65. I remind myself that I am responsible for my performance, and that I can chose to work on and improve my mental skills	①	②	③	④	⑤

Appendix F

Exercise Processes of Change Questionnaire

Instructions

Mental training is defined as the intentional and systematic practice of mental skills to improve sport performance. This might include goal setting, imagery, deep breathing and relaxation, working on your focus, improving your confidence, or any other training you do to specifically improve your mental game. The questions below are meant to assess your thoughts and experiences towards mental training. Because individuals differ in their approach towards sport, please know that we expect athletes to respond differently, and there is no right or wrong answer. We only ask that you are open and honest of your opinions and experiences.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I recall information people have personally given me on the benefits of mental training	①	②	③	④	⑤
2. I think about information from articles and advertisements on how to make mental training a regular part of my life	①	②	③	④	⑤
3. I read articles about mental training in an attempt to learn more about it	①	②	③	④	⑤
4. I look for information related to mental training	①	②	③	④	⑤
5. Warnings about the hazards of not doing mental training move me emotionally	①	②	③	④	⑤

6. Dramatic portrayals of the evils of not doing mental training move me emotionally	①	②	③	④	⑤
7. I react emotionally to warnings about not doing mental training	①	②	③	④	⑤
8. I feel I would be a better role model for others if I did mental training regularly	①	②	③	④	⑤
9. I wonder how not doing mental training affects those people who are close to me	①	②	③	④	⑤
10. I realize that I might be able to influence others to do mental training if I did it as well	①	②	③	④	⑤
11. Some of my close friends might do mental training if I did	①	②	③	④	⑤
12. I am considering the idea that regular mental training would make me a healthier, happier person to be around	①	②	③	④	⑤
13. I think about the type of person I will be if I keep doing mental training	①	②	③	④	⑤
14. I get frustrated with myself when I do not do mental training	①	②	③	④	⑤

15. I consider the fact that I would feel more confident in myself if I did mental training regularly	①	②	③	④	⑤
16. I find society changing in ways that make it easier for people to do mental training	①	②	③	④	⑤
17. I am aware of more and more people encouraging me to do mental training these days	①	②	③	④	⑤
18. I notice that more teams are encouraging their players to do mental training by offering sport psychology services	①	②	③	④	⑤
19. I am aware of mental training clubs that provide babysitting services to their members	①	②	③	④	⑤
20. Instead of remaining inactive, I engage in some mental training	①	②	③	④	⑤
21. Rather than viewing mental training as simply another task to get out of the way, I try to use it as a special time to relax and try to get away from the day's worries	①	②	③	④	⑤
22. When I feel tired, I make myself do mental training anyway because I know I will feel better afterwards	①	②	③	④	⑤

23. When I am feeling tense, I find mental training a great way to relieve my worries	①	②	③	④	⑤
24. I have someone on whom I can depend when I am having problems with mental training	①	②	③	④	⑤
25. I have a healthy friend who encourages me to do mental training when I do not feel up to it	①	②	③	④	⑤
26. I have someone who points out my rationalizations for not doing mental training	①	②	③	④	⑤
27. I have someone who provides me feedback about my mental training	①	②	③	④	⑤
28. I reward myself when I do mental training	①	②	③	④	⑤
29. I try to set realistic goals for myself rather than setting myself up for failure by expecting too much	①	②	③	④	⑤
30. When I do mental training, I tell myself that I am being good to myself by taking care of my mind in this way	①	②	③	④	⑤
31. I do something nice for myself for making efforts to do mental training more	①	②	③	④	⑤

32. I tell myself that I am able to keep doing mental training if I want to	①	②	③	④	⑤
33. I tell myself that if I try hard enough, I can keep doing mental training	①	②	③	④	⑤
34. I make commitments to do mental training	①	②	③	④	⑤
35. I remind myself that I am the only one who is responsible for my health and well-being, and that only I can decide whether or not I will do mental training	①	②	③	④	⑤
36. I put things around my home to remind me of mental training	①	②	③	④	⑤
37. I keep things around my place of work that remind me of mental training	①	②	③	④	⑤
38. I remove things that contribute to me not doing mental training	①	②	③	④	⑤
39. I avoid spending long periods of time in environments that do not promote mental training	①	②	③	④	⑤

Appendix G

Marlowe Crown Social Desirability Scale

For the following items, please indicate whether you believe they are true or false.

1. It is sometimes hard for me to go on with my work if I am not encouraged.
TRUE FALSE

2. I sometimes feel resentful when I don't get my way. **TRUE FALSE**

3. On a few occasions, I have given up doing something because I thought too little of my ability. **TRUE FALSE**

4. There have been times when I felt like rebelling against people in authority even though I knew they were right. **TRUE FALSE**

5. No matter who I'm talking to, I'm always a good listener. **TRUE FALSE**

6. There have been occasions when I took advantage of someone. **TRUE FALSE**

7. I'm always willing to admit it when I make a mistake. **TRUE FALSE**

8. I sometimes try to get even rather than forgive and forget. **TRUE FALSE**

9. I am always courteous, even to people who are disagreeable. **TRUE FALSE**

10. I have never been irked when people expressed ideas very different from my own.
TRUE FALSE

11. There have times when I was quite jealous of the good fortune of others.
TRUE FALSE

12. I am sometimes irritated by people who ask favors of me. **TRUE FALSE**

13. I have never deliberately said something that hurt someone's feelings.
TRUE FALSE

Curriculum Vitae: William V. Massey, M.S., CSCS

Doctoral Candidate, University of Wisconsin-Milwaukee
College of Health Sciences, Department of Kinesiology
wvmassey@uwm.edu
414-344-8036

Formal Education

University of Wisconsin-Milwaukee (2013)
Doctorate of Philosophy, Health Sciences
Specialization: Applied Sport Psychology
Advisor: Dr. Barbara B. Meyer
Dissertation: *Behavior change in sport psychology: The use of processes of change in psychological training for athletes*

Southern Illinois University Carbondale (2008)
Masters of Science in Education, Kinesiology
Specialization: Social Psychology of Sport
Advisor: Dr. Julie A. Partridge
Thesis: *Differences in shame coping styles among high school athletes*

Central Michigan University (2006)
Bachelor of Applied Arts
Major: Sports Studies
Minors: Business Administration, Journalism

Professional Certifications

Certified Strength and Conditioning Specialist, National Strength and Conditioning Association (2008); Certification Number: 200836388

Professional Experience

Lecturer, Department of Kinesiology, University of Wisconsin-Milwaukee (2012-2013)

- Instructor of record for five sections of KIN 270: Statistics in the Health Professions
- Instructor of record for one section of KIN 200: Introduction to Kinesiology

Graduate Intern Therapist, Pathfinders Milwaukee (2011-2012)

- Clinical internship providing counseling and crisis intervention to homeless, runaway, and throw-away youth (ages 11-17) in Milwaukee
- 600 hours
- Supervisor: Randall Neff, LCSW

Advanced Opportunity Fellow, University of Wisconsin-Milwaukee (2010-present)

- Lead investigator for a research study utilizing grounded ethnography in mixed martial arts
- Lead investigator for a series of research studies examining the transtheoretical model in applied sport psychology
- Undergraduate intern supervisor, Laboratory for Sport Psychology and Performance Excellence
- Website manage, Laboratory for Sport Psychology and Performance Excellence

Performance Excellence Consultant (2008- present)

- Complete the required coursework and consulting hours to earn the credential of Certified Consultant, Association for Applied Sport Psychology upon complete of Doctoral Degree
- Part of a team assembled to create psychological profiles and player development plans for the NHL draft
- Part of a team assembled to create psychological profiles and player development plans for a National Governing Body sport organization
- Sport psychology consultant for an elite youth soccer club
- Sport psychology consultant for a high school girls track and cross country team
- Sport psychology consultant for individual high school athletes
- Athlete development coach for a high school athletics program (all sports)
- Athlete development coach for a middle school athletics program (all sports)

Graduate Project Assistant, Department of Human Movement Sciences, University of Wisconsin-Milwaukee (2009-2010)

- Graduate student researcher on a project examining hand function in older adults
- Graduate student researcher of a project examining the effects of an exercise intervention on mild cognitive impairment

Sport Performance Coach, Parisi Speed School, Cincinnati, Ohio

- Speed and agility coach for middle school, high school, and collegiate athletes
- Strength coach for middle school, high school, and collegiate athletes

Graduate Teaching and Research Assistant, Department of Kinesiology, Southern Illinois University (2006-2008)

- Instructor of record for Diversity in American Sport
- Instructor of record for three physical education program activity classes (strength training, tennis basketball)
- Graduate student researcher on a project examining the effects of a health and exercise class on the quality of life in cancer survivors

Research Support, Honors, and Awards

1. Chancellor's Graduate Student Award. (2012). University of Wisconsin-Milwaukee, College of Health Sciences. $4,000.

2. Dissertation Fellowship Award (2012-2013). University of Wisconsin-Milwaukee. $16,500.

3. Advanced Opportunity Fellowship. (2010-2012). Graduate school fellowship awarded at the University of Wisconsin-Milwaukee. $14,000 (per year).

4. College of Health Sciences Student Research Grant Program. (2011). Massey, W.V., & Meyer, B.B. "A grounded theory of performance in mixed martial arts." $2,000.00.
   - Not Funded.

5. Advanced Opportunity Fellowship Summer Award. (2011). Graduate school fellowship awarded at the University of Wisconsin-Milwaukee. $2,100.

6. Chancellor's Graduate Student Award. (2010). University of Wisconsin-Milwaukee, College of Health Sciences. $1,000.

7. Massey, W.V., & Meyer, B.B. (2010). University of Wisconsin-Milwaukee, College of Health Sciences, student research competition, 2nd place award. *Sport psychology and high school athletics: A transtheoretical approach*. $200.00.

8. Department of Kinesiology graduate achievement award, Southern Illinois University. (2008). $500.00.

9. Finalist for Graduate Assistant Outstanding Teaching Award in the College of Education and Human Services (COEHS), Southern Illinois University. (2007).

Grants

1. Whitley, M.A. & **Massey, W.V.** (accepted through Phase I). *Youth rising up: Attaining personal and performance excellence via sport in underserved communities*. American Alliance for Health, Physical Education, Recreation and Dance.

2. **Massey, W.V.** & Meyer, B.B. *A grounded theory of performance in mixed martial arts*. University of Wisconsin-Milwaukee College of Health Sciences (not funded).

Peer-Reviewed Publications .

1. Arvinen-Barrow, M., **Massey, W.V.,** & Hemmings, B. (under review). Role of sport medicine professionals in addressing psychosocial aspects of sport injury rehabilitation: Professional athletes' views. *Journal of Athletic Training.*

2. **Massey, W.V.**, Meyer, B.B., Naylor, A. (2013). Towards a grounded theory of self-regulation in mixed martial arts. *Psychology of Sport and Exercise, 14,* 12-20. doi: 10.1016/j.psychsport.2012.06.008

3. Keenan, K.G., & **Massey, W.V.** (2012). Control of fingertip forces in young and older adults pressing against fixed low- and high-friction surfaces. *PLoS ONE 7(10):* e48193.doi: 10.1371/journal.pone.0048193.

4. Keenan, K.G., **Massey, W.V.,** Walters, T.J., & Collins, J.D. (2012). Sensitivity of EMG-EMG coherence to detect the common oscillatory drive to hand muscles in young and older adults. *Journal of Neurophysiology, 107,* 2866-2875. doi: 10.1152/ jn.01011

5. **Massey, W.V.,** Meyer, B.B., & Hatch, S.J. (2011). The transtheoretical model: Examining readiness for psychological skills training. *Journal of Performance Psychology, 2,* 3-22.

6. Keenan, K.G., Collins, J.D., **Massey, W.V.**, Walter, T., & Gruszka, H. (2011). Coherence between EMG is influenced by electrode placement in hand muscles. *Journal of Neuroscience Methods, 195,* 10-14. doi:10.1016/j.jneumeth.2010.10.018.

7. **Massey, W.V**. & Partridge, J.A. (2010). Patterns of shame coping in adolescent athletes. *Youth First: The Journal of Youth Sports, 5,* 3-8.

Book Chapters and Professional Development Publications

1. Meyer, B.B., Merkur, A., Ebersole, K.T., & **Massey, W.V.** (in press). The realities of working in elite sport: What you did not learn in graduate school. In G. White, A. Lane, R. Godfrey, M. Loosemore, (Eds.), *Applied sport science and medicine: Case studies from practice,* Human Kinetics: London, UK.

2. Meyer, B.B., Cashin, S.E., & **Massey, W.V.** (2012). The validity of online and paper-pencil measure of emotional intelligence. In A. Di Fabio (Eds.), *Emotional Intelligence,* InTech: Rijeka, Croatia.

3. **Massey, W.V.** (2011). In the huddle. *Journal of Sport Psychology in Action, 2,* 124-125.

4. **Massey, W.V.**, Cauthen, H., & Bauman, D. (Eds.). (2011). *Performance Excellence Movement Newsletter*. Association for Applied Sport Psychology: Madison, WI.

5. Hatch, S.J., MacKenzie, J.L., **Massey, W.V.,** & Meyer, B.B. (2010, September). The unique demands of famous athletes: Implications for novice sport psychology professionals. *Performance Excellence Movement Newsletter*, 2-4. Retrieved from http://appliedsportpsych.org/files/file/pem/PEM2010.pdf.

Presentations at Academic and Professional Meetings

1. **Massey, W.V.**, Meyer, B.B., & Mullen S.P. (under review). *Development of a processes of change measure for use in applied sport psychology settings*. Paper submitted for presentation at the annual meeting of the Association of Applied Sport Psychology, New Orleans, LA, 2013.

2. Meyer, B.B., **Massey, W.V.,** Gnacinski, S. (2012). *Operationalizing the symbiotic relationship between talent identification and talent development in elite sport*. Workshop submitted to the annual meeting of the Association of Applied Sport Psychology, Atlanta, GA, USA.

3. **Massey, W.V.,** & Meyer, B.B. (2011). *A grounded theory of performance excellence in mixed martial arts*. Paper presented at the annual meeting of the Association of Applied Sport Psychology, Honolulu, HI, USA, September 23.

4. Hatch, S.J., **Massey, W.V.,** & Meyer, B.B. (2011). *The psychological requirements of American Football officials: A descriptive study.* Poster presented at the annual meeting of the Association of Applied Sport Psychology, Honolulu, HI, USA, September 22.

5. **Massey, W.V.,** & Meyer, B.B. (2011). *A grounded theory to performance excellence in mixed martial arts*. Paper presented at University of Wisconsin-Milwaukee College of Health Sciences Research Symposium, Milwaukee, WI, USA, April 15.

6. Hatch, S.J., **Massey, W.V.,** & Meyer, B.B. (2011). *The psychological requirements of American Football officials: A descriptive study.* Poster presented at the University of Wisconsin-Milwaukee College of Health Sciences Research Symposium, Milwaukee, WI, USA, April 15.

7. **Massey, W.V.,** & Meyer, B.B. (2011). *An ethnographic study of the lived experiences of mixed martial artists.* Paper presented at the Midwest Symposium for Sport and Exercise Psychology: Annual regional conference of the Association of Applied Sport Psychology, Oxford, OH, USA, February 18.

8. Keenan, K.G., Collins, J.D., **Massey, W.V.,** Walter, T., & Gruszka, H. (2010). *Coherence between EMG is influenced by electrode placement in hand muscles.* Paper presented at the Society for Neuroscience, San Diego, CA, USA, November 14.

9. **Massey, W.V.,** Hatch, S.J., Mackenzie, J.L., & Meyer, B.B. (2010). *The transtheoretical model and psychological skills training in high school athletes.* Poster presented at the annual meeting of the Association of Applied Sport Psychology, Providence, RI, USA, October 29.

10. Keenan, K.G., Collins, J.D., **Massey, W.V.,** & Walters, T. (2010). *Maximal voluntary fingertip force, but not sub-maximal steadiness, is limited by a low-friction condition during index finger pressing tasks.* Paper presented at the American Society of Biomechanics, Providence, RI, USA, August 19.

11. Keenan, K.G., Collins, J.T., **Massey, W.V.,** Walters, T., & Smith, J.C. (2010). *Fine control of index finger flexion forces is altered with contact points along the finger.* Poster presented at the International Society of Electrophysiology and Kinesiology, Aalborg, Denmark, June 16.

12. **Massey, W.V.** (2010). *Developing a mastery orientation: Regulating intensity, building confidence and improving concentration.* Paper presented at the 7th National of Medicine for sport, Guatemala City, Guatemala, June 2.

13. Faltus, J., & **Massey, W.V.** (2010). *Functional assessment of lower extremities.* Presented at the 7th National of Medicine for sport, Guatemala City, Guatemala, June 2.

14. Skurzewski, M., & **Massey, W.V.** (2010). *From theory to application: Coaching effectiveness as a way to actualize the team and the self.* Paper presented at Sport and Society in America, Green Bay, WI, USA, May 27.

15. **Massey, W.V.,** & Meyer, B.B. (2010). *Sport psychology and high school athletics: A transtheoretical approach.* Paper presented at the University of Wisconsin-Milwaukee College of Health Sciences Research Symposium, Milwaukee, WI, USA, April 23.

16. Hatch, S.J., MacKenzie, J.L., **Massey, W.V.,** & Meyer, B.B. (2010). *Emotional intelligence and sport performance: A unified approach to understanding theory, measurement and application.* Poster presented at the University of Wisconsin-Milwaukee College of Health Sciences Research Symposium, Milwaukee, WI, USA, April 23.

17. **Massey, W.V.,** Voelker, D., & Whitley, M. (2010). *Association for Applied Sport Psychology (AASP): How to become involved as a student member*. Presented at the Midwest Symposium for Sport and Exercise Psychology: Annual regional conference of the Association of Applied Sport Psychology, Muncie, IN, USA, February 14.

18. **Massey, W.V.,** & Partridge, J.A. (2007). *Differences in shame coping styles among high school freshman athletes*. Poster presented at the Annual meeting of the Association of Applied Sport Psychology, Louisville, KY, USA, October 26.

19. **Massey, W.V.** (2007). *Demographic differences in shame coping styles for high school freshmen athletes.* Paper presented at the Midwest Symposium for Sport and Exercise Psychology: Annual regional conference of the Association of Applied Sport Psychology, West Lafayette, IN, USA, February 23.

Local Presentations

1. **Massey, W.V.** (2012). *Motivational Interviewing: Counseling approaches for homeless youth.* In service training presented to Pathfinders, Milwaukee, WI, USA, November 6, 2012.

2. **Massey, W.V.** (2010). *Opportunities for sport psychology in high school athletics.* Keynote presentation presented at University of Wisconsin-Sheboygan Athletic Director's Brunch, Sheboygan, WI, USA, April 30.

3. Meyer, B.B., **Massey, W.V.**, Bartz, M., & Hatcher, A. (2009). *Sport Psychology: Skills and applications*. Presentation delivered to University School of Milwaukee, Mequon, WI, USA, November 30.

4. **Massey, W.V.** (2007). *Sport psychology skills: Focus and concentration*. Presentation delivered to student athlete advisory counsel, Southern Illinois University, Carbondale, IL, USA, December 4.

5. **Massey, W.V.** (2008). *Sport psychology skills: Goal setting.* Presentation delivered to student athlete advisory counsel, Southern Illinois University, Carbondale, IL, USA, February 19.

Undergraduate Courses Taught

KIN 200	Introduction to Kinesiology (Fall 2012)
KIN 270	Statistics in the Health Professions (Spring 2012, Fall 2012, Spring 2013)
KIN 350	Psychological Aspects of Sport and Exercise (co-instructor; Spring 2011)
KIN 210	Diversity in American Sport (Fall 2007, Spring 2008)
KIN 104D	Strength Training (Fall 2006)
KIN 105E	Tennis (Fall 2006, Spring 2007)
KIN 106A	Basketball (Spring 2006)

Service

1. **Professional Service**
   - Peer Reviewer:
     - *Psychology of Sport and Exercise*
     - *Journal of Applied Sport Psychology*
     - *Strength and Conditioning Journal*

   - Midwest Student Regional Representative, Association for Applied Sport Psychology (2009-2011)
     - Initiatives: Performance Excellence Movement (Editor); Internship Database (Director)

2. **University Service**
   - Search and screening committee member, two social science positions, Department of Kinesiology, University of Wisconsin-Milwaukee (2011-2012).
   - Master's of science in kinesiology task force for integrative human performance member, Department of Kinesiology, University of Wisconsin-Milwaukee.
   - Executive Member of Student Athlete Advisory Counsel, Southern Illinois University Athletics (2007-2008)

3. **Community Engagement**
   - Licensed Foster Parent, Children's Service Society of Wisconsin (2010-2012)
   - Big Brothers Big Sisters of Milwaukee (2009-2011)
   - Special Olympics of Wisconsin (2009)
   - Carbondale Jr. Sports (2007-2008)
   - Michigan Special Olympics, Winter Games (2006)