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## Sources of self-efficacy in distance runners

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# SOURCES OF SELF-EFFICACY IN DISTANCE RUNNERS

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy  
in  
The Department of Kinesiology

by  
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## **ABSTRACT**

Self-efficacy theory (Bandura, 1997) asserts that people will be more likely to engage in behaviors that they believe they can successfully perform and avoid behaviors in which they feel that they will be unsuccessful. Researchers have concluded that individuals with high levels of self-efficacy are more likely to pursue challenging goals, cope with pain, and persevere through setbacks, while those with low self-efficacy avoid challenges and tend to give up when confronted with obstacles (Llewellyn, Sanchez, Asghar, & Jones, 2008). Endurance sport, particularly distance running, is a domain in which being able to cope with pain and persevere through setbacks is especially important; therefore the purpose of this dissertation was to increase our understanding of self-efficacy in the physical activity domain by exploring the sources of self-efficacy for distance runners. The first study utilized a quantitative approach to investigate the relationship between self-efficacy, affect and training volume during marathon training. The results revealed that self-efficacy fluctuated over the training period and was only minimally related to affect. Study two was an extension of the first and utilized a qualitative approach to investigate the sources of self-efficacy information used by runners. Physiological states emerged as the most influential source of efficacy information throughout the program and past performance experiences increased in their influence as participants gained more running experience. The third study was a qualitative investigation of the sources of self-efficacy for running using a sample of African American distance runners. Past performance was cited as the most salient source of efficacy information for these runners and, for the majority of participants, race/ethnicity did not emerge as a significant factor in their efficacy for running.

## **CHAPTER ONE: INTRODUCTION**

Self-efficacy theory is one of the most prominent sub-theories developed within the framework of Bandura's (1986) social cognitive theory. Social cognitive theory emphasizes reciprocal determinism in the interaction between people and their environments. Individuals are viewed as active participants in the regulation of their cognitions and behavior, instead of passive reactors to their environment (Feltz, Short, & Sullivan, 2008; Glanz, Rimer, & Viswanath, 2008). The theory posits that behavior is a product of the complex interaction of personal, behavioral, and environmental influences, while acknowledging the ability of the individual to alter and construct their environments to fit their needs (Glanz et al., 2008).

Through the social cognitive lens, self-efficacy theory characterizes self-referenced beliefs as the core factor that influences individuals' goal-directed behavior. According to Bandura (1997), self-efficacy beliefs are "people's judgments of their capabilities to organize and execute courses of action required to attain a desired outcome" (p. 3). Bandura describes self-efficacy as the cognitive mechanism that mediates between self-appraisal information and an individual's subsequent thoughts, emotions, motivations, and behaviors. Self-efficacy theory posits that people will be more likely to engage in behaviors that they believe they can successfully perform and avoid behaviors in which they feel that they will be unsuccessful. In addition to predicting whether or not an individual will engage in a behavior, self-efficacy influences the amount of effort an individual expends and the length of time that such effort endures in the face of adversities (Bandura, 1992).

Self-efficacy beliefs vary on three dimensions: level, strength, and generality (Feltz et al., 2008). The "level" of self-efficacy refers to individuals' expected performance achievements at different levels of difficulty (i.e. completing a mile in six minutes up to completing a mile in ten

minutes). The “strength” of self-efficacy beliefs refers to the degree of certainty with which the individual believes they can achieve the different levels of performance (i.e. two people may both believe they can run a ten minute mile, but one may be more certain in their beliefs) “Generality” of self-efficacy beliefs is indicative of the transferability of an individual’s efficacy beliefs across domains or tasks (Feltz et al., 2008).

Originally, studies based on self-efficacy theory were designed for the treatment of phobias, but later studies expanded to include addressing concerns for a variety of behaviors. The empirical validation of self-efficacy theory has been repeated numerous times in a variety of contexts, with a variety of behaviors (Gotay, 2005; Kelder et al., 2005; Moritz, Feltz, Farhback, & Mack, 2000; Theis, Helmick, & Hootman, 2007). Self-efficacy beliefs have been associated with engagement in behaviors so strongly that examinations of behavioral determinants are considered incomplete if self-efficacy is not included (Glanz et al., 2008). Because of its broad appeal, the construct of self-efficacy has been extended beyond SCT and been incorporated in several other models of behavior change, including Health Belief Model (HBM), Theory of Planned Behavior (TBP), Integrated Behavioral Model (IBM), Transactional Model of Stress and Coping (TMSC), and Transtheoretical Model (TTM) (Glanz et al., 2008).

One of the major appealing factors of self-efficacy related to behavior change is that it is a strong predictor of behavior, yet it is a construct that is malleable. According to Bandura (1997), self-efficacy perceptions are the product of a complex process consisting of selection, interpretation, and integration of four main sources of efficacy information: past performance accomplishments, verbal persuasion, vicarious experience/modeling, and physiological /emotional states. The information gained from the four sources is not particularly enlightening, but becomes relevant and influential through cognitive processing and thoughtful reflection.



Other researchers have added separate categories for emotional states and imaginal experiences (i.e. Maddux, 1995) as sources of efficacy information, but in this dissertation I focus on the investigation of sources to the four proposed by Bandura.

### **Self-efficacy and Physical Activity**

There is evidence that an individual with a higher level of self-efficacy will persist longer and be more robust and resolute in their efforts than an individual with a lower level of self-efficacy (Feltz et al., 2008). In the physical activity domain, self-efficacy has been one of the strongest predictors of exercise behaviors (Hu, Motl, McAuley, & Konopack, 2007; Rovniak et al., 2002; Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). Bandura (1997) notes that while physical skills and ability are important to the successful completion of a physical task, having the confidence to be able to apply those skills in a given situation is crucial. Self-efficacy beliefs influence individuals' efforts, affective experiences, and overall enjoyment of physical activities (Bandura, 1986; Martin & Gill, 1995). People with high levels of self-efficacy are more likely to pursue challenging goals, cope with pain, and persevere through setbacks, while those with low self-efficacy avoid challenges and tend to give up when confronted with obstacles (Feltz et al., 2008; Llewellyn, Sanchez, Asghar, & Jones, 2008).

**Engagement.** Research examining the relationship between self-efficacy and physical activity engagement has been consistent in demonstrating the predictive power of efficacy beliefs for physical activities. Examinations of social cognitive determinants of physical activity using a prospective design to examine the relationship between social cognitive variables and physical activity in adults have found that self-efficacy had the greatest total effect on physical activity (Rovniak et al., 2002). Similarly, self-efficacy was a strong predictor of physical activity, as well as alcohol, smoking, and nutrition behavior in college students (Von Ah et al., 2004). The

same trends were evident in a sample of Australian college students, indicating that self-efficacy's power as a predictor of behavior engagement is not specific to geographical region (Leslie, Owen, & Salmon, et al., 1999). These results indicate that self-efficacy is a strong predictor of physical activity adoption and maintenance, in addition to other health behaviors, and that those who maintain a high level of self-efficacy will be more likely to plan around obstacles, set goals, and persevere in incorporating physical activity into their daily lives (Feltz et al, 2008; Hu et al., 2007; Rovniak et al., 2002; Von Ah et al., 2004). Additionally, McAuley and colleagues (1992, 2005, 2006) have consistently demonstrated the relationship between self-efficacy and physical activity adoption and maintenance in older adults.

**Enjoyment.** In addition to influencing engagement in physical activity behaviors, self-efficacy perceptions can also affect the amount of enjoyment that one derives from participation in those activities. Manipulations of participants' efficacy beliefs revealed that those assigned to a low-efficacy group reported lower levels of enjoyment than did the high-efficacy group (Hu et al., 2007). The greatest difference between the groups was seen after the participants completed a high-intensity exercise test, indicating that self-efficacy beliefs can be especially important in higher intensity physical activities. Similar manipulations of self-efficacy beliefs in adult women also documented changes in mood states after exercise bouts (Jerome, Marquez, & McAuley, et al., 2002). The positive self-efficacy-affect relationship has also been found in older adults participating in a 6-month exercise intervention (McAuley et al., 2005). These findings indicate that self-efficacy plays a role in enhancing the positive experiences associated with participating in physical activity, thus increasing the likelihood for adoption and maintenance of such behaviors.

**Effort.** Self-efficacy beliefs also influence the amount of effort that one will put forth when engaging in physical activity. Measures of physical activity effort such as perceived exertion ratings, self-report intensity logs, heart rate, VO<sub>2</sub> max, and time to reach 70% of max heart rate have all been associated with self-efficacy perceptions (McAuley & Mihalko, 1998). A relationship between self-efficacy and effort was found in a sample of urban high school students, with those reporting higher self-efficacy putting forth more effort in their physical activities (Wright, Ding, & Li, 2005). Additionally, Hutchinson and colleagues (2007, 2008) manipulated efficacy beliefs in participants and found that those who received efficacy-enhancing information persisted longer in the tasks assigned to them and also reported more positive affective experiences, further supporting the efficacy-effort and efficacy-enjoyment relationships. Effort is a key component of performance in the physical activity domain and research has found a consistent, positive relationship between efficacy beliefs and performance, particularly in the area of persistence and performance in endurance activities (Feltz & Riessinger, 1990; Feltz & Lirgg, 2001; Moritz, et al., 2000).

### **Distance Running**

Endurance sport, particularly distance running, is a domain in which being able to cope with pain and persevere through setbacks is especially important. Athletes who participate in distance running voluntarily expose themselves to physical distress on a regular basis while following regimented time schedules and diets (Ogles & Masters, 2000). These athletes have been widely studied for many years because researchers are interested in what motivates these individuals to engage in such a strenuous activity as a pleasurable pastime (Blumenthal, O'Toole, & Chang, 1984; Dishman, 1985; Ogles & Masters, 2003). There is evidence that an individual with a higher level of self-efficacy will persist longer and be more robust and resolute

in their efforts than an individual with a lower level of self-efficacy (Feltz et al., 2008). Thus, it follows that a high level of self-efficacy would be essential for success in a strenuous sport such as distance running. Although the role of self-efficacy in distance running has not been thoroughly explored, this context seems to be well-suited to provide a clearer understanding self-efficacy in the physical activity domain.

### **Purpose of Dissertation**

The purpose of this dissertation was to increase our understanding of self-efficacy in the physical activity and sport domain by exploring the sources of self-efficacy for endurance athletes, specifically distance runners. The first study utilized a quantitative approach to investigate the relationship between self-efficacy, affect and training volume during marathon training. Study two is an extension of the first study and employed a qualitative approach to investigate the sources of self-efficacy information used by runners to form perceptions about their capacities for success in completing a marathon. These studies contribute to the current literature by providing a more in depth picture of how self-efficacy beliefs form and fluctuate during a long-term activity program and how individuals select and use sources of information when forming self-judgments. In addition, the studies followed the participants throughout the 15-week training program and race completion using a longitudinal design, filling a void in the self-efficacy literature. The third study was a qualitative investigation of the sources of self-efficacy for running using a sample of African American distance runners. The majority of research in the self-efficacy area (including the first two studies) has used Caucasian populations and this study contributes to the literature by exploring the phenomenon within an understudied population.

## **CHAPTER TWO: CHANGES IN SELF-EFFICACY DURING MARATHON TRAINING**

### **Introduction**

According to Bandura's (1977) self-efficacy theory, individuals will be more likely to engage in behaviors in which they believe they have the capabilities to be successful and avoid behaviors in which they feel that they lack the capabilities for success. Self-efficacy influences the amount of effort an individual expends and the length of time that effort is put forth when faced with obstacles (Bandura, 1992). Specifically in the physical activity domain, there is evidence that an individual with a higher level of self-efficacy will persevere longer in their efforts than an individual with lower levels of self-efficacy (Feltz et al., 2008).

Research in the sport and physical activity arenas demonstrates self-efficacy has the potential to influence physiological arousal, stress reactions, pain tolerance, physical stamina, and affective states (Bandura, 1986; Rudolph & McAuley, 1996). Additionally, with regard to physiological and affective states, McAuley, Pena, and Jerome (2001) posit that self-efficacy can be viewed as both a determinant and an outcome. Athletes cognitively interpret their physiological states in order to form efficacy judgments about whether or not they can be successful in a given task; however, previously held efficacy beliefs can also influence how one interprets physiological information (Feltz et al., 2008). According to Feltz et al. (2008), "physiological information has been shown to be a more important source of efficacy information in the case of physical activity tasks than in nonphysical tasks," (p.12).

Early research reported that exercise efficacy beliefs were related to lowered perceptions of effort and physical strain during exercise, in addition to more positive affective experiences (McAuley & Courneya, 1992; Rudolph & McAuley, 1996). More recently, efficacy has been shown to be inversely related to perceptions of pain and exercise intensity (Hu et al., 2007; Motl

et al., 2006). Furthermore, negative physiological and emotional states have been inversely correlated with efficacy beliefs, meaning that higher levels of negative emotions and physiological states are related to lowered levels of self-efficacy (Hauck, Carpenter, & Frank, 2008; Rudolph & Butki, 1998; Treasure & Newberry, 1998). While the above studies employed *subjective* measures of physiological states (i.e. individuals' perceptions), research using *objective* measures of physiological states has demonstrated individuals higher in self-efficacy display fewer signs of physiological arousal (measured by heart rate, skin temperature, and pulse pressure) when completing a motor task (Sanz & Villamarin, 2001).

According to Bandura, self-efficacy plays a “pivotal role in the regulation of affective states,” (1997, p.137). Schachter's (1964) two-factor theory of emotion states that different emotions can have the same physiological state, thus the nature and intensity of the emotional experience is based on how the individual interprets the physiological symptoms presented by their body. Early research found that those who possessed higher self-efficacy beliefs were more likely to have more optimistic patterns of thinking and positive interpretations of their emotional states than those who were lower in self-efficacy beliefs (Bandura, 1997; Kavanagh & Bower, 1985; Kavussanu & McAuley, 1995). Later, this relationship was demonstrated in competitive rifle shooters and wrestlers using the Profile of Mood States (POMS; McNair, Lorr, Droppleman, 1971) and Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) to assess emotional states before competition (Prapavessis & Grove, 1994; Treasure, Monson, & Lox 1996). More recently, similar results have also been reported across other physical activity tasks, such as basketball shooting and wheelchair road racing, using different measures of emotion/affect (Mack & Stephens, 2000; Martin & Gill, 2002). High efficacy beliefs have been predictive of positive emotional states during exercise in fit young adults (Tate, Petruzzello, &

Lox, 1995), sedentary college students (Treasure & Newberry, 1998), and in older adults (Katula, Blissmer, & McAuley, 1999; McAuley, Blissmer, Katula, & Duncan, 2000). In recent years, these relationships have continued to emerge in other investigations, including a dart-throwing task with college students (Bindarwish & Tenenbaum, 2006), a longitudinal exploration of exercise behaviors in adults (Kwan & Bryan, 2010), and an 8-week exercise program for depressed patients (White, Kendrick, & Yardley, 2009).

While there is a critical mass of research that examines the relationship between self-efficacy and physiological and affective variables in the physical activity domain, the manner in which self-efficacy changes over time has not been explored. Bandura (1997) suggested that to enhance our understanding of self-efficacy, researchers should focus on the development of efficacy beliefs, documenting their rise and fall and investigating factors that enhance or inhibit self-efficacy. Few researchers, however, have chosen to undertake this endeavor and most of the research that exists on self-efficacy in the physical activity domain is cross-sectional in design. Individuals who participate in activities within the sport and physical activity domain usually do so over a prolonged period of time, thus it is important to understand how efficacy beliefs fluctuate across those time periods.

McAuley and colleagues' research with older adults and exercise is the primary source of information on changes in efficacy beliefs. Performance successes and failures can cause fluctuations in efficacy beliefs as a result of doubts about or boosts to one's confidence regarding their ability in the task. In general, efficacy beliefs increase over time as an individual becomes more familiar with and skilled at the exercise task (McAuley, 1992, McAuley, Jerome, Elavsky, et al., 2003, McAuley, Morris, Doerkson, et al., 2007). Research focusing specifically on older women has yielded similar results (McAuley, Morris, & Motl, et al., 2007). Self-efficacy beliefs

for physical activity can change over time; however much more research is needed to gain a better understanding of how self-efficacy evolves and the factors that are influential in the process.

**Distance Running.** Individuals with high levels of self-efficacy are more likely to pursue challenging goals, cope with pain, and persevere through obstacles, while those with low self-efficacy are more likely to avoid challenges and give up when confronted with setbacks (Feltz et al., 2008; Llewellyn, Sanchez, Asghar, & Jones, 2008). Distance running is a sport in which being able to deal with discomfort and overcome obstacles are critical. Individuals who participate in distance running willingly expose themselves to distress and pain while following strict training, and oftentimes nutritional, plans (Ogles & Masters, 2000).

Researchers over the years have focused primarily on the physiological variables related to distance running and racing; however there is some research that explores psychological variables related to participation in such a taxing sport. The majority of research in this area focuses on the motivations of runners and the underlying reasons for their participation. This line began in the early 1980's with Curtis and McTeer's (1981) investigation of marathoners' reasons for running. Several researchers followed with their investigations of the driving force behind participation in such an activity and concluded that it was largely the appeal of goal attainment and personal well-being that motivated distance runners (Johnsgard, 1985; Masters & Lambert, 1989; Summers, Machlin, & Sargent, 1983). More recently, researchers have continued to explore the reasons behind participation in distance running and have largely supported previous findings that personal health and attainment of a long-term goal are the primary motivators for running a marathon (Ogles & Masters, 2003).



Research specifically examining self-efficacy in distance runners is fairly limited and not cohesive, thus only general conclusions can be drawn. Martin and Gill (1991, 1995) were among the first to explore self-efficacy in distance runners, using expectancy-value models to predict performance in high-school distance runners. They concluded that runners with higher self-efficacy for running placed higher and performed better than runners with lower running self-efficacy. Later investigations produced similar results with Olympic-level male distance runners in Australia (Astle, Adams, & Thompson, 2000). Prior to a 20k race, runners higher in self-efficacy selected more difficult goals and, subsequently, ran at a faster pace (resulting in better performance) than runners with lower self-efficacy. In a more recent study with distance runners, Scholz, Nagy, Schuz, and Zieglermann (2008) followed a group of runners while they trained over a year-long period for a marathon or half-marathon race and concluded that increases in running behaviors were related to higher levels of self-efficacy. They also reported that fluctuations in running behaviors were associated with fluctuations in self-efficacy levels. While the results of these studies give some insight into the relationships among self-efficacy, running behavior, and performance, much more research is needed to gain a deeper understanding of self-efficacy in the context of distance running.

Despite the fact that the role of self-efficacy in distance running has not been thoroughly studied, the existent research suggests that a high level of self-efficacy is critical for success in a strenuous sport such as distance running; therefore, this context seems to be well-suited to provide a clearer understanding self-efficacy in the physical activity domain. Therefore, the purpose of this study was to explore changes in self-efficacy during a 15-week training program and to examine how changes in self-efficacy relate to marathon training-related variables in distance runners.

## **Research Questions**

The research questions in this study were:

- (1) How do self-efficacy and affect change over the course of training for a marathon?
- (2) What are the relationships among self-efficacy, affect, and training volume during endurance training?

With regard to research question one, it was hypothesized that self-efficacy would fluctuate as training volume increased, but demonstrate a general upward trend as the training progressed. The overall effect was hypothesized to be an increase in self-efficacy from pre-training to post-race. The relationship between self-efficacy, affect, and training volume (research question 2) was hypothesized to be moderately correlated, with changes in training volume related to changes in affect and self-efficacy.

## **Methods**

### **Participants and Setting**

Participants were 40 Caucasian, college-aged students who enrolled in a senior level course at a large university in the southeast United States. The sample consisted of 11 males and 29 females with running experience ranging from beginner to experienced marathoners. Over the duration of the semester, these individuals trained for a marathon race that was to be the capstone experience in the course. Due to injury, one student dropped out of the training and withdrew from the study, leaving a sample of 39 participants (11 males, 28 females). Students were provided with a full description of the study procedures prior to participation and informed consent was obtained for each participant. This study was reviewed and approved by the Institutional Review Board.

The 15-week training program took place over the duration of a semester in which students were enrolled in an exercise physiology course. The class met twice a week to learn about training-related physiology principles and trained together three days during the week. Participants also completed one training run of a longer duration (8-20 miles) during the weekend. The capstone event at the completion of the semester and training program was a group trip to a major city in the southeast U.S. to complete a marathon race. During the weekend of the race, weather conditions including severe storms and flooding, led to the cancellation of the event mid-race. As a result, only 4 participants actually got to complete the race, while the rest of the participants were removed from the course at miles 20 and 21.

**Instrumentation.** Throughout the marathon training process, participants completed a series of questionnaires designed to assess variables including self-efficacy levels, affect, and training volume.

**Self-efficacy.** The Barrier Self-efficacy Scale (Bandura, 2006) is an 18 item inventory designed to assess individuals' barrier self-efficacy levels to successfully reach their goal of training for and completing the marathon across varying levels of challenge. The original version was developed to assess barrier self-efficacy for exercise in general, thus the instrument was modified such that the word "exercise" was replaced with the word "run." Individuals responded to each item on a 0-100 scale ranging from 0, "not confident at all that I can do it," to 100, "I am completely certain that I can do it." An average score was calculated based on the responses to the individual items, with a higher score indicating a higher level of self-efficacy. Sample items included, "I can successfully train for and complete my marathon goal when I have too much work to do for school," and, "I can successfully train for and complete my marathon goal when I have visitors in town."

Task-specific self-efficacy was assessed by participants' 0-100% confidence ratings on 5 marathon-specific items, such as, "I can complete a marathon." The scores for the five items were averaged in the same manner as outlined for Barrier self-efficacy. In addition, overall task self-efficacy was assessed by two final open-ended items added to the scale that asked "What is your goal for the marathon?" and "How confident are you in your abilities to attain your goal for the marathon?" Participants answered the second question in the same 0-100 manner as described above.

**Positive and Negative Affect Scale.** (PANAS; Watson, Clarke, & Tellegen, 1988). The PANAS is a 20 item survey which was used to assess participants' affective states throughout the training program. Participants were asked to respond how often they have felt the listed emotions during the past week. Some example emotions listed include: angry, jittery, calm, happy, and enthusiastic. The inventory consists of two subscales, positive affect and negative affect, and is scored by calculating an average for each subscale. A higher score for the positive affect subscale indicates more positive mood states, while a higher score on the negative affect subscale indicates more negative mood states. For data analysis in this study, a difference score was calculated between the two scales in order to yield one variable representing overall affect levels. A positive number reflected a higher score on the positive affect subscale, indicating more positive than negative mood states, and a negative number reflected higher score on the negative affect subscale, indicating more negative than positive mood states. The PANAS has been shown to be correlated with longer measures of affect and mood states and it has also demonstrated sufficient sensitivity in order to capture fluctuations in mood states during repeated administration. This instrument has been validated across diverse populations and has been found to be highly reliable and internally consistent (Watson et al., 1988).

**Training Logs.** Throughout the training process, participants completed weekly logs to keep records of distances run, intensity level of runs, and any other outside physical activity that was completed by the individual. This information was recorded in an Excel file and emailed to a member of the research team at the end of each week. The overall training plan that all participants followed is presented in the table below. The participants started with a “fitness building” phase in which a base of cardiovascular fitness was built, then proceeded into the “mileage build up” phase in which more miles were added each week until “peak” weeks were reached. During the “peak” weeks, participants complete their longest runs (18-22 miles) and then reduced their training for the two “taper” weeks leading up to the race.

Table 2.1 Marathon Training Program

<b>Marathon Training Plan (Distances in Miles)</b>									
<b>Week</b>		<b>Mon</b>	<b>Tues</b>	<b>Wed</b>	<b>Thur</b>	<b>Fri</b>	<b>Sat</b>	<b>Sun</b>	<b>Total (miles/wk)</b>
1	Initial	Rest	3	3	3	Rest	6	cross	15
2	FB 1	Rest	3	4	3	Rest	7	cross	17
3	FB 2	Rest	3	4	3	Rest	8	cross	18
4	FB Reduced	Rest	3	4	3	Rest	7	cross	17
5	MBU 1	Rest	3	5	3	Rest	10	cross	21
6	MBU 2	Rest	3	6	3	Rest	12	cross	24
7	MBU 3	Rest	3	5	4	Rest	10	cross	22
8	MBU 4	Rest	4	7	4	Rest	14	cross	29
9	MBU 5	Rest	4	8	5	Rest	16	cross	33
10	Peak 1	Rest	4	9	5	Rest	18	cross	36
11	Peak 2	Rest	5	9	5	Rest	20-22	cross	39-41
12	Taper 1	Rest	5	10	5	Rest	12	cross	32
13	Taper 2	Rest	5	6	5	Rest	8	cross	24
14	Race	Rest	3	4	2	Rest	RACE		

\*Note: FB= Fitness Building, MBU=Mileage Build Up

**Procedures.** Prior to starting the training program, participants completed both self-efficacy questionnaires and the PANAS. Each week during the training program, the participants completed the PANAS with the two open-ended task self-efficacy items and the training log. Just prior the race, the self-efficacy questionnaires and PANAS were administered again to the runners. Immediately following the race, participants completed the final set of self-efficacy questionnaires and PANAS. A visual depiction of the study procedures is presented in the illustration below:

Pre-Training	Each Week during Training	During the Week Before the Race		During the Week After the Race
<ul style="list-style-type: none"> <li>• Self-efficacy Inventories</li> <li>• PANAS</li> </ul>	<ul style="list-style-type: none"> <li>• PANAS with SE items</li> <li>• Training Log</li> </ul>	<ul style="list-style-type: none"> <li>• Self-efficacy Inventories</li> <li>• PANAS</li> </ul>	RACE	<ul style="list-style-type: none"> <li>• Self-efficacy Inventories</li> <li>• PANAS</li> </ul>

## Results

Table 2.2 Descriptive Data for Self-efficacy, Barrier Self-efficacy, and Task Self-efficacy

	Affect	Self-Efficacy		Barrier Self-Efficacy	Task-Specific Self-Efficacy
	M(SD)	M(SD)		M(SD)	M(SD)
Initial Week	19.82(8.8)	80.00(16.3)	Pre- Training	73.26(12.9)	74.36(17.6)
Fitness Building 1	18.66(7.1)	83.12(14.5)			
Fitness Building 2	16.97( 8.4)	81.95(15.8)			
Fitness Building Reduced	12.10(13.0)	78.11(21.7)			
Mileage Build Up 1	13.60(11.0)	82.24(15.1)			
Mileage Build Up 2	6.94(9.0)	79.26(17.1)			
Mileage Build Up 3	15.31(10.8)	77.66(18.8)			
Mileage Build Up 4	11.64(9.7)	76.41(18.0)			
Mileage Build Up 5	11.28(12.6)	80.55(16.9)			
Peak 1	13.20(11.8)	80.19(17.5)			
Peak 2	11.77(10.1)	85.31(12.6)			
Taper 1	12.13(10.0)	85.31(12.6)			
Taper 2	14.42(13.6)	91.03(14.6)	Pre- Race Post- Race	72.43(15.9)	77.41(16.8)
After Race	14.54(13.5)	97.31(6.57)		76.63(16.7)	86.79(13.1)

**Changes in Self-efficacy across Training.** To answer the first research question, how does self-efficacy change over the course of training for a marathon, a simple plot of the self-efficacy rating (based on the open-ending questions) for each of the weekly time points was completed to examine trends. Initial examinations of the plots indicated that self-efficacy started off relatively high (80% confident in abilities) and then fluctuated as training reached the peak weeks (i.e. the weeks with the highest volume of activity). Once the peak weeks were completed, the plots depict a steady increase in self-efficacy to higher than initial levels. The figure below provides a visual representation of the means over the training program.

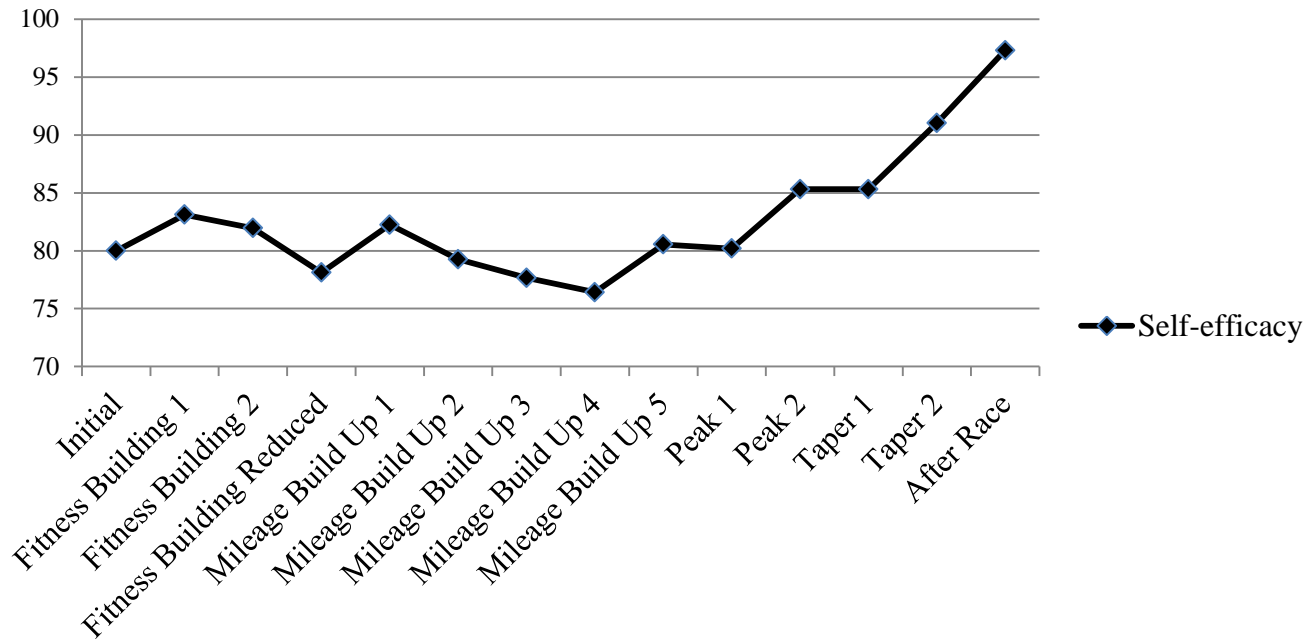


Figure 2.1 Changes in Self-efficacy across Training

In order to test for significant changes in self-efficacy across training, a repeated-measures analysis of variance (ANOVA) was conducted with self-efficacy as the dependent variable. This analysis revealed an overall main effect for self-efficacy, indicating that there was a significant change over time ( $F(13,169) = 5.94, p < .01, \text{partial } \eta^2 = .314$ ). Post Hoc analyses were conducted using repeated measures contrasts, which compared each week's mean



to that of the subsequent one to test for significant changes from week to week in the training program. The results indicated a significant increase from week 8 to 9 (mileage build up 4 and 5); ( $F(1,13) = 4.58, p = .05, \text{partial } \eta^2 = .260$ ) and from week 12 to 13 (taper 1 and taper 2); ( $F(1,13) = 4.98, p = .04, \text{partial } \eta^2 = .277$ ). In addition, examination of the plot revealed a steady increase in self-efficacy once Peak 1 and Peak 2 were reached. During these weeks of training, participants ran between 18-22 miles, which were the longest runs in the training program. For most marathon runners, completing the 20 mile run is the gateway to being able to complete a marathon. The efficacy levels for completing the race increased after runners experienced those long runs, providing evidence that the mastery experience of completing that distance had a powerful and positive influence on self-efficacy.

**Changes in Barrier and Task Efficacy across Training.** Barrier and Task self-efficacy were assessed at three time points during the training duration (Pre-Training, Pre-Race, and Post-Race). Analyses of Barrier self-efficacy did not reveal a main effect over time ( $F(2,76) = 1.65, p = .198, \text{partial } \eta^2 = .008$ ). There was, however, a significant increase from Pre- to Post-Race ( $F(1,38) = 8.15, p = .007, \text{partial } \eta^2 = .177$ ). An overall main effect was found for Task self-efficacy, indicating an increase over time ( $F(2,76) = 13.07, p = .000, \text{partial } \eta^2 = .256$ ). In addition, post hoc analyses confirmed a significant increase in Task self-efficacy from Pre- to Post Race ( $F(1,38) = 15.2, p = .000, \text{partial } \eta^2 = .287$ ). The two figures below provide a visual representation of the changes over time in the two variables.

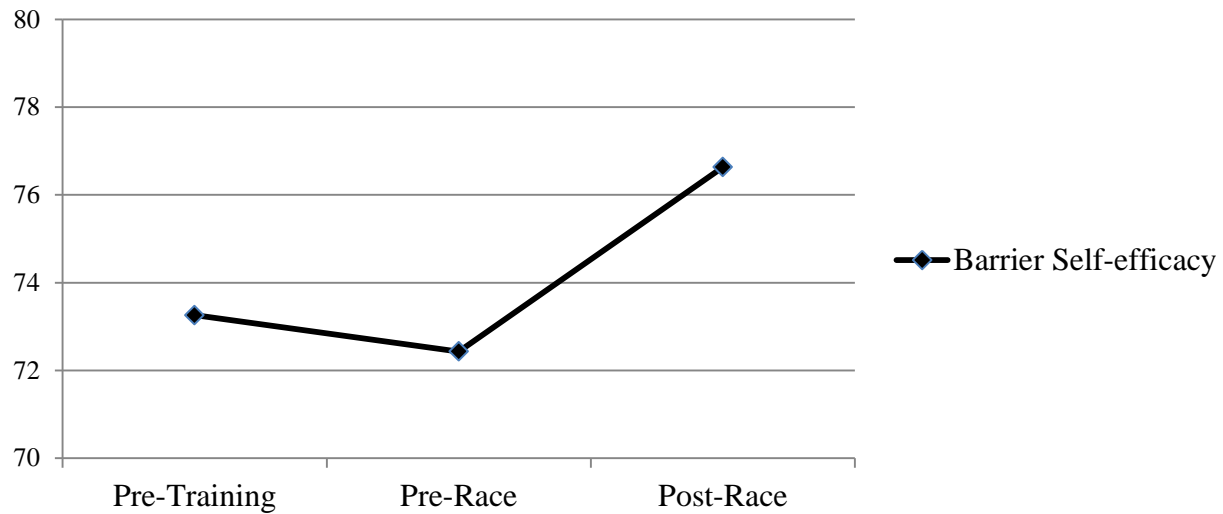


Figure 2.2 Changes in Barrier Self-efficacy across Training

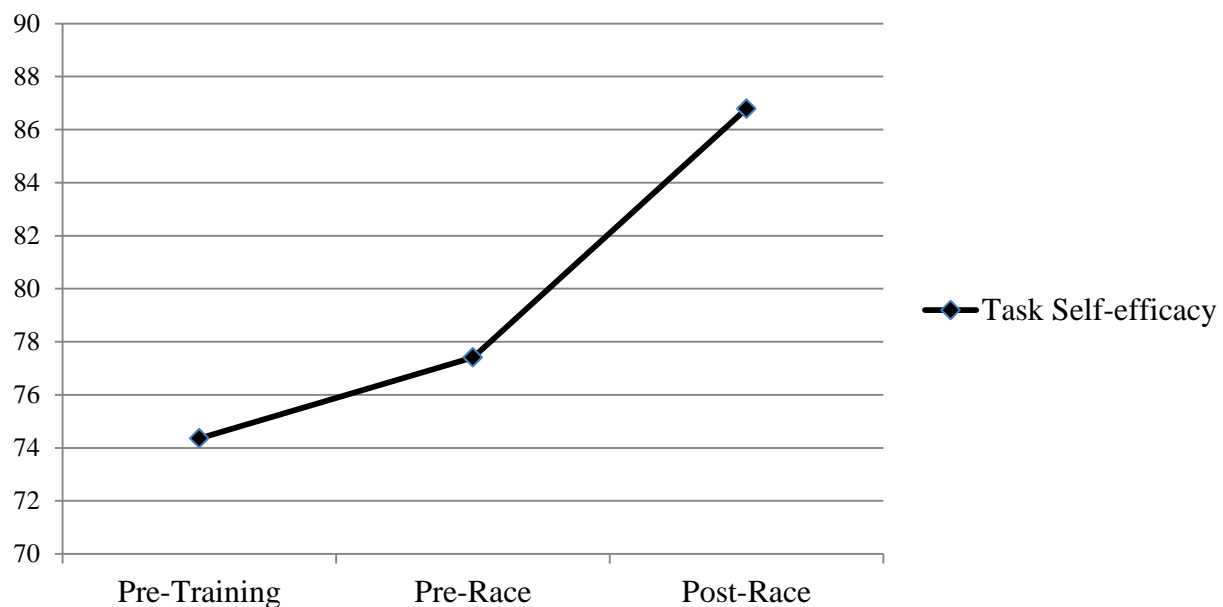


Figure 2.3 Changes in Task Self-efficacy across Training

**Relationships among Barrier and Task Efficacy.** Simple correlations among Barrier and Task self-efficacy are reported in Table 2. The two variables were moderately and positively correlated. Barrier self-efficacy was related to Task self-efficacy across all three time points, indicating that the two variables were related. Barrier self-efficacy at the Pre-Training time point was related to Barrier self-efficacy at the Pre-Race measurement; however it was not related to

Barrier self-efficacy at the Post-Race time point, providing further evidence for the change in efficacy across the training program. Task self-efficacy was at the Pre-Training measurement was related to Task self-efficacy at both the Pre-Race and Post Race time points.

Table 2.3 Correlations among Barrier and Task Self-efficacy

	Barrier Self-efficacy			Task Self-efficacy		
	1	2	3	1	2	3
1. Barrier Self-efficacy Pre-Training						
2. Barrier Self-efficacy Pre-Race	.341*					
3. Barrier Self-efficacy Post-Race	.256	.842*				
1. Task Self-efficacy Pre-Training	.568*	.334*	.247			
2. Task Self-efficacy Pre-Race	.425*	.523*	.547*	.643*		
3. Task Self-efficacy Post-Race	.394*	.580*	.607*	.365*	.527*	

\* $p < .05$

**Changes in Affect across Training.** Similar to self-efficacy, affect fluctuated throughout the training process. A repeated-measures ANOVA was conducted in order to test for significant changes in affect across training. An overall main effect was found across the training period, indicating a significant change over time ( $F(13,169) = 2.19, p = .01$ , partial  $\eta^2 = .141$ ). Post hoc analyses for week-to-week changes revealed a significant decrease between week 3 and 4 (fitness building 2 and fitness building reduced); ( $F(1,13) = 5.86, p = .03$ , partial  $\eta^2 = .311$ ), a significant increase between week 4 and 5 (fitness building reduced and mileage build up 1); ( $F(1,13) = 4.95, p = .04$ , partial  $\eta^2 = .276$ ), and a significant decrease between week 5 and 6 (mileage build up 1 and mileage build up 2); ( $F(1,13) = 9.56, p = .009$ , partial  $\eta^2 = .424$ ).

The final affect measure was actually lower than the initial levels ( $F(1,38) = 5.27, p = .02$ , partial  $\eta^2 = .122$ ). This can be explained by extenuating circumstances of the marathon

being cancelled mid-race due to extreme weather conditions. Several participants were removed from the course during the race and expressed negative feelings about the race due to this factor. Before the race, however, it is evident that affect levels depicted an increase during the taper weeks leading up to the race. The figure below provides a visual representation of the fluctuations in affect over the training period.

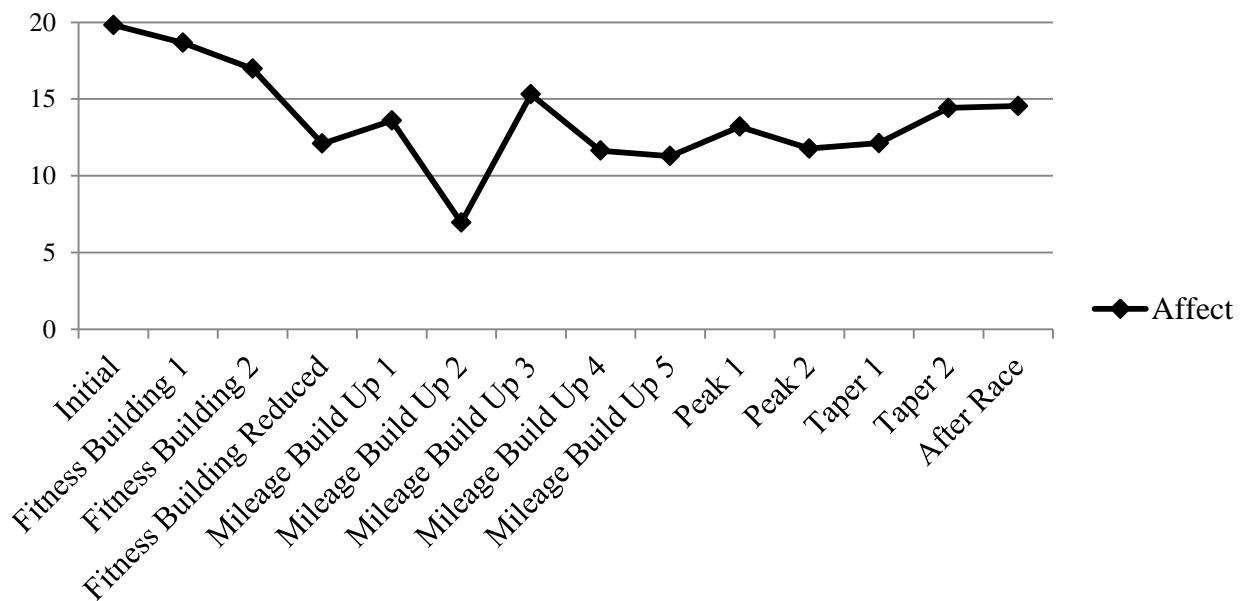


Figure 2.4 Changes in Affect across Training

**Relationships among Self-efficacy and Affect.** The relationship between self-efficacy and affect over the duration of training (research question 2) was examined using bivariate correlations. The analysis revealed a small, positive relationship between the variables, with significant relationships during training weeks 1 (Initial), 3 (Fitness Building 2), and 10 (Peak 1). Pearson's Correlation coefficients for significant relationships ranged from .387-.465, with all p values significant at .05 levels.

## Discussion

The purpose of this study was to explore changes in self-efficacy and its relationship to marathon training-related variables in distance runners. This study provides a deeper understanding of how self-efficacy beliefs form and fluctuate during a long-term, high-intensity physical activity program. In addition, the study helps to fill a void in the self-efficacy literature through its longitudinal design, which followed the participants throughout the entire training program and race completion.

With regard to research question one, it was hypothesized that self-efficacy would fluctuate as training volume increased, but demonstrate a general upward trend as the training progressed. The overall main effect was hypothesized to be an increase in self-efficacy from pre-training to post-race and the hypotheses were supported. Examinations of the plots for self-efficacy illustrated that self-efficacy started with a mean rating of 80% confident in abilities and then fluctuated as training reached the peak weeks. Once the weeks of highest training volume were completed, the plots depict a steady increase in self-efficacy to significantly higher than initial levels. These results are congruent with previous research that has reported a general upward trend in self-efficacy beliefs as individuals participate in a physical activity for a prolonged period of time (McAuley, Morris, & Motl, et al., 2007; McAuley, Morris, Doerkson, et al., 2007). In addition, the fluctuations in self-efficacy during peak weeks were consistent with the findings of Scholz, Nagy, Schuz, and Zieglermann (2008), who reported that fluctuations in running behaviors were associated with fluctuations in self-efficacy levels. Lastly, previous researchers (Moritz et al, 2000) have reported that self-efficacy was related to performance in endurance sport; however, due to the circumstances of the race, finishing times could not be obtained. Perhaps future replications of this study can explore the relationship further.

A significant increase from pre-race to post-race in barrier self-efficacy indicates that, after completion of the race, participants felt more confident in their abilities to negotiate barriers to be successful in their goal. This is logical given that the runners had to deal with major barriers during the race, such as extreme weather and race closure at mile 21, and most still felt successful after the experience. An overall main effect was found for task-specific self-efficacy, which provides additional evidence of the upward trend reported for overall self-efficacy. The two variables (barrier and task self-efficacy) were moderately and positively correlated, which supports previous research that has concluded that as one type of self-efficacy increases, others tend to increase as well (Feltz et al., 2008).

Affect also fluctuated throughout the training process; however, unlike self-efficacy, the final affect measure was actually significantly lower than the initial levels. This can be attributed to the adverse conditions during the race, as almost all participants were removed from the course due to extreme weather and subsequent cancellation of the event. As a result, several participants expressed negative feelings about the race experience; however, a week after the experience participants were able to put the experience in perspective and appraise it a more positive light. This is more fully explored in the qualitative study reported in Chapter 3. It is worth noting that prior to the race, affect was trending upwards across “Peak 2” and the two “Taper” weeks leading up to the race. These results are consistent with previous research by Wittig, Houmard, and Costill (1989) reporting positive changes in moods during reduced training in distance runners.

The relationship between self-efficacy and affect across training was hypothesized to be moderately positive, with changes in training volume related to changes in affect and self-efficacy, and this hypothesis was only partially supported. The hypothesis was tested using

bivariate correlations that revealed a small, positive relationship between the variables. Significant relationships were only reported for 3 of the 14 training weeks (weeks 1, 3, & 10). Previous research (Hauck, Carpenter, & Frank, 2008) has shown that decreased levels of positive affect are related to decreased efficacy beliefs, thus the weakness in the relationship may be attributed to the fluctuations in affect across training. It is interesting to note that the main effects for self-efficacy and affect across training were in opposite directions, with self-efficacy increasing over time and affect decreasing over time, yet the relationship was still found to be positive overall. Again, the decrease in affect most likely resulted in the circumstances of the race cancellation and lower than initial levels, but more research is needed to better understand this phenomenon.

Based on the results of this study, a major implication for practitioners is the finding that affect and self-efficacy are related to training volume. Therefore teachers and/or coaches must be aware that athletes' moods and efficacy levels may fluctuate as physical tasks become progressively more difficult. It is imperative to provide extra encouragement and support during these times to ensure that athletes do not experience extreme fluctuations in mood states and/or efficacy beliefs.

As with any scientific research, this discussion would not be complete without acknowledgement of the limitations of the study and directions for future research. The sample size of the study is the first limitation. The forty participant sample was of sufficient size to detect significant effects; however the power of the study could be increased with a larger sample that could have revealed additional significant effects. A second limitation that deals with the sample is the fact that it was comprised of students taking a class for course credit, thus their motivations might be different from that of someone training for a marathon on their own time.

Completion of the marathon was not mandatory; however, participation in the training program was, so the changes in psychological variables could differ when explored in a different population. Replication of this study with a non-student sample of distance runners could shed light on this issue and provide more information about changes in self-efficacy and affect during marathon training. A final limitation to the study, and perhaps the most detrimental one, was the situation concerning the extreme weather and marathon race cancellation. Although this could not be controlled for, the outcome had an effect on the final affect scores of participants and, thus, had the potential to influence the final responses for all of the psychological variable assessments. Replication of the study when the participants are able to complete the marathon race with no environmental factors hindering them is certainly warranted.

In conclusion, the purpose of this study was to increase the knowledge of self-efficacy in the physical activity and sport domain by exploring fluctuations in self-efficacy and its relationship to affect and training volume in a sample of runners training for a marathon. In general, self-efficacy demonstrated an upward trend as the training progressed, while affect fluctuated throughout the process and ended at a level that was lower than initial levels. The two variables were only moderately correlated, thus more exploration is needed to understand their relationship. This study provides a strong start to a promising line of research aimed at gaining a deeper understanding of how self-efficacy beliefs form and fluctuate in the sport and physical activity domain; however, further research is needed to grasp the true nature of this powerful variable.



## CHAPTER THREE: SOURCES OF SELF-EFFICACY IN DISTANCE RUNNERS

### Introduction

Self-efficacy is one of the most powerful predictors of physical activity engagement, enjoyment, and effort (Bandura, 1992). Because self-efficacy is such a critical component in behavior outcomes, it is important to examine how efficacy beliefs are formed. Thus, the aim of this study was to gain a deeper understanding of the sources of information used to form self-efficacy beliefs. In the initial study, self-efficacy in runners training for a marathon fluctuated as training progressed and was moderately related to affect. The focus of this investigation was to explore factors that influenced those self-perceptions.

According to Bandura (1997), self-efficacy perceptions are the product of selection, interpretation, and integration of four main sources of information: past performance accomplishments, verbal persuasion, vicarious experience/modeling, and physical/emotional states. Through cognitive processing and thoughtful reflection, the information gained from these sources becomes relevant and influential in shaping efficacy beliefs. The literature to date has provided support for the existence of the four sources of efficacy information; however we are only beginning to examine *how* they influence efficacy beliefs.

**Past Performance Accomplishments.** Past performances are the most powerful source of efficacy information because they are based upon one's own mastery experiences (Bandura, 1997). Reflecting upon past successes (or failures) allows individuals to self-appraise their performances and subsequently form efficacy judgments for the future. In general, if one consistently perceives the past experiences as successes, then self-efficacy beliefs will increase, while past experiences viewed as failures are likely to produce a decrease in self-efficacy beliefs. Contextual factors, however, can enhance or hinder this relationship (Feltz et al., 2008).

Current research on past experiences and self-efficacy demonstrates the relationship between past performances and self-efficacy beliefs. Netz and Raviv (2004) examined adults in Australia and found that current physical activity participation level was a positive correlate of self-efficacy for future physical activity. In studies focusing on older adults and physical activity behaviors, previous exercise behavior was found to be a strong predictor of self-efficacy and subsequent physical activity behaviors through both cross-sectional and longitudinal research designs (McAuley, Jerome, & Marquez, et al., 2003, McAuley, Jerome, Elavsky, et al., 2003, McAuley, Morris, Doerkson, et al., 2007). In addition, similar results documenting the relationship between past performances and self-efficacy have been reported in athletes as well (Chase, Feltz, & Lirgg, 2003; Chase, Magyar, & Drake, 2005; Gernigon & Delloye, 2003).

Performance successes generally raise self-efficacy beliefs and repeated performance failures tend to lower efficacy beliefs, especially if the failures occur before efficacy beliefs are established (Bandura, 1997). In one of the few experimental studies in which efficacy beliefs concerning a past performance were manipulated, Escarti and Guzman (1999) manipulated individuals' perceptions regarding success or failure for performance in a hurdling task by giving the athletes false feedback. Those who were told their performance was a success had higher self-efficacy scores, performed the next task better and chose more difficult tasks (i.e. higher hurdles) than those who were informed their past performance was a failure. Manipulation of perceptions of success and failure for past performances was also explored by Gernigon and Delloye (2003), who demonstrated that appraisals of past performances as successes and failures resulted in increases and decreases in the self-efficacy beliefs of track athletes performing sprinting tasks, respectively.

According to Bandura (1997), a host of contextual factors exist that can potentially hinder or facilitate successful completion of the task and its influence on later efficacy beliefs. These factors include situational barriers, assistance from others, types and amount of resources available, and the circumstances under which an activity is performed. Successes achieved with external help have little influence on efficacy beliefs because they are likely to be attributed to the assistance rather than the individual's capabilities (Bandura, 1997). Similarly, unsuccessful performances in undesirable circumstances have a much weaker influence on efficacy than those performed under optimal conditions. In general, the more non-ability related (i.e. contextual) factors that influence a task's outcome, the weaker effect the experience has on efficacy beliefs (Bandura, 1997). While these statements make sense, there is no empirical evidence to support these claims made by Bandura. Therefore a need to validate these statements exists.

**Verbal Persuasion.** Verbal persuasion can come in the form of feedback and speeches given by coaches or others, expectations of others, or even self-talk. Confidence in one's abilities can be influenced by the encouragement, or discouragement, of other people, especially those whose opinions are greatly respected (e.g. peers, significant others, superiors). Although verbal persuasion alone has a limited influence, it can help encourage individuals to persevere in their efforts if the feedback given is realistic (Bandura, 1997).

Research on verbal persuasion as an influence on efficacy beliefs has been focused on the use of feedback, particularly bogus feedback, which was a popular approach in the seventies and eighties (Feltz et al., 2008). Bandura (1997) argues that the feedback given to an individual can either undermine or enhance self-efficacy and the evidence has largely supported this claim. Early studies focused on the feedback-performance relationship, beginning with Ness and Patton (1979) using weight-lifting tasks. They found that positive feedback enhanced performance and

later studies expanded to include the feedback-efficacy relationship; however, the results were somewhat inconsistent. Fitzsimmons and colleagues (1991) reported positive feedback enhanced self-efficacy and subsequent performance, while Wells, Collins, and Hale (1993) found that although participants lifted more weight after false positive feedback, their self-efficacy beliefs actually decreased. Bandura (1997) acknowledges that altering self-efficacy through bogus feedback is effective for testing the theoretical relationship between verbal persuasion and self-efficacy, but suggests using other methods that are more relevant in the field to increase efficacy instead of relying on false information.

More recently, research utilizing feedback as a means of enhancing self-efficacy has been more methodologically consistent. Woodgate and Brawley (2008) conducted a randomized control trial to test the effectiveness of an efficacy enhancing feedback to increase cardiac rehabilitation patients' sense of self-efficacy for completing a program of independent exercise. They found that those who received the efficacy-enhancing feedback reported stronger self-efficacy scores and intentions to exercise on post-tests than the control group. In a weight-lifting task similar to Ness and Patton's (1979) study, Wise, Posner, and Walker (2004) found that knowledge of the feedback provider's expertise in the given skill was an important factor in the influence on feedback to increase self-efficacy.

Support and encouragement from others is another form of verbal persuasion that has been found to increase efficacy beliefs. Peterson and colleagues (2008) reported that encouragement from peers, family, and hospital staff influenced participants' self-efficacy for physical activity, and subsequent activity levels. In the sport setting, coaches ranked social/verbal persuasion through pre-game speeches as the one of the most effective methods for raising the efficacy beliefs of their athletes (Feltz et al., 2008). The majority of recent research in

this area, done by Vargus-Tonsing and various colleagues, and has been fairly consistent in demonstrating that pre-game speeches from coaches significantly increased players' self-efficacy beliefs about the upcoming competition (Vargus-Tonsing, 2009; Vargus-Tonsing & Bartholomew, 2006; Vargus-Tonsing & Guan, 2007; Vargus-Tonsing, Myers, & Feltz, 2004).

Verbal persuasion from within the individual in the form of self-talk can also enhance or undermine efficacy beliefs. Self-talk can be especially useful because it can serve many functions, such as increasing attentional focus and emotional control, in addition to increasing efficacy beliefs (Hardy, Gammage, & Hall, 2001). It has been a major focus in sport and exercise psychology research, however most of the studies focus on the relationship between self-talk and performance (Feltz et al., 2008). In 2005, Hardy, Hall, Gibbs, and Greenslade demonstrated that self-talk was positively related to self-efficacy in a sit-up task. More recently, Hatzigeorgiadis and colleagues (2008) tested this relationship in an experimental design with young tennis players and concluded that those players who underwent a motivational self-talk intervention reported greater feelings of self-efficacy and subsequent improved performance than the control group.

**Vicarious Experience/Modeling.** In addition to increasing self-efficacy through past experience appraisals and verbal persuasion, vicarious learning is another avenue through which efficacy information is derived. Learning through vicarious experience, or modeling, is the process through which people learn by watching someone else perform the desired task. By watching someone like themselves experience a success in performing the desired behavior, people's confidence in their own chances for success are enhanced, thus leading to higher self-efficacy beliefs (Lirgg & Feltz, 1991). While vicarious experiences have not been found to be as influential as past performances on efficacy beliefs, McCullagh and Weiss (2002) conclude that

observational learning is a key source of efficacy information and can have a profound impact on psychological variables related to self-perceptions.

Efficacy information can be garnered through vicarious experience in a number of avenues. The first is through instructional information about how to correctly execute the task, which can be obtained through repeated demonstrations by a proficient model. Modeling of coping strategies and successful progress toward a goal can also influence efficacy beliefs by communicating to the individual that a challenging task is attainable (Feltz et al., 2008). Social comparison with others is another source of efficacy information for individuals, especially in the sport competition setting where appraisals of opponents' physiques can provide information concerning the likelihood of beating them (Weinberg, Gould, & Jackson, 1979). Feltz and colleagues (2008) also comment on the influence of visual media as a potential source of efficacy information, particularly in the case of girls and women who are now seeing more female athletes competing on television, thus raising beliefs about their own athletic potential.

Bandura (1986) asserts that the closer the similarity between the model and the individual, the greater influence the model has on the individual's perception; however there is evidence that this is not always so. Similar to verbal persuasion, this line of research dates back to the seventies and initially focused on performance as the outcome of interest. It began with Landers and Landers (1973) study on the effect of model similarity and model competence on children's performance on a balance task. They concluded that when learning a new task, model competence was more important than model similarity to performance; however, Gould and Weiss (1981) concluded that contexts in which individuals are uncertain about their capabilities in a task, such as with a novel task, similarity was found to be a more important source of efficacy information. Beliefs about gender appropriateness have also been shown to influence

confidence ratings on a physical activity task after viewing a model demonstration, with females more likely to express low confidence when they feel the task is masculine than when they feel the task is gender-neutral (Solmon, Lee, Belcher, Harrison, & Wells, 2003). These varied results indicate that there are differences in the importance placed on specific model characteristics across demographic and task variables, but more research is needed to better understand these relationships.

The type of model used also has an effect on the potential influence vicarious learning on efficacy beliefs. Self-modeling, or watching a videotape of oneself performing the desired task, is a type of modeling used to increase efficacy beliefs in individuals; while participant modeling is a form of modeling in which a model demonstrates the desired task, and then has the individual perform the desired task with the model physically assisting them through the movements so that the individual can get a kinesthetic sense of what the movement should feel like. Early research comparing the different forms of modeling began with Feltz and colleagues' (1979) study in which they compared the effects of participant modeling, self-modeling on videotape, and traditional (live) modeling on self-efficacy for a dive task. They found that participant modeling produced a greater increase in self-efficacy, when compared to self and traditional modeling, and that self and traditional modeling were not significantly different from each other. Similar results have been reported in studies involving gymnastics tasks (McAuley, 1985). In addition, coping models, which do not repeatedly show successful behavior, but instead progress through challenges and adversities within the task and gradually show positive improvements, have been shown to be superior to mastery models in enhancing self-efficacy (Kitsantas, Zimmerman, & Cleary, 2000; McCullagh & Weiss, 2001).

**Physiological/Emotional States.** McAuley, Pena, and Jerome (2001) argue that self-efficacy can be viewed as both a determinant and an outcome of behavior, especially in the relationship between physiological/emotional states and self-efficacy. Interpretations of physiological symptoms can influence efficacy beliefs about the likelihood of success in a given task, but that interpretation can be influenced by previously held efficacy beliefs. Additionally, emotional states can also play a role in forming efficacy judgments because research has demonstrated a relationship between positive and negative emotions and increased and decreased efficacy beliefs respectively (Kavanagh & Bower, 1985). Physiological information can include such constructs as strength, fitness, fatigue, or pain and can be measured by body composition, aerobic capacity, heart rate, and perceived exertion levels.

Although physiological states are established as a source of efficacy information, few empirical studies have examined physiological states as a predictor of self-efficacy beliefs and most of the studies focus on the relationship between self-efficacy and its influence on interpretations of physiological symptoms. Early studies provide support for the notion that efficacy beliefs are an outcome of perceptions of physiological states (Feltz & Albrecht, 1986; Feltz & Mugno, 1983); however few researchers have continued to explore the relationship in more recent years (Feltz et al., 2008).

Feltz and Mugno (1983) concluded that perceived arousal was a stronger predictor of self-efficacy than actual arousal as measured by heart rate on a dive task. A subsequent study using a dive task suggested that physiological arousal perceptions were a more influential source of efficacy information than past performances (Feltz & Albrecht, 1986). The divers relied more on how they felt at the time of the dive rather than drawing from successes or failures of past performance experiences to make their efficacy judgments. Furthermore, negative physiological



states have been negatively correlated with efficacy beliefs, meaning that higher levels of negative emotions and physiological states are related to lowered levels of self-efficacy (Hauck, Carpenter, & Frank, 2008).

While the investigation of physiological states and self-efficacy beliefs is somewhat limited, research that examines the relationship between affective states and self-efficacy is more abundant. Kavanagh and Bower (1985) were among the first to explore the relationship between emotional states and self-efficacy beliefs, providing empirical evidence that efficacy beliefs were raised by positive emotional states and lowered by negative emotional states. This relationship has been reported in competitive rifle shooters, wrestlers, basketball players, and wheelchair road racing (Mack & Stephens, 2000; Martin & Gill, 2002; Prapavessis & Grove, 1994; Treasure, Monson, & Lox 1996).

**Purpose.** There is a large body of evidence supporting the relationship between self-efficacy and physical activity engagement, effort, and enjoyment. There is; however, a lack of information about how sources of information influence self-efficacy beliefs. In addition, the majority of research that does exist is quantitative and correlational. As a result, the conclusions from these studies are somewhat limited by their research designs as well as their ability for generalization across populations. Based on the literature reviewed, there are several directions or lines of inquiry that researchers can pursue that would extend the knowledge-base relevant to self-efficacy in sport and exercise settings. A focus for research suggested by Samson and Solmon (2011, in press) involves investigating the relationships from a qualitative perspective. Given the nature of the relationship between the sources of efficacy information and self-efficacy, a logical next step is to explore the relationship from a qualitative perspective. Therefore the purpose of this study was to gain a deeper understanding of how people select and

use the sources of information to form self-efficacy beliefs by employing a qualitative perspective with runners training for a marathon.

### **Research Questions**

The research questions were:

- 1) What sources of efficacy information do participants use to form perceptions about their ability to be successful in their marathon endeavor?
- 2) How does the influence of these sources change over the course of training?

Based on previous research, it was predicted that participants would largely draw upon past experiences in running to develop their efficacy beliefs related to successful completion of a marathon. In addition, it was expected that physiological/emotional states would be an important source of efficacy information, as research has concluded that physiological states are more important when the task is of a physical nature. Also, it was presumed that multiple sources of efficacy information would be utilized when participants were forming their efficacy beliefs. With regard to how the influence of the sources might change over time, it was predicted that the influence of past performance might be surpassed by that of physiological states as the training volume increased and the ability to push the body to its physiological limit was required.

### **Methods**

**Participants and Procedures.** This study was part of a larger study. The initial phase used quantitative assessments of self-efficacy and affect. The larger pool of participants and setting for the study are described in Chapter 2. For this phase of the study, all 39 of the participants provided written responses to open-ended questions and 26 (9 males, 17 females) agreed to complete a series of interviews to more fully explore the evolution of efficacy beliefs over the course of training for a marathon.

**Written Questions.** At two time points during the marathon training (at the beginning of training and just prior to the race), all 39 participants provided written answers to questions that have been previously utilized in self-efficacy research (Chase, Feltz, & Lirgg, 2003). Participants were asked “What is your goal for the marathon?” and “How confident do you feel in your abilities to successfully reach your goal?” They answered the second question based on a 0%-100% scale, with 0% being “not confident at all” to 100% being “I am completely confident.” Participants were also asked to discuss the reasons why they gave the confidence rating that they did (i.e. what influenced their confidence to be successful).

**Interviews.** Along with the written questions that were administered pre-training and pre-race, the 26 participants who agreed to complete the interviews also completed a 15-20 minute audio taped interview. In addition, participants completed a third interview after the race. The interview questions allowed the researchers to explore participants’ self-efficacy judgments at a more in depth level than surveys while also focusing on the sources of information used to form those self-perceptions. A combination of the standardized, open-ended interview protocol and interview guide approach was used (Patton, 2002). This particular interview protocol was selected because it ensured that all participants were asked the same questions, while allowing the researcher to ask additional questions when needed to elicit more information relevant to the research question. The initial interviews were conducted during the first week of the training program and the focus was on participants’ previous running (if any) and physical activity experience, goals for the marathon, and perceptions of capabilities for success. For the interviews conducted just prior to and immediately after the race, the overall focus was similar to that of the initial interview with the questions regarding the marathon, and the addition of questions

referring to the participants' perceptions of the experience thus far and self-evaluations of success/failure after the marathon race.

**Ranking Task.** Participants also completed a ranking activity similar to that of a Q-sort at the end of each of the three interviews. Twelve examples of common sources of self-efficacy were listed on a form for participants and they selected the ones they felt were relevant to their self-perceptions and then ranked them in order of influential strength. Some examples included: watching a peer succeed in a similar task, verbal encouragement from a friend/family member, having experienced success in a similar task in the past, and feeling energetic.

**Data Analysis.** Interviews were conducted by multiple interviewers who underwent training prior to the study's beginning. They were trained on procedures for following the interview guide, probing more deeply for more information, and how to ensure that participants fully explained their responses. After the pre-training interviews were conducted, all transcriptions were read carefully to ensure that all interviewers were competent in the study procedures and additional training was conducted, if necessary.

All interviews were transcribed verbatim and read carefully while a line-by-line analysis was conducted with the primary research questions in mind. In this analysis phase, data were coded in the margins of the interview transcripts. Responses to questions regarding the sources of self-efficacy that influenced participants' self-perceptions were deductively coded into pre-defined categories based on Bandura's four sources of efficacy information (1997). Following the initial coding, other members of the research team were asked to read and comment on the original codes. This process aided in reducing researcher biases that may have taken place in the initial coding. Frequencies for the four sources of efficacy information were counted by the total number of statements, not by the number of participants who stated that source. In other words,

if a participant stated, “feeling good physically is important,” and “feeling good emotionally is important,” it was coded as two statements for physiological/emotional states. This frequency counting method was employed for both the interviews and the responses to the open-ended questions. To establish reliability, the four pre-defined categories were explained to an independent rater who coded a random sample of 20% of the responses. Interobserver agreement was 95.4 %. Trustworthiness was also maintained through member checks, which were conducted by allowing the participants to read and comment on their pre-training transcripts during the pre-race interview. In addition, during the post-race interview, participants were asked to comment on responses from the pre-race interviews in order to ensure that their responses were interpreted correctly by the interviewers.

## **Results**

**Sources of Efficacy Information.** Analysis of the written questions completed by all 39 participants revealed a wide range of individual participant goals concerning the marathon race, ranging from just wanting to finish ( $n = 26$ ) to specific time goals ( $n = 11$ ), such as qualifying for the Boston Marathon ( $n = 2$ ). Overall, participants reported relatively high self-efficacy scores ranging from 60%-100% certainty that they could successfully meet their goal. The experience level of the participants was also diverse, ranging from beginning runner to experienced marathoner.

**Pre-Training.** When asked about the sources of information that influenced their self-efficacy for meeting their personal marathon goal (research question 1), the 26 participants who completed the pre-training interview identified 64 distinct sources of information. When those sources were coded into categories based on the four sources of efficacy information proposed by Bandura, physiological/emotional states were cited most frequently ( $f = 20$ ), followed by

verbal persuasion ( $f = 15$ ), which according to Bandura included self-talk, and past performance experiences ( $f = 11$ ). Vicarious experience was mentioned least frequently ( $f = 8$ ). Participants also mentioned several other sources of information ( $f = 10$ ) that did not fall into the categories proposed by Bandura. In addition, 19 of the 26 participants listed two or more sources of information that were utilized when forming beliefs about their capabilities for success, suggesting participants used multiple sources.

Responses on the written questions completed by all 39 participants largely supported the responses from the interviews. When asked about the influences on their efficacy beliefs for meeting their marathon goal, runners described 51 separate sources of information. Similar to the frequencies from the interviews, physiological and emotional states were mentioned most often ( $f = 21$ ). Verbal persuasion was the second most-cited source ( $f = 14$ ), followed by past performances ( $f = 11$ ), and vicarious experience ( $f = 3$ ). As in the interviews, participants also cited sources that did not fall into Bandura's four sources and were coded as "other" ( $f = 2$ ).

With regard to physiological/emotional states, participants cited "feeling physically good" and "feeling happy" as sources of information that increased self-efficacy beliefs. One participant stated, "When I feel strong, I know I can do something...if my body feels up to it, I know I can do it." Participants also frequently mentioned difficulties with past injuries as a source of information that decreased efficacy beliefs. Another participant said, "If I was completely healthy, I would have said 100% [confident in capabilities], but I take back that 10% because of the IT Band Syndrome."

Verbal persuasion was the second most frequently mentioned source of information for participants. Support from others, including friends, family, and the professor of the course were mentioned most often as reasons for runners' efficacy ratings. Participants said such things as,

“If it was just me and I didn’t have any support from [others], I don’t think I could stay confident to stay with it [the marathon]” and “knowing that she’s [friend] there with me, telling me I can do it, that boosts my confidence....She’s a big part of it.”

According to Bandura (1997), self-talk falls under this source of information because it is considered to be verbal persuasion from within the individual. Several participants mentioned being able to “talk myself through it” as a source of efficacy information for marathon running. “If I can tell myself, ‘you can do this, you got it,’ then I know that I can do it, no matter what,” is another example.

Past performance experiences, which have generally been reported as the most powerful source of efficacy information, was not cited more than physiological/emotional states and verbal persuasion. This could possibly be attributed to the fact that most of the participants did not have a large amount of running experience, thus did not have many past experiences to draw from when forming self-perceptions. Those participants who did cite past performance experiences as an important source of information listed experiences in other sports such as soccer, swimming, and triathlons. Those who did have past running experiences cited those as important when forming perceptions about their ability to be successful in the marathon running task. As one participant commented,

“I think because of my past experience...knowing that I have run before. If I hadn’t run two half marathons before, I would be a bit more tentative about putting a number that high. I kind of know, to a degree what I am getting myself into.”

Vicarious experience, or modeling, was the least frequently cited source of efficacy information by participants. In this category, participants largely mentioned family members as models from whom they drew their efficacy beliefs, specifically family members who also ran marathons. Participants also mentioned comparisons to friends as a source of efficacy

information, “Definitely other people who have done it... I kind of compare myself to my friends, and if they have done it and survived, I can do it.”

In addition, participants mentioned several other sources of information that did not fall into the categories identified by Bandura, such as religion, individual characteristics, uncertainty about the future, and external factors, such as weather and school obligations. Individual characteristics, such as “competitive nature,” “self-driven personality,” and “liking a challenge” were mentioned by participants as reasons for their efficacy ratings. With regard to religion, two participants cited it as a factor in their efficacy ratings and, interestingly, felt that it was the most important factor in forming their self-judgments. A participant stated, “Being a Christian, it just gives me encouragement because I know when I’m on a long run and I’m struggling, I can pray and sing worship songs, and he [God] will carry me through it.”

**Pre-Race.** Analysis of the pre-race interviews and written questions revealed that from pre-training to pre-race, thirteen participants adjusted their goal for the marathon race, with 9 changing to a slower goal and 4 changing to a faster goal. Six participants cited injuries as the reason for adjusting their goal to a slower one than initially stated. Self-efficacy levels for the runners remained high, with a mean rating of 88% confidence in capabilities to successfully meet their marathon goal. Regarding the sources of self-efficacy, participants who completed the pre-race interviews reported 71 sources. As with the pre-training interviews, physiological/emotional states were listed most frequently by runners ( $f = 25$ ), followed by verbal persuasion ( $f = 20$ ), past performance experiences ( $f = 10$ ), and vicarious experience ( $f = 3$ ). Something worth noting about this interview that differed from the pre-training interview was that one participant listed a source of information that could be coded into two categories, verbal persuasion and vicarious experience, thus it was added to the frequency for both of those source categories. In addition,



participants again mentioned sources of information ( $f = 5$ ) that did not fall into the four pre-defined categories.

Similar to the pre-training data collection, responses from the written questions were congruent to the responses given in the interviews. Physiological and/or emotional states remained the most frequently cited source of information ( $f = 25$ ), followed by verbal persuasion ( $f = 11$ ), past performance ( $f = 10$ ), and vicarious experience ( $f = 3$ ). Sources that were coded into the “other” category were cited 3 times.

The influence of physiological/emotional states remained high during the training period and participants still felt that it was most important in the pre-race interview. They mentioned “feeling good physically” and “being in better shape than I thought” as sources that positively influenced their efficacy beliefs regarding the marathon. One participant stated, “The main thing is how good I felt on those last two long runs, much better than I thought, I felt physically good.” On the negative side, several participants had to deal with injuries, which had adverse effects on their self-perceptions for the race. They spoke of “doubts due to pain associated with my injury” and “worries about my injury flaring up during the race.”

With regard to verbal persuasion, participants felt that encouragement from friends and family were important influences for their self-efficacy beliefs. A few runners mentioned that their friends and families were “impressed with their accomplishments” thus far and were very supportive of their continuing in the marathon race endeavor. In addition, the professor of the course was mentioned as a source of information. “She [the professor] keeps telling us to stay positive during our long runs and that’s what I have tried to do...she really makes me think that I can do it [the race].” Also, expectations of verbal encouragement at the upcoming event were mentioned as a positive influence on efficacy beliefs regarding the race. “I know there will be so

many people there, volunteers and random people, cheering me on, I know that makes me feel more confident about it all” commented one runner.

Past performances remained the third most-frequently cited source of efficacy information by runners during the pre-race interview. Participants mentioned their experiences with the training as important for their confidence in the upcoming race. They spoke of “the long runs in the training” and “having good training experiences” as examples. One runner stated, “the experience really helps you out, you know what to do, like how to prepare for a run that is that long, knowing that you have done it, so you can do it again.”

Similar to the pre-training interview, vicarious experience was mentioned the least by participants when discussing their efficacy for the upcoming race. Runners primarily mentioned the experiences of other classmates as influential for their own efficacy beliefs. One runner stated,

“I was like ‘what am I doing, this isn’t going to work’ but then I felt that other people were feeling the same thing and I kinda got over that...that was definitely very helpful, I don’t think that I could have stuck through the program had I not known that, you know, 40-something other people were experiencing the exact same thing.”

As mentioned earlier, one participant mentioned a source of information that fell into both the verbal persuasion and vicarious experience categories, thus it was added to the frequencies for both of the two categories in order to stay consistent with the coding procedures. The participant stated,

“My sister, she’s also a marathoner, she’s very supportive of my taking this class, she has been very encouraging, calling and texting me all the time... also from watching her run and be successful, it makes me think that I can do it to... We want to run a race together in the future.”

Lastly, participants again mentioned sources of information that did not fall into the categories proposed by Bandura. Similar to the pre-training interview, participants mentioned

religion and spirituality as sources of efficacy information regarding the upcoming race. In addition, runners spoke of “dedication to training” and “having come this far, I’m not going to stop” as reasons for confidence in their abilities to complete the marathon.

**Post-Race.** During the post-race interviews, participants were asked about their perceptions of the experience and efficacy levels before and during the race. At the start line of the race, the runners’ efficacy levels remained high, with a mean score of 87% confidence. One runner stated, “When I got to the starting line, I got a little nervous, but then I saw all the people around me and started to get really excited.” When asked about the sources of information that influenced their efficacy beliefs, participants mentioned 55 sources of efficacy information during the post-race interviews. As with the pre-training and pre-race interviews, physiological/emotional states were mentioned most frequently ( $f = 24$ ). Past performance experiences were the second most-frequently cited source of information ( $f = 13$ ), followed by verbal persuasion ( $f = 9$ ) and “other” sources that did not fit into Bandura’s four categories ( $f = 7$ ). Vicarious experience was mentioned by two participants. Written questions were not asked during this data collection period, thus the information from post-race is exclusively from the 26 participants’ interview data.

Before and during the marathon race, physiological/emotional states seemed to have both positive and negative effects on participants’ self-efficacy beliefs. On the positive side, runners mentioned being “excited and energetic” and “feeling well-rested and physically prepared,” as factors that increased efficacy beliefs while on the negative side, “feeling sore” and feeling tired” decreased efficacy beliefs for the race. During the actual running of the race, participants mentioned “legs hurting on hills” as a factor that decreased their efficacy beliefs.

Drawing upon past performances, specifically experiences from the training program, became very important for runners' efficacy beliefs as they ran the marathon race. Runners stated, "being successful in training," "I had run that far before in training," and "I made it through training just fine" as reasons for their confidence in their abilities to complete the marathon. When the weather started to worsen and race conditions became more adverse, one participant spoke of remembering his training experiences to keep his confidence up and continue running,

"I was starting to get cold and thought, 'can I really do this?' but then I remembered one of our long runs that we did in horrible rainy weather and I made it through okay, so I knew I could do this too."

As mentioned previously, adverse weather conditions impacted the circumstances of the race, thus most of the sources of efficacy information that were coded into the miscellaneous category concerned the weather and race conditions. Participants mentioned "chaos of weather conditions," "bad weather," and "concerned about weather and slipping on hills" as reasons for decreased efficacy beliefs at the start of the race. Regarding her race experience, one participant said, "it got really, really dark and started to thunder really loud, and I started to think, 'oh no, what am I doing, can I make it?'"

Verbal persuasion was mentioned by seven participants as influential during the race experience. As with the previous interviews, support from family and friends, the professor of the course, and being able to "tell myself that I can do it" were all mentioned as important for forming efficacy beliefs about completing the race. In addition, participants mentioned "random people cheering for me" as a factor that increased efficacy beliefs during the race. One runner commented, "there were always people on the side of the road cheering me on, that was so nice, it kept me going."

Lastly, two runners mentioned vicarious experience as a source of efficacy information for completing the marathon race. “Seeing all the other runners out there, that made me feel really confident, I looked around and was like, ‘if they can do it, I can do it too’ ” stated one participant. In addition, another participant ran the race with her father and felt that he had an impact on her efficacy beliefs, “I had my dad with me, so I knew he would keep me on pace, so I wasn’t too worried, plus I know he would keep it fun, which made me confident.”

In addition to examining the sources of efficacy information for marathon running, participants were also asked about their race experiences and intentions to keep running and/or run another marathon. The adverse weather conditions led to an unexpected cancellation of the race, mid-event, and only 4 participants actually finished the race. Despite this unfortunate turn of events, most participants ( $n = 23$ ) felt the experience was a positive one and a success. “It [the race] was just an unfortunate ending to a semester of hard work, but I had a great time anyway and still loved running it,” commented one runner. Of the participants who did not get to finish the race, most stated that they were 100% sure that they would have finished the race, had they not been stopped, thus efficacy levels for completing a future marathon remained high. One participant commented, “They [race officials] wanted everyone off the course, we could have finished, we had like 5 miles to go and we would have finished...but I still had a blast, it was a lot of fun.” In addition, 25 of the 26 participants stated that they wanted to train for and run another marathon in the future. “I’m definitely going to do another one because I’m not satisfied yet,” stated one runner.

**Changes across Time.** Changes across time regarding the influence of sources of efficacy information (research question 2) were explored by analyzing the responses from the interviews and written questions across the data collection time points and also by examining the median rankings of the items from the ranking task.

Physiological/emotional states were the most frequently cited source across all three of the interviews and in the pre-training and pre-race written questions, indicating that the influence of this source of information remained strong throughout the training and race experiences. In addition, vicarious experience remained the least-cited source of efficacy information throughout the process in both the interviews and the written questions. The relative frequencies of verbal persuasion and past performance experiences remained the same from pre-training to pre-race, meaning that verbal persuasion was the second most frequently cited and past performance experiences were third. However, during the post-race interview, the influence of past performance experiences overtook that of verbal persuasion to become the second most cited source of efficacy information used during the marathon race. In other words, the influences of the sources did not change from pre-training to pre-race, but from pre-race to post-race, verbal persuasion decreased in its relative frequency while past performance increased.

Table 3.1 Frequencies of Sources

		Physiological / Emotional States	Verbal Persuasion	Past Performances	Vicarious Experience	Other	Total
Pre- Training	Interviews	20	15	11	8	10	64
	Written Questions	21	14	11	3	2	51
Pre-Race	Interviews	25	20	10	3	5	63
	Written Questions	25	11	10	0	3	49
Post-Race	Interviews	24	9	13	2	7	55

\*Note: Written questions were not asked during the post-race data collection

**Ranking Task.** The trends across time for the sources of efficacy information were largely supported by the data from the ranking task as well. There were three items for each of the four sources of efficacy information, resulting in a total of 12 items. Participants ranked “feeling good physically,” as the most influential source of efficacy information across all three time points, further demonstrating the continued strength of physiological/emotional states during marathon training. In addition, participants consistently ranked the three items for vicarious experience as the least influential for efficacy beliefs (items 3, 7, 11), providing further support for the responses in the interviews. The second most influential source for participants across the pre-training and pre-race time points was “I tell myself I can do it,” while “feeling well-rested and not sick” was the second most influential during the race. Table 3.2 represents the median rankings for all items across the three time points. A higher score (closer to 12) represents a higher ranking, indicating that participants felt it had a stronger influence on

efficacy beliefs. The items are organized by category and the numbers represent the order in which the items were presented.

Table 3.2 Median Rankings

	Item	Pre-Training	Pre-Race	Post-Race
Physiological and/or Emotional States	1. Feel good physically	11	11	11
	5. Feel good emotionally	8	7.5	8
	9. Feel well-rested and not sick	6	7.5	10
Verbal Persuasion	2. Parents' encouragement	5.5	4.5	5
	6. Friends' or significant others' encouragement	5.5	7	6.5
	10. I tell myself that I can do it	10	10	9.5
Vicarious Experience	3. Watched peer succeed in similar task	3	3.5	5.5
	7. Read/heard inspirational story about running	2	3	2.75
	11. I am comparable to others who have complete the task	4.5	3	2.5
Past Performance Experiences	4. Been successful in the past in similar tasks	7.5	8	6
	8. I had good runs this last week	6	7	6
	12. I am an experienced runner	4	6.5	6

\*Note: A higher score denotes a higher ranking



## **Discussion**

This study was part of a larger study and the purpose of this phase was to utilize a qualitative perspective to explore how people select and use the four sources of information to form self-efficacy beliefs with college students training for a marathon. When asked about the sources of information that influenced their self-efficacy for meeting their personal marathon goal, the twenty-six runners mentioned multiple sources of information. This is consistent with research from Chase, Feltz, and Lirgg (2003) that explored the sources of efficacy information used by collegiate basketball players. It was predicted that participants would largely draw upon past experiences in running to form their efficacy beliefs; however, physiological/emotional states were the most frequently cited source, supporting previous research suggesting that physiological states were more important for efficacy beliefs when the task was a physical one (Chase, Feltz, & Lirgg, 2003; Feltz & Riessinger, 1990). Participants spoke of feeling physically good and positive emotions as influential in increasing confidence in their capabilities for success. On the negative side, runners also mentioned challenges with past injuries and pain from flare ups as a factor that decreased efficacy beliefs.

Verbal persuasion was the second most frequently mentioned source of information for participants during the pre-training and pre-race interviews. This could perhaps be attributed to the fact that, at the time of the pre-training interviews, most participants did not yet have much running and/or racing experience to draw from, therefore encouragement from others was more important for shaping efficacy beliefs. This finding is consistent with statements made by Bandura (1997) regarding the importance of verbal encouragement when the task is relatively new to the individual. In addition, many participants mentioned the professor of the course, who was a Boston Marathon Qualifier, as a significant source of efficacy information and this is

congruent with Wise, Posner, and Walker's (2004) study that suggests that the feedback provider's expertise in the given skill is important for influencing efficacy beliefs.

Exploration of changes over time regarding the influential strength of the sources of efficacy information revealed that physiological/emotional states were the most influential sources of information and continued to be throughout the duration of the training and race experience. From the pre-training to pre-race interviews, the frequency of the sources remained the same, indicating no change over that time period; however analysis of the post-race interview revealed a change from pre- to post-race, with past performance experiences emerging as a more influential source than verbal persuasion. This could be attributed to runners drawing upon training experiences with longer runs to help increase efficacy for being able to complete the race. This makes logical sense because by the end of the training program, the participants had past experiences that they may not have had if they were not runners prior to the class. These trends across time for the sources of efficacy information were largely supported by the data from the ranking task as well, as "feeling good physically" remained the highest ranked source across all three time periods.

The results of this study provide practitioners with several implications for use in the field. The first is the importance of athletes' assessments of physiological states as an influence for efficacy beliefs when the task is of a physically demanding nature. In this study, physiological states remained the most important source of efficacy information throughout the training and race experience, thus it is critical for coaches and/or practitioners to help athletes positively interpret their physiological symptoms in order to avoid decreases in efficacy beliefs. An example of this could include providing information on physical and/or emotional symptoms to expect during something as demanding as marathon training so that runners may know what to

expect. This has also been suggested by other researchers as a means of utilizing physiological states to increase efficacy beliefs (Johnson, 1996; Resnick, 2002).

Another implication evident in this study is related to the increased importance of past performance experiences as the training and race program continued. As mentioned above, this makes sense because the majority of participants did not have many past experiences in running to draw from, thus they were not important until later in the program when runners had been training for 3 months and had opportunities to gain many experiences. This indicates that it is important for practitioners to provide opportunities for performance success as much as possible in training programs to help increase efficacy beliefs for the task.

Lastly, the importance of verbal persuasion provides another avenue for practitioners striving to increase efficacy beliefs. Based on the results of this study, encouragement from the professor of the course, classmates, and family members were all important sources of efficacy information. Therefore, practitioners should recognize the importance of encouragement from various significant peers in their athletes' lives as a means to increase efficacy beliefs.

Although several sound implications can be derived from this study, there are some limitations. One limitation of this investigation is the fact that the sample was comprised of students taking a class for course credit, thus their motivations might be different from that of someone training for a marathon on their own time. Completion of the marathon was not mandatory; however, participation in the training program was, so sources of efficacy information used to form self-beliefs could vary when explored in a non-student running sample. In addition, the importance of physiological/emotional states might have been affected by the fact that the course the students were enrolled in was an exercise physiology course, thus runners were exposed to and discussing physiology-related topics on a regular basis. This might have

influenced the frequency of statements made regarding physiological/emotional states.

Replication of this study with a non-student sample of distance runners could provide more information about the sources of information used when forming self-efficacy beliefs related to marathon running. Another limitation was the situation concerning the extreme weather and marathon race cancellation. On a positive note, almost all participants perceived the experience as a successful one and cited high self-efficacy beliefs about being able to complete a marathon. Although it was not possible to control for these circumstances, replication of the study in the future in which participants are able to complete the marathon race with no adverse conditions is warranted.

Overall, the results indicate that physiological states are certainly an important influence on the formation of efficacy beliefs for a physical activity task. However, it is important to recognize that past performance experiences did become more influential as the training and race experience continued. This suggests that in the absence of past experience, physiological states and verbal persuasion were more important, but as participants had more opportunities to have running experiences, those became more important for increasing efficacy beliefs.

Bandura (1997) stated that there were specific contexts that could cause the influential strength of the four sources to vary and perhaps the unexpected results concerning the rankings of the four sources of efficacy information reveal one of those contexts. In addition, researchers (Chase, Feltz, & Lirgg, 2003; Feltz & Riessinger, 1990) report that physiological states are a more important source of efficacy information when the task is a physical one, but generally past performances are still the most influential. This leads one to ponder if the physical difficulty of the task is related to the importance of physiological states when forming efficacy beliefs. In other words, during a physical activity task that is not very physically demanding, such as rolling

a ball towards a target, physiological states might be important, but past performance experiences might still be most influential for forming efficacy beliefs for success. On the other hand, during an extremely physically demanding task, such as running a marathon or completing a triathlon, physiological states may be more important than past performance experiences because of their critical importance to successful task completion. While this theory makes sense, further research is necessary to explore this potential relationship.

In conclusion, this study contributes to the current literature on self-efficacy in the sport and physical activity domain by providing a more in-depth picture of which sources of efficacy information are selected when forming beliefs about capabilities for success. Researchers (Samson & Solmon, 2011, in press) have suggested that studies of a qualitative nature are needed in the self-efficacy literature, thus this investigation helps to fill a void. Also, the longitudinal nature of the study allowed researchers to explore changes over time for sources of information utilized to develop efficacy beliefs. In the future, researchers can build upon this knowledge by conducting similar studies with different populations and with varied sport and physical activity tasks. It is imperative that this line of research be continued so that we may continue to understand the nature of self-efficacy and how we might influence beliefs to create more positive outcomes.

## **CHAPTER FOUR: SELF-EFFICACY IN AFRICAN AMERICAN DISTANCE RUNNERS**

### **Introduction**

In the physical activity domain, self-efficacy has been reported as one of the strongest predictors of behaviors (Hu, Motl, McAuley, & Konopack, 2007). In addition, research evidence supports the conclusion that an individual with a higher level of self-efficacy will persist longer in their efforts than an individual with lower levels of self-efficacy (Feltz et al., 2008). Self-efficacy beliefs influence individuals' efforts, affective experiences, and overall enjoyment of physical activities (Bandura, 1986; Martin & Gill, 1995). People with high levels of self-efficacy are more likely to pursue challenging goals, cope with pain, and persevere through setbacks, while those with low self-efficacy avoid challenges and tend to give up when confronted with obstacles (Llewellyn, Sanchez, Asghar, & Jones, 2008).

According to Bandura (1997), the processing of efficacy information involves two functions, which he delineated as separable cognitive processes. The first process centers on the types of efficacy information to which individuals choose to attend. The four sources of efficacy information are: past performance accomplishments, verbal persuasion, vicarious experience, and physiological/emotional states. Past performances have been established as the most influential source of efficacy information because they are based upon one's own mastery experiences (Bandura, 1997). Verbal persuasion can come in the form of feedback and speeches given by coaches or others, expectations of others, or even self-talk. Learning through vicarious experience, or modeling, is the process through which people learn by watching someone else successfully perform the desired task. Interpretations of physiological symptoms (such as heart rate and perceived exertion levels) can influence efficacy beliefs about the likelihood of success in a given task, but that interpretation can also be influenced by previously held efficacy beliefs.

Each of the sources of efficacy information provides distinct information regarding competence in a given task, thus the source(s) selected by the individual provides unique information upon which to base the self-appraisal.

The second cognitive process pertains to the rules or heuristics that individuals utilize in order to weight and integrate the sources of efficacy information when forming their own beliefs. While it has been established that past performances are typically the most salient source of efficacy information, Bandura (1997) asserts that there are some contexts in which the sources of efficacy information vary in the strength of their influence on beliefs; however little research, has been conducted in this vein, thus the nature of these contexts is not defined clearly.

One context that has not been extensively studied is that of diverse populations. The majority of the studies reviewed thus far, including the studies outlined in the two previous chapters, utilized Caucasian individuals for the study participants. Samson and Solmon (2011, in press) suggested that researchers needed to address the integrity of the sources of self-efficacy for physical activity and sport in more diverse populations, especially minority populations. Given that differences have been reported in studies that compared Caucasian and minority cultures (Annesi & Unruh, 2007; Felton, Dowda, Ward, Dishman, Trost, Saunders, & Pate, 2002), it is logical to hypothesize that some differences might exist with regard to the most salient sources of self-efficacy.

Although not many researchers have chosen to explore this area, the existent research has largely supported the notion that differences exist. Examinations of self-efficacy for physical activity in racially diverse populations have found that social support was cited more frequently than past experience as an important source when forming efficacy beliefs in African American and Latino populations (Anderson, Wojcik, Winett, & Williams, 2006; Marquez & McAuley,

2006). Comparisons of African American and Caucasian populations have revealed that African American girls cited family member participation in physical activity (vicarious experience) and social support from those family members (verbal persuasion) as more important for increasing self-efficacy and physical activity levels than did Caucasian girls (Felton et al., 2002). In addition, differences in the type of feedback provided to African American and Caucasian women to increase self-efficacy beliefs about physical activity have also been reported. A focus on proximal goal attainment over outcome goal attainment seemed to be more appropriate for Caucasian women while a focus on how self-management skills were appropriately used to complete exercise were more applicable for African American women (Annesi & Unruh, 2007).

While this line of research shows promise, further study is needed to better understand how race/ethnicity might influence the sources of efficacy information used by individuals when forming their efficacy beliefs for physical activity participation. Further exploration is needed to gain insight into the factors that might influence the salience of those sources. These factors might encompass constructs such as cultural variables surrounding racial minority groups or societal influences on “culture-appropriate” behaviors. Research has reported that societal pressure to participate in “culturally-appropriate” activities can have an influence on self-efficacy beliefs, particularly in negatively stereotyped groups (Milner & Hoy, 2003). For example, scientists concluded that framing a physical activity (e.g., strength training) within a negative stereotype (e.g., “girls are not strong”) can affect the performance of members of the negatively stereotyped group by hindering self-efficacy judgments because they experience conflicting efficacy perceptions as a result of “stereotype threat” (Beilock, Jellison, Rydell, McConnell, & Carr, 2006; Beilock & McConnell, 2004; Stone, Lynch, Sjomeling, & Darley, 1999).



Although this area holds potential for a deeper understanding of the influence of racial/ethnic norms on self-efficacy beliefs for physical activities in stereotyped groups, limited research has been conducted in the sport and exercise field, thus creating an area for further investigation. Conclusions drawn from this line of research can be especially beneficial to practitioners working with ethnically diverse populations by identifying strategies that can be used to structure interventions aimed at increasing self-efficacy to meet the needs of the specific target population. Therefore, the purpose of this study was to examine the sources of self-efficacy for running in a sample of African American distance runners. Distance running over the years has largely been framed as “White space” and African Americans were seen as primarily short distance, sprint athletes; thus this context is well-suited to explore the influence of racial/ethnic norms on self-efficacy beliefs for physical activities in stereotyped groups (Walton & Butryn, 2006).

### **Research Questions**

The research questions were:

- 1) What sources of efficacy information do participants use to form perceptions about their ability to be successful in distance running?
- 2) What role does race/ethnicity play in the selection of sources of self-efficacy information?

Based on previous research, it was expected that past performance, along with verbal persuasion would be the most salient sources of information used by the runners. In addition, as in the previous study, it was predicted that efficacy beliefs would be the product of influences from several sources of efficacy information, rather than just one. Also, the role of race/ethnicity was

predicted to be a factor in the selection of sources of efficacy information for running because, generally, long distance running is not a common pastime for African Americans.

## **Methods**

**Participants and Procedures.** Participants in this study were 10 African American distance runners (6 males, 4 females), with a mean age of 31.5 years. They were recruited from local running groups and at local running events. ‘Distance running’ was designated as someone who ran at least a 10 kilometer distance or greater on a regular basis and could complete a 10k in less than 60 minutes. The primary distance run by this sample of participants ranged from 10k’s to half and full marathon and the experience level of the participants varied from beginning runners who had only begun running in the past year to experienced runners who had run for more than 20 years. Participants were given a full description of the study and informed consent was obtained prior to their entering the study. This study was approved by the Institutional Review Board prior to the study’s beginning.

**Demographic Questionnaire.** Participants were asked to complete a demographic questionnaire that included such items as: racial/ethnic background, years of running experience, primary running/racing distances, and competition experiences.

**Interviews.** After completing the demographic information form, participants completed a 20-30 minute audio taped interview. The interview questions focused on participants’ self-efficacy judgments and the sources of information used to form those self-perceptions. In addition, participants also responded to questions regarding their perceptions of support/nonsupport from their culture regarding participation in distance running. A combination of the standardized, open-ended interview protocol and interview guide approach was used in this study

(Patton, 2002). This particular interview protocol was selected because it ensured that all participants were asked the same questions, while allowing the researcher to probe more deeply when further information may be obtained or relevant to the research question.

**Ranking Task.** Participants also completed the ranking task described Chapter 3 to explore which sources participants felt were relevant to their self-perceptions and why. Twelve examples of common sources of self-efficacy were listed on a form for participants and they selected the ones they felt were relevant to their self-perceptions and then ranked them in order of influential strength. Some examples included: watching a peer succeed in a similar task, verbal encouragement from a friend/family member, having experienced success in a similar task in the past, and feeling energetic.

**Data Analysis.** Interviews were transcribed verbatim and analysis followed the same procedure outlined in Chapter 3. A line-by-line analysis was conducted with the primary research questions in mind while data was coded in the margins of the interview transcripts following a deductive coding method that utilized pre-defined categories based on Bandura's four sources of efficacy information. Following this, members of the research team were asked to read and comment on the original codes. The interviewer who conducted the study was Caucasian and it is acknowledged that this could potentially create a weakness in the methodology; however, the interviewer had a long history of positive interactions with members of the African American community and every effort was made to reduce bias. In addition, an African American not involved with the study was asked to read the results and validate the perspective of her culture. Trustworthiness was maintained through member checks, acknowledgement of researcher bias, triangulation using the ranking task, and an external auditor, who had a 96.4% agreement rate with the original codes.

## Results

**Reasons for Running.** When asked to discuss why they began distance running, six participants spoke of running during their younger years and continuing as they grew older. Runners discussed experiences in elementary and high school track as a factor that initially influenced them to run and they developed a love for the sport that continued to present day. One runner commented,

“Originally my father introduced me to running, I wasn’t too particular about it, I just wanted to play football, but he said that if I wanted to be good at football, I had to be able to run, all of the good guys [football players] ran track, so I said ‘okay, I’ll give it a try,’ and that’s how I got started, I love it now, I was apprehensive at first, but I have grown to love it over the years.”

Another runner stated,

“Actually in high school, I was a sprinter, a track athlete, but all of my friends that I was close to were distance runners and they were really fast and I couldn’t keep up with them [laughs], but during senior year they convinced me to run cross country with them, which was horrible [laughs again] because every run over 2 miles they would leave me, but it gave me a love for it that I didn’t know was there and I have done it ever since.”

The remaining four participants discussed health reasons for initially taking up distance running. Participants spoke of wanting to “take control of their lives, lose weight,” and one runner mentioned “obtaining and maintaining physical fitness levels” for his military job. One runner commented,

“I just started running one day, I needed to get healthy, I found out I had high blood pressure and I weighed around 250 pounds and was only 25, I needed to be healthy and it made me feel good, I started losing weight, I weigh around 160 now and I run a 2:40 marathon [2 hours and 40 minutes].”

Another participant recalled,

“Pretty much I had gained a lot of weight two years ago and I just happened to go into the running store around Christmas time and I saw the posting about the running group, you know I was scared because I was not fast and a beginner, but a friend was like, ‘no, you will like it,’ so I actually went out and did the New Year’s

day resolution run with them...I really liked it and the folks there were really nice so I stuck with it and for the past two years have been doing it.”

**Perceptions of Success.** Analysis of the interviews revealed a wide range of individual participant goals concerning their perceptions of success for running, ranging from just wanting to finish their distances ( $n = 2$ ) to time goals ( $n = 4$ ), to feeling physically good when they ran ( $n = 4$ ). One runner commented, “Finishing the race is success to me...really just starting the race, just going for it is a success.” “If I can keep an 8 minute mile, that’s good for me, you know anything over 3 miles with an average pace of 8 minutes per mile, and I’m a happy woman,” is another example. Another runner stated, “Success for me right now is just covering the distances and feeling good after, being able to finish and not be in complete pain, that’s when I know I’ve had a good run.” Overall, participants reported relatively high self-efficacy scores ranging from 60%-100% certainty that they could successfully meet their goals when running, with a mean score of 83% certainty.

**Sources of Self-efficacy.** When asked about the sources of information that influenced their self-efficacy for meeting their personal running goals, participants cited 28 total sources of information during the interviews. All participants listed at least two sources of information that were utilized when forming beliefs about their capabilities for success, thus providing further evidence that participants rely on multiple sources when forming efficacy beliefs.

**Interviews.** When those sources were coded into categories based on the four sources of efficacy information proposed by Bandura, past performance experiences were cited most frequently as all ten participants mentioned them. Physiological/emotional states were cited by six individuals while, verbal persuasion and vicarious experience were each mentioned by five participants. In addition, two participants mentioned sources of information that did not fall into any of Bandura’s categories, spirituality and feeling a sense of control over one’s life.

Table 4.1 Frequencies of Sources

	Past Performances	Physiological/ Emotional	Verbal Persuasion	Vicarious Experience	Other	Total
Frequency	10	6	5	5	2	28

With regard to past performance experiences, every participant felt that their previous experiences in running played an influential role in the formation of their efficacy beliefs.

Runners cited “training experiences” and “past successes in competition” as sources of information that increased self-efficacy beliefs for running. One participant commented,

“I know my body and I know what I’m capable of...I know how to pace myself and the distance has never really bothered me because of that, so just having the experience of running so many different runs, different distances, knowing how to approach many situations, I know what to do when I step out just because I have been running so long.”

Another participant mentioned having run the distance in the past as a reason for her high efficacy beliefs for running her next race,

“I think with the last go around, I had never actually run the distance before the race [half-marathon]...going into this one, I have now run that distance and have been consistent in my training, so that’s why I feel so confident.”

Physiological/emotional states were the next most frequently mentioned source of efficacy information utilized by runners. They mentioned “feeling physically strong” and “knowing how good I will feel after” as sources of information that increased self-efficacy beliefs for running. One participant spoke of physical changes that happened as he got into running condition, “When I made it through a run and I was able to finish feeling strong, it makes me want to go out and do more runs.” Participants also mentioned setbacks with injuries as a source of information that decreased efficacy beliefs. One runner, when speaking about his next race, said, “Honestly I’m concerned right now about my knee, if it weren’t for that, I would feel much better about this weekends’ race [full marathon].”

The remaining sources of self-efficacy, verbal persuasion and vicarious experience, were each mentioned five times by participants during the interviews. Runners spoke of running friends or “buddies” that both encouraged them and gave them a positive role model to look to for running confidence. They also mentioned support from family members and significant others as reasons for their confidence in their running abilities. One female runner spoke of reading stories of other African American female runners to increase her efficacy for running, “I saw stories about other African American women out there running and why they do it, their experiences, it makes me more confident because they are out there too.”

**Ranking Task.** The results of the ranking task supported the sources of efficacy mentioned in the interviews. Participants ranked “I am an experienced runner,” “feeling good physically,” and “I had good runs this past week” as the top three influences on efficacy beliefs. This suggests that, according to the modified Q-sort activity, past performance experiences were most influential, followed by physiological/emotional states which is consistent with the responses in the interviews. In addition, the six items that were representative of vicarious experience and verbal persuasion were ranked in the lower half of the items, indicating that runners did not feel they exerted a strong influence on efficacy beliefs when compared to the items representing past performances and physiological/emotional states. A visual representation is found in the table below. Items are grouped by the source of efficacy information they represent (i.e. items 1, 5, 9 are representative of physiological and/or emotional states).

Table 4.2 Median Rankings

	Item	Median Ranking
Past Performance Experiences	4. Been successful in the past in similar tasks	7
	8. I had good runs this last week	8
	12. I am an experienced runner	11
Physiological and/or Emotional States	1. Feel good physically	9.5
	5. Feel good emotionally	7
	9. Feel well-rested and not sick	6.5
Verbal Persuasion	2. Parents' encouragement	3.5
	6. Friends' or significant others' encouragement	6
	10. I tell myself that I can do it	3.5
Vicarious Experience	3. Watched peer succeed in similar task	5.5
	7. Read/heard inspirational story about running	4
	11. I am comparable to others who have complete the task	3.5

\*Note: A higher score denotes a higher ranking

**Role of Race/Ethnicity.** When asked about the role of race/ethnicity in the selection of sources of self-efficacy for running, participants first described their views of the African American culture. Some of the defining characteristics that runners described included “family-oriented, close-knit, traditional, not very active, very into appearance, and all about food.” When asked about distance running in African American culture, all participants agreed that it was not common for African Americans to run distance races, and most African American runners were



track and field athletes, specifically sprinters. One participant, who was formerly a sprint athlete mentioned, “You know us Black runners, we are mostly sprinters, so it has been a transition away from the norm, starting to run distance.” In addition, runners acknowledged that it was challenging at first to adjust to being one of a few African American runners in a group,

“I actually thought, ‘hmmm I don’t know about this’ when I first came out, you know there were like maybe five African Americans in a group of like 100 runners, and I have had to adjust the way my thinking was and realize that everyone was cool and here to do the same thing and we are here to have fun together and just chill...I really enjoy it now, but it was a different experience at first.”

Despite the fact that distance running is not a common pastime for African American runners, participants still felt that they were supported in their running endeavors, “I mainly feel supported by other African Americans, they don’t see it as something for them and sometimes ask “why?” but they see that it is part of my personality and something that I love, so they support me.”

Also, female participants mentioned appearance-related concerns regarding why they thought there was so little participation in running by African American females. One runner said, “I think African American women and running, they just don’t do it...from not wanting to mess up their hair to not wanting to sweat, they just don’t value it enough to think that it’s worth it.” Another female participant spoke of similar barriers when trying to encourage her African American female friends to join her in running,

“How do you change people’s mindset, that you can wash your hair you know, that’s the biggest thing, we are very into our appearance and something that is going to make us sweat and not make us look so hot, we are not into doing.”

When asked if their perceptions of their racial/ethnic culture played into their efficacy beliefs for running, most participants ( $n = 7$ ) said that they did not feel that race/ethnicity played any role. Runners acknowledged that they were aware of the fact that they were participating in

an activity that was not common for their racial/ethnic group, “I mean, I know that I am a rarity, but it doesn’t really make me feel [more or] less confident, at the end of the day it’s just me out there running like everyone else.” One participant mentioned that it increased his enjoyment of running, but did not influence his confidence in his running abilities,

“For instance, not a lot of my running buddies have been Black outside of my family members, so I haven’t really had that as something that I have experienced in the past....so now meeting Adrian, and us running together, that was a good sense of joy because Black people tend to gravitate together and especially when it’s not something that a lot of Black people do, so having someone else who is Black experience something and like it as much as you do brings a sense of happiness that you don’t get when you run with your other running buddies [who are White], so I think in that sense, it adds joy to the running, but it doesn’t really bring my confidence up or down.”

The three participants who felt that their racial/ethnic culture did play a role in their efficacy beliefs for running were all female. The runners mentioned, “feeling like a rarity, working towards breaking stereotypes, and being a role model for other African American females” as reasons for their beliefs. One female runner stated, “I know that I am a rarity and so sometimes I wonder if people are thinking, ‘what’s she doing here?’ and that can sometimes make my confidence a bit shaky.” “Working towards a goal and knowing that you can do anything regardless of the color of your skin, that was how I was raised and that definitely plays into my confidence for running now, showing that I can do it,” was mentioned by another female runner when she described how her race/ethnicity affected her confidence for running. Another runner spoke of being a role model for other females, “I want to set an example for my younger nieces and relatives, to show them that you can do it...I think that if Black females see other Black females out there doing it, we can change that perception of running.”

## **Discussion**

The purpose of this study was to examine the sources of self-efficacy for running in a sample of African American distance runners. It contributes to the literature by providing a promising start to a better understanding of racial/ethnic norms and their influence on self-efficacy beliefs for physical activities in stereotyped groups. African Americans have been primarily framed as short distance, sprint athletes and distance running over the years has largely been viewed as “White space” (Walton & Butryn, 2006); therefore, this context was well-suited to explore the influence of racial/ethnic norms. In addition, the majority of self-efficacy research in the physical activity and the sport domain utilizes Caucasian populations, thus this investigation helps to fill a gap in the literature.

Based on previous research (Bandura, 1997; Feltz et al., 2008), it was expected that past performance would be the most salient sources of information used by the runners and all ten participants felt that their previous experiences in running played the largest role in the formation of their efficacy beliefs for running. This provides support for the importance of past performances as important for forming efficacy beliefs; this contrasts with previous research with diverse populations that suggest verbal persuasion is more important (Anderson, Wojcik, Winett, & Williams, 2006). As for the second most-mentioned source of efficacy information, physiological/emotional stated were cited. In addition, all participants listed at least two to three sources of information that were utilized when forming beliefs about their capabilities for success, thus the prediction that efficacy beliefs would be the product of influences from several sources of efficacy information was also supported, and is consistent with other researchers’ findings (Bandura, 1997, 1986; Chase, Feltz, & Lirgg, 2003) .

The role of race/ethnicity was expected to be a factor in the selection of sources of efficacy information for running because, generally, long distance running is not a common pastime for African Americans. When asked about this, participants first described their views of the African American culture and the themes that emerged were “traditional, family oriented and not active.” Participants also mentioned that it was not common for African Americans to run distance races and most African American runners were track and field sprint athletes, indicating an awareness that they were deviating from what was considered “normal physical activities” for their culture. In addition, female participants mentioned appearance-related concerns regarding why they thought there was so little participation in running by African American females. This concern by the female participants was interesting and perhaps warrants further study in the future to better understand the importance of appearance within African American culture.

When asked if racial/ethnic culture played into their efficacy beliefs for running, most participants said that they did not feel that race/ethnicity played any role and the three participants who did feel that their racial/ethnic culture played a role were all female. The major themes that came from those runners were, “feeling like a rarity, working towards breaking stereotypes, and being a role model for other African American females” as reasons for their beliefs. Perhaps the reason that the majority of these athletes did not feel that race/ethnicity played a role is that these individuals were not typical representations of their race. Furthermore, research is needed to understand what motivates these individuals to break the racial stereotypes in addition to explorations into why those female participants felt that race/ethnicity played a role in the formation of efficacy beliefs and what motivates them to want to break stereotypes.

In general, the results indicate that African American distance runners’ selection of the sources of efficacy information is consistent with that of past research within the sport and

physical activity domain, including those that used Caucasian populations (Bandura, 1997; Chase, Feltz, & Lirgg, 2003; Feltz et al, 2008). Participants were aware that they were engaging in an activity that was uncommon for African Americans, but the majority did not feel that it played a role in their efficacy for running. This indicates that perhaps race/ethnicity does not play a large role in the selection of the sources of efficacy information, which is in contrast to previous research that did report differences in sources of efficacy information for diverse populations (Annesi & Unruh, 2007, Felton et al., 2002). However, as mentioned earlier, these participants were not necessarily representative of their race/ethnicity, thus the influence of race could be decreased due to that factor. This suggests practitioners should be aware that differences may exist, but participants who are engaging in activities that are not representative of their race may be more likely to have their efficacy beliefs influenced by the sources supported by research utilizing Caucasian populations. Researchers in the future might explore the perceptions of race/ethnicity, stereotypes, and what that means for a distance runner in addition to differences between male and female perceptions of being African American and a distance runner. Lastly, investigations of the perceptions of racial/ethnic norms and participation in other stereotypically uncommon sports are warranted.

## CHAPTER FIVE: SUMMARY AND CONCLUSIONS

The purpose of this dissertation was to investigate self-efficacy in the physical activity and sport domain by exploring the sources of self-efficacy for distance runners. The first study utilized a quantitative approach to investigate the relationship between self-efficacy, affect and training volume during marathon training. Study two used a qualitative approach to investigate the sources of self-efficacy information used by runners. The third study was a qualitative investigation of the sources of self-efficacy for running using a sample of African American distance runners.

**Summary.** In the first study, self-efficacy demonstrated an upward trend throughout the marathon training program, and the self-efficacy results were congruent with previous research (McAuley, Morris, Doerkson, et al., 2007). In addition, fluctuations in self-efficacy during the hardest training weeks were consistent with the findings of previous research where fluctuations in running were associated with fluctuations in efficacy levels (Scholz, Nagy, Schuz, & Zieglermann, 2008). Affect also fluctuated throughout the marathon training, but unlike self-efficacy, the final affect measure was lower than initial levels, which could be attributed to the adverse weather conditions during the race. It is worth noting that before the adverse circumstances of the race, affect levels were demonstrating an upward trend during the weeks leading up to the race. Lastly, the results revealed only a small, positive relationship between self-efficacy, affect, and training volume.

In the second study, runners identified multiple sources of information when forming their efficacy beliefs. Exploration of the sources of efficacy information used by participants revealed that physiological/emotional states were the most influential sources of information throughout the duration of the training and race experience, while the influence of past

performance experiences gradually increased throughout the duration of the program. These results were congruent with previous research suggesting that physiological states can be more important for efficacy beliefs when the task was a physical one (Feltz et al., 2008). However, it is important to recognize that past performance experiences did become more influential as the training and race experience continued. This suggests that in the absence of past experience, physiological states and verbal persuasion were more important, but as participants had more opportunities to have running experiences, those became more important for increasing efficacy beliefs.

These first two studies contribute to the current literature by providing a more comprehensive picture of how self-efficacy beliefs develop and change during a long-term physical activity program. The qualitative nature of the second study provides insight into how individuals select sources of efficacy information when forming self-judgments, which fills a void in the current self-efficacy research. In addition, the longitudinal nature of the studies also helps to fill a gap in the self-efficacy literature by exploring the formation and fluctuation of efficacy beliefs over time.

In the third study, self-efficacy perceptions of African American distance runners were explored. Their selection of sources of efficacy information was consistent with past research in the sport and physical activity domain, including a large majority of studies that used Caucasian populations (Bandura, 1997; Chase, Feltz, & Lirgg, 2003; Feltz et al, 2008). Participants discussed their awareness about choosing to engage in a sport activity that was rare for African Americans, but the majority did not feel that it played a role in their self-efficacy for running. This suggests that sources of self-efficacy may not differ across diverse race/ethnicity groups; however, these individuals may not be representative of their race, therefore race may not be an

influential factor. While this makes sense, much more research is needed before conclusions can be made.

**Conclusions.** Overall, the results of the three studies are largely congruent with previous research findings and provide the basis for a promising line of research aimed at gaining a deeper understanding of how self-efficacy beliefs form and fluctuate in the sport and physical activity domain. While the results of studies one and two indicate that self-efficacy increases over time with continued involvement in a physical activity task and that physiological states are an important influence on the formation of those beliefs, interesting points arose that warrant further investigations. Researchers (Feltz et al., 2008) report that physiological states are a more important source of efficacy information when the task is a physical one, but generally past performances are the most influential, yet this was not the case in the second study. This may suggest that the physical difficulty of the task is related to the importance of physiological states when forming efficacy beliefs. While this notion makes sense, further research is needed to explore this potential relationship. In addition, the increase in importance of past performances after the actual marathon race provides support for the importance of mastery experiences and should be explored more in the future.

Study three also produced a few noteworthy findings, specifically regarding perceptions of male and female African American distance runners. Generally the sources of efficacy information were those that Bandura (1997) identified, suggesting the theory is applicable across ethnicities. The appearance-related concerns of the female runners was noteworthy and perhaps merits further investigation into the barriers faced by women of Color engaging in physical activities in comparison to other populations. In addition, the fact that the three participants who felt that race/ethnicity played a role in their efficacy for running were all female, creates a need



for more insight into possibly differing male and female perceptions of being African American and a distance runner. Lastly, exploration of racial/ethnic norms and participation in other stereotypically uncommon sports is needed. As our population becomes ever more diverse, it is imperative that we continue to expand our knowledge on those diverse populations.

Based on the results of the three studies several implications can be drawn for practitioners wishing to increase self-efficacy in the physical activity and sport setting. From study one, the fluctuations in efficacy and affect during peak training weeks suggest that encouragement for athletes in high-intensity training can be important for maintaining efficacy and affect levels. Study two provides evidence that physiological and/or emotional states are especially important for a physically demanding task, thus it is important for practitioners to educate athletes on physical and/or emotional symptoms that may arise from high-intensity training. Lastly, the results from study three indicate that practitioners should be aware that differences in the sources of efficacy for diverse populations may exist, but participants who are engaging in activities that are not representative of their race may be more likely to be congruent with research utilizing Caucasian populations.

In closing, this dissertation is a critical first step in gaining more insight into self-efficacy beliefs in the physical activity and sport setting. Although the participants in these studies are not necessarily representative of the general population (i.e. not everyone can be a distance runner), it is important to acknowledge this line as stepping stone to further research with more representative populations and in other contexts. Researchers can build upon this knowledge by following any of the lines of study mentioned above, in addition to replicating these studies with varied populations and diverse sport and physical activity tasks so that more generalizable findings might emerge. It is imperative that the self-efficacy line of research be continued so that

we may continue to understand the nature of this powerful variable and how we might influence beliefs to create positive outcomes.

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## **APPENDIX A: GENERAL EXAMINATION**

Examining the Sources of Self-efficacy in Physical Activity

General Examination  
Submitted to the Graduate Faculty of  
Louisiana State University  
in partial fulfillment for the degree of  
Doctor of Philosophy  
In  
The Department of Kinesiology

by  
Ashley A. Samson  
B.S. Northwestern State University, 2006  
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## **ABSTRACT**

Self-Efficacy Theory is perhaps the most prominent sub-theory stemming from Bandura's Social Cognitive Theory (1986). The theory posits that people will be more likely to engage in behaviors they believe they can successfully perform and avoid behaviors in which they feel they will be unsuccessful. An individual with a higher level of self-efficacy should persist longer and be more robust and resolute in their efforts than someone with lower levels of self-efficacy. One behavior where being robust and resolute in one's efforts is especially beneficial is in the physical activity domain. Self-efficacy perceptions help to shape individuals' efforts, affective experiences, and enjoyment of physical activities, particularly at higher intensities (Bandura, 1986; J. Martin & Gill, 1995).

The purpose of this literature review is to synthesize the current literature on self-efficacy in the physical activity domain, focusing on the mechanisms through which self-efficacy perceptions are derived. The first section provides an overview of the current literature on self-efficacy in the physical activity domain, as well as issues that arise with the definition and measurement of self-efficacy. In the second section, recent literature concerning the four major mechanisms that influence self-efficacy perceptions for physical activities is examined in addition to the provision of implications for practitioners. The third section of the paper explores the literature concerning factors that enhance or restrain sources of efficacy information in the physical activity domain. The paper concludes with a summary of positive and negative aspects of the literature and suggestions for avenues of further investigation.

### **Examining the Sources of Self-efficacy in Physical Activity**

Physical activity is defined as “any bodily movement produced by the skeletal muscles and resulting in a substantial increase over the resting energy expenditure” (Bouchard & Shephard, 1994, p.77). The American College of Sports Medicine (ACSM) and the Centers for Disease Control and Prevention (CDC) recommend engagement in 30 minutes of moderate activity on most days of the week; however most Americans fail to meet the physical activity guidelines set forth by those organizations (CDC, 2001; Gordon-Larson, Nelson, & Popkin, 2005; Pate, Pratt, & Blair, 1995). These behavioral trends are of concern because of the connection between the lack of physical activity and the approximately 400,000 premature deaths each year in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004).

Increasing physical activity levels in all segments of the population from childhood to old age is a prevalent issue concerning many public health organizations due, in part, to its high correlation with obesity (Bratteby, Sandhagen, & Samuelson, 2005; Malina, 1996; US Department of Health and Human Services, [USDHHS], 2004). Carrying excess body weight can lead to increased risk for coronary heart disease, diabetes, and certain types of cancers (USDHHS, 2002). Participation in regular physical activity is critical to preventing many health conditions and improving overall quality of life (Bratteby, et al., 2005).

Developing interventions for behavior change presents many challenges and it is important that they be based on theoretical models that appropriately explain and predict subsequent behaviors (Baranowski, Anderson, & Carmack, 1998). One of the most successful theories for behavior change, and specifically physical activity, is Bandura’s Self-Efficacy Theory. Self-efficacy perceptions help to shape individuals’ efforts, affective experiences, and

enjoyment of physical activities, particularly at higher intensities (Bandura, 1986; Martin & Gill, 1995).

The purpose of this literature review is to synthesize the current literature on self-efficacy in the physical activity domain, focusing on the mechanisms through which self-efficacy perceptions are derived. The first section provides an overview of the current literature on self-efficacy in the physical activity domain, as well as issues that arise with the definition and measurement of self-efficacy. In the second section, recent literature concerning the four major mechanisms that influence self-efficacy perceptions for physical activities is examined in addition to the provision of implications for practitioners. The third section of the paper explores the literature concerning factors that enhance or restrain sources of efficacy information in the physical activity domain. The paper concludes with a summary of positive and negative aspects of the literature and suggestions for avenues of further investigation.

### **Self-Efficacy Theory**

Self-efficacy theory is one of the most prominent sub-theories developed within the framework of Bandura's (1986) social cognitive theory. Social cognitive theory emphasizes reciprocal determinism in the interaction between people and their environments and individuals are viewed as active participants in the regulation of their cognitions and behavior, instead of passive reactors to their environment (Feltz, Short, & Sullivan, 2008; Glanz, Rimer, & Viswanath, 2008). The theory posits that behavior is a product of the complex interaction of personal, behavioral, and environmental influences, while acknowledging the ability of the individual to alter and construct their environments to fit their needs (Glanz et al., 2008).

Through the social cognitive lens, self-efficacy theory characterizes self-referenced beliefs as the core factor that influences individuals' goal-directed behavior. According to



Bandura (1997), self-efficacy beliefs are “people’s judgments of their capabilities to organize and execute courses of action required to attain a desired outcome” (p. 3). Bandura describes self-efficacy as the cognitive mechanism that mediates between self-appraisal information and an individual’s subsequent thoughts, emotions, motivations, and behaviors. Self-efficacy theory posits that people will be more likely to engage in behaviors that they believe they can successfully perform and avoid behaviors in which they feel that they will be unsuccessful. In addition to predicting whether or not an individual will engage in a behavior, self-efficacy influences the amount of effort an individual expends and the length of time that such effort endures in the face of adversities (Bandura, 1992).

Self-efficacy beliefs vary on three dimensions: level, strength, and generality (Feltz et al., 2008). The “level” of self-efficacy refers to individuals’ expected performance achievements at different levels of difficulty (i.e. completing a mile in six minutes up to completing a mile in ten minutes). The “strength” of self-efficacy beliefs refers to the degree of certainty with which the individual believes they can achieve the different levels of performance (i.e. two people may both believe they can run a ten minute mile, but one may be more certain in their beliefs) “Generality” of self-efficacy beliefs is indicative of the transferability of an individual’s efficacy beliefs across domains or tasks (Feltz et al., 2008).

Originally, studies based on self-efficacy theory were designed for the treatment of phobias, but later studies expanded to include treatments for a variety of behaviors. The empirical validation of self-efficacy theory has been repeated numerous times in a variety of contexts, with a variety of behaviors (Gotay, 2005; Kelder et al., 2005; Moritz, Feltz, Farhback, & Mack, 2000; Theis, Helmick, & Hootman, 2007). Self-efficacy beliefs have been associated with engagement in behaviors so often that examinations of behavioral determinants are

considered incomplete if self-efficacy is not included (Glanz et al., 2008). Because of its broad appeal, the construct of self-efficacy has been extended beyond SCT and been incorporated in several other models of behavior change, including Health Belief Model (HBM), Theory of Planned Behavior (TBP), Integrated Behavioral Model (IBM), Transactional Model of Stress and Coping (TMSC), and Transtheoretical Model (TTM) (Glanz et al., 2008).

### **Self-efficacy and Related Concepts**

Self-efficacy beliefs are very context and behavior-specific, and not do represent an overall global trait (Feltz et al., 2008). They refer to beliefs about what one “can do” and not what one “has” or what one “is” (Bandura, 1977, 1997). Despite this distinction, several related concepts of the self are often mislabeled as self-efficacy, when in fact they are more global concepts of the self and not confined within a goal-striving context. Some of the related concepts of the self that are commonly confused with self-efficacy include sport confidence, self-confidence, perceived competence, perceived ability, self-concept, self-esteem, and outcome expectancies.

**Sport Confidence** refers to the degree of certainty an individual possesses about their ability to be successful in sport (Vealey, 1986). In Vealey’s original model, she conceptualized sport confidence as both a trait and a state and developed instruments to measure both components. Feltz and Chase (1998) argue sport competence has many commonalities with self-efficacy; however, the goal that represents success is more broadly defined in sport confidence than it is in self-efficacy. With regards to sport performance, Moritz and colleagues (2000) found that state sport confidence was not as strong of a predictor of performance as were task-specific self-efficacy scales.

**Self-confidence** was identified by Martens and colleagues (1990) as an influential component of anxiety when they were examining the cognitive and somatic factors associated with anxiety. In contrast, Bandura (1997) utilizes the term to refer to beliefs about one's control over actions, thoughts and affect and he perceived self-confidence as an influence on anxiety, rather than a component of it. Bandura also hypothesized that self-confidence and anxiety were outcomes of a low sense of efficacy to meet the demands of the specified task.

**Perceived Competence and Ability** are two related constructs within the goal-striving context proposed by Harter (1978, 1981) and Nicholls (1984). These concepts are more relevant to perceptions developed over time rather than task-specific self-perceptions that can vary by task or across difficulty levels within the same task (Feltz et al., 2008). Another contrast between these concepts and self-efficacy perceptions is that perceived competence and ability refer to abilities that one has developed and not what one can do in the future with those abilities (i.e. "I have" versus "I can"). In discussing the construct of perceptions of ability, it is important to make the distinction from *conceptions* of ability. Perceptions of ability refer to one's beliefs about whether or not they possess the skills to be successful in a given task, while conceptions of ability refers to one's beliefs regarding the origin of ability as innate or acquired through effort and practice (Harter, 1978, 1981; Nicholls, 1984).

**Self-concept** is regarded as one's self-description based on interactions within the environment and past evaluative experiences (Feltz et al., 2008). It also incorporates dynamics of self-reactions, feelings of self-worth, and general beliefs about competence (Zimmerman & Cleary, 2006). Some advances have been made with regard to the development of physical self-concept, which assesses one's views of themselves in a physical context, but it is still too global of a construct to be used as a consistent predictor of behaviors (Feltz et al., 2008).

**Self-esteem** is another more global concept of the self and it refers to one's personal perceptions of worthiness. Self-efficacy and self-esteem have been found to be related, but self-efficacy is more of a cognitive judgment rather than an affective reaction (Pintrich & Schunk, 2002). Someone can have low self-efficacy for a given task, but still feel that they are a worthy person, while someone else can have high efficacy for the task, but not like themselves.

**Outcome Expectations** are commonly confused with self-efficacy and Bandura (1986, 1997) cautions against using the two terms interchangeably. Outcome expectancies refer to beliefs that a certain behavior will produce certain outcomes, while self-efficacy beliefs refer to whether or not one can perform a behavior successfully. An example in the physical activity domain might be someone who believes that they can successfully complete a weight training program (efficacy beliefs), but does not think that it will produce long term weight loss (outcome expectancies).

Other related concepts that are commonly confused with self-efficacy include level of aspiration, locus of control, and concepts from within Manzo et al.'s (2001) two-factor theory of sport confidence, dispositional optimism and perceived sport competence. While some of these more global measures of the self are useful for gaining insight into one's overall outlook on life and mental well-being, they are not very useful in predicting variability in task performance situations. In conclusion, self-efficacy beliefs differ from other related concepts of the self because they are task and context specific and focus on one's perceptions of capabilities to succeed in the given task (Zimmerman & Cleary, 2006).

### **Types of Efficacy**

In light of the specific nature of self-efficacy, the manner in which one defines efficacy beliefs is highly dependent on the research question being studied (Feltz et al., 2008). As a result,

researchers over the years have identified specific types of efficacy in order to more effectively answer their research questions (Bandura, 1986, 1997; Maddux, 1995). The variations in the definitions of self-efficacy and how it is measured can help to explain some inconsistencies in the research regarding self-efficacy and behavioral or performance measures (Feltz et al., 2008). In their review of research in the physical activity domain, Sallis and colleagues (2000) found that some studies reported evidence of the relationship between self-efficacy and activity in children and adolescents, while others did not. A closer examination of the literature revealed that a number of different types of self-efficacy were examined and the development of the instruments differed as well, offering some explanation for the inconsistent findings.

**Task Self-efficacy** Several types of self-efficacy have been delineated in the literature, but task self-efficacy is the type of efficacy that is most closely aligned with Bandura's (1997) definition. It refers to the belief in one's ability to successfully execute a task. This type of efficacy can be used to examine an individual's beliefs about performing a task with graded difficulty levels or performing the task under particular situational demands. This is in contrast to Maddux's (1995) definition of task self-efficacy as perceived capability to perform a simple motor act. Feltz and colleagues (2008) argue that tasks in the sport and physical activity setting can be quite complex, thus Bandura's (1997) definition is more commonly used when task self-efficacy is examined in the physical activity domain.

**Self-regulatory Efficacy** refers to beliefs about an individual's capability to control their motivations, thoughts, emotions, and behaviors in order to complete a task (McAuley, Konopack, & Morris, et al., 2006). This is also sometimes referred to as barriers efficacy (Feltz et al., 2008). This type of efficacy is used to measure beliefs about a task that might be familiar to the individual, but must be performed on a regular basis to achieve the desired outcome (i.e.

physical activity). This type of efficacy has been studied extensively within the frameworks of Social Cognitive Theory and Theory of Planned Behavior with regard to engagement and adherence to exercise programs (Moritz et al., 2000).

**Ameliorative Efficacy** An individual's perceived ability to cope with potential threats is known as ameliorative, or coping, efficacy (Bandura, 1997). This type of efficacy is used by researchers who are interested in examining an individual's perceived capabilities to cope with setbacks, obstacles, or injuries should they occur in the future. Ameliorative efficacy can be related to self-regulatory efficacy, but is its own separate type of efficacy that can also stand alone.

**Learning Self-efficacy** is the belief in one's capability to learn a new task (Feltz et al., 2008). A strong sense of learning efficacy can enhance the process of becoming proficient in a new skill because individuals with this type of efficacy should put forth more effort than those who doubt their learning capabilities. This type of efficacy has been found to be more influential on the amount of effort put forth when the task is challenging, rather than when it is perceived as easy (Bandura, 1997). Learning efficacy beliefs are closely related to the belief system about conceptions of ability described by Nicholls (1984). Individuals who regard ability as something that can be acquired are more likely to possess confidence in being able to learn a new skill and react more adaptively to mistakes during the learning process than individuals who believe that ability is a fixed trait.

**Preparatory and Performance Efficacy** are two additional related efficacy terms, but Bandura (1986, 1997) distinguishes differences between the two. Preparatory efficacy includes beliefs regarding the potential for success in acquisition of skills and preparation for a competition, while performance efficacy refers to beliefs about the ability to successfully

perform the task in a competition setting. Research has shown a linear relationship between performance efficacy beliefs and performance in a competition setting and Bandura (1997) explains that “one cannot execute a task very well when they are plagued with self-doubt” (Feltz et al., 2008, p.24).

**Collective Efficacy** is the label given to efficacy beliefs as they relate to groups. Bandura (1997) defined it as “a group’s shared belief in its capabilities to organize and execute courses of action to produce given levels of attainment” (p.477). Just as with individual efficacy beliefs, collective efficacy beliefs have been demonstrated to be a primary factor in a group’s motivation to act together to accomplish a goal and is reflected in the tasks that the group chooses, the effort expended and the perseverance during setbacks ( Feltz et al., 2008). While it is noted that collective efficacy is an important construct with regards to behavior engagement, the primary focus of this review is on individual efficacy beliefs in the physical activity setting.

As demonstrated by the discussion of different types of efficacy above and the specific nature of self-efficacy, it is apparent that consideration of the differentiation between the types of efficacy beliefs is necessary. However, because of the many distinct types of efficacy that have been defined, some inconsistencies in the research regarding self-efficacy and physical activity behaviors exist as well. In addition to inconsistencies resulting from confusion over the type of efficacy being examined, related concepts are often mistakenly labeled as self-efficacy, and this further clouds the waters of research on self-efficacy.

### **Measurement of Self-efficacy**

In addition to a lack of conceptual clarity regarding the true nature of self-efficacy, Bandura (2006) also raises concern about instruments that are labeled as self-efficacy inventories. Some of these instruments are actually measures of related constructs discussed

above such as self-esteem, self-concept, or physical self-confidence. These measurement issues can also contribute the lack of cohesion in the research literature. Bandura (2006) devised a set of guidelines for constructing self-efficacy measures, advocating for the use of domain-specification and graduations of difficulty in the development of self-efficacy inventories.

**Domain-Specification and Content Relevance** Domain-specification is identified as the most important of Bandura's (2006) guidelines. He states that researchers must utilize conceptual analysis and expert knowledge of what it takes to succeed in a given task (Bandura, 1997). Measures that integrate the specific factors that affect task completion (i.e. asking runners about their efficacy to run during cold weather and then assessing whether or not they actually ran during such conditions) are stronger predictors of task performance than more global measures (Feltz et al., 2008). Moritz and colleagues (2000) found that even though Vealey's (1986) Sport Confidence Inventory (SSCI) and Martens et al.'s (1990) Competitive State Anxiety Inventory used the stem "in your sport " to assess confidence beliefs, they were less predictive of task performance than task-specific self-efficacy beliefs. Similarly, Hu, McAuley, and Elavsky (2005) examined the appropriateness of the Perceived Physical Ability Scale (PPA) as a measure of self-efficacy beliefs and concluded that it was actually a more appropriate measure of self-esteem rather than self-efficacy.

According to Bandura (1997, 2006), the development of a strong domain-specific self-efficacy scale calls for the thorough assessment of the level, strength, and generality of self-efficacy beliefs. Feltz and colleagues (2008) note that in the physical activity domain, assessment of generality of self-efficacy beliefs is not always relevant because most individuals tend to stick with one specific activity or sport. In order to develop items that assess the strength and level of efficacy beliefs, researchers must examine the skills, along with contextual factors that are



needed to succeed in the given task. This can be done through interviews, open-ended questions, and direct observation to examine the appropriate increments of challenge against which efficacy judgments are made (Feltz & Lirgg, 1998). Lee & Bobko (1994) concluded that using one-item efficacy scales reduce the predictive power of self-efficacy. By conducting a conceptual analysis of the given task and determining an appropriate number of challenge graduations, it is implied that multiple items should be utilized when examining self-efficacy in order to assess all of the relevant and key components.

Content relevance refers to Bandura's (2006) distinction of self-efficacy as a perception of what one can do in the future. As mentioned above, self-efficacy refers to one's beliefs concerning what they *can do* rather than what one *has* or *intends to do*. As a result, Bandura (2006) states that self-efficacy items should be worded accordingly. Feltz and Chase (1998) found that an examination of the Physical Self-efficacy Scale (PSES; Ryckman, Robins, Thornton, & Cantrell, 1982) revealed the instrument was more a measure of self-concept, rather than a self-efficacy scale. The items in the scale were worded with "I have" and "I am," which were more indicative of one's self-description and Feltz and Chase recommended rephrasing the items with beginnings such as "I can" if the researchers were truly interested in assessing self-efficacy beliefs.

With regard to response scales for measures of self-efficacy beliefs, scales that measure both level and strength have more predictive validity than those that measure only level because level alone is not sensitive to one's perceptions (Feltz et al., 2008). Strength has been assessed in numerous ways ranging from 1-10 or 10-100 scales to those that require the participant to mark a slash on a line representing a continuum of certainty of success in the task. Generally, most sport psychologists and those who conduct research in the physical activity domain rely on measures

of self-efficacy that assess both level and strength together or strength alone, but not level alone (Feltz & Lirgg, 2001).

Although Bandura (1997, 2006) devised guidelines regarding the definition and appropriate construction of self-efficacy scales in order to accurately measure beliefs, research has shown that several instruments labeled as measures of efficacy beliefs are actually measures of more global concepts of the self (Feltz et al., 2008; Moritz et al., 2000). Feltz and Chase (1998) suggest that cases where self-efficacy has not been shown to be a predictor of task completion are most likely the result of the way in which the self-efficacy beliefs are measured and not question of the soundness of self-efficacy theory. In order to address this issue, an attempt was made to confine a large portion of the research studies included in this review to those that follow Bandura's recommendations for definition and measurement of self-efficacy.

### **Self-efficacy and Physical Activity**

There is evidence that an individual with a higher level of self-efficacy will persist longer and be more robust and resolute in their efforts than an individual with lower levels of self-efficacy (Feltz et al., 2008). In the physical activity domain, self-efficacy has been found to be one of the strongest predictors of behaviors (Hu, Motl, McAuley, & Konopack, 2007; Rovniak et al., 2002; Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). Bandura (1997) notes that while physical skills and ability are important to the successful completion of a physical task, having the confidence to be able to apply those skills in a given situation is crucial. Self-efficacy beliefs influence individuals' efforts, affective experiences, and overall enjoyment of physical activities (Bandura, 1986; Martin & Gill, 1995). People with high levels of self-efficacy are more likely to pursue challenging goals, cope with pain, and persevere through setbacks, while those with low

self-efficacy avoid challenges and tend to give up when confronted with obstacles (Feltz et al., 2008; Llewellyn, Sanchez, Asghar, & Jones, 2008).

## **Engagement**

In examining the relationship between self-efficacy and physical activity engagement, research has been fairly consistent in demonstrating the predictive power of efficacy beliefs for physical activities. Examinations of social cognitive determinants of physical activity using a prospective design to examine the relationship between social cognitive variables and physical activity in adults have found that self-efficacy had the greatest total effect on physical activity (Rovniak et al., 2002). Similarly, self-efficacy was found to be a strong predictor of physical activity, as well as alcohol, smoking, and nutrition behavior in college students (Von Ah et al., 2004). The same trends were evident in a sample of Australian college students, indicating that self-efficacy's power as a predictor of behavior engagement was not limited by geographical region (Leslie, Owen, and Salmon, et al., 1999). These results indicate that self-efficacy is a strong predictor of physical activity adoption and maintenance, in addition to other health behaviors, and that those who maintain a high level of self-efficacy will be more likely to plan around obstacles, set goals, and persevere in incorporating physical activity into their daily lives (Feltz et al, 2008; Hu et al., 2007; Rovniak et al., 2002; Von Ah et al., 2004). Additionally, McAuley and colleagues (1992, 2005, 2006) have consistently demonstrated the relationship between self-efficacy and physical activity adoption and maintenance in older adults.

## **Enjoyment**

In addition to influencing engagement in physical activity behaviors, self-efficacy perceptions can also affect the amount of enjoyment that one derives from participation in those activities. Manipulations of participants' efficacy beliefs revealed that those assigned to the low-

efficacy group reported lower levels of enjoyment than did the high-efficacy group (Hu et al., 2007). The greatest difference between the groups was seen after the participants completed a high-intensity exercise test, indicating that self-efficacy beliefs can be especially important in higher intensity physical activities. Similar manipulations of self-efficacy beliefs in adult women also documented changes in mood states after exercise bouts (Jerome, Marquez, and McAuley, et al., 2002). Results supporting the self-efficacy-positive affect relationship have also been found in older adults participating in a 6-month exercise intervention (McAuley et al., 2005). These findings indicate that self-efficacy plays a role in enhancing the positive experiences associated with participating in physical activity, thus increasing the likelihood for adoption and maintenance of such behaviors.

## **Effort**

Self-efficacy beliefs also influence the amount of effort that one will put forth when engaging in physical activity behaviors. Measures of physical activity effort such as perceived exertion ratings, self-report intensity logs, heart rate, VO<sub>2</sub> max, and time to reach 70% heart rate have all been associated with self-efficacy perceptions (McAuley & Mihalko, 1998). A relationship between self-efficacy and effort was found in a sample of urban high school students, with those rating higher in self-efficacy also putting forth more effort in their physical activities (Wright, Ding, & Li, 2005). Additionally, Hutchinson and colleagues (2007, 2008) manipulated efficacy beliefs in participants and found that those who received efficacy-enhancing information persisted longer in the tasks assigned to them and also reported more positive affective experiences, further supporting the efficacy-effort and efficacy-affect relationships. Effort is thought to be a key component of performance in the physical activity domain and research has found a consistent, positive relationship between efficacy beliefs and

performance, particularly in the area of persistence and performance in endurance activities (Feltz & Riessinger, 1990; Feltz & Lirgg, 2001; Moritz, et al., 2000).

As demonstrated by the studies discussed, self-efficacy has been found to be one of the strongest predictors of physical activity behaviors (Hu et al., 2007; Rovniak et al., 2002; Von Ah et al., 2004). Research has consistently illustrated the predictive power of efficacy beliefs for physical activity engagement, enjoyment and effort. This relationship is robust across diverse populations. Several studies have documented the influence of efficacy on physical activity behaviors in special populations such as older adults, patients in cardiac rehabilitation programs, type 2 diabetes patients, brain and neck cancer patients, and those with brain injuries (Driver, 2006; Dutton, Tan, Provost, & Sorenson, 2009; Millen & Bray, 2008; Rogers, Courneya, and Robbins, et al., 2008).

### **Sources of Self-efficacy**

One of the major appealing factors of self-efficacy related to behavior change is that it is such a strong predictor of behavior, yet it is a construct that is malleable. Therefore, it is important to examine the sources that influence efficacy beliefs. According to Bandura (1997), self-efficacy perceptions are the product of a complex process consisting of selection, interpretation, and integration of four main sources of efficacy information: past performance accomplishments, verbal persuasion, vicarious experience/modeling, physical/emotional states. He states that the information gained from the four sources is not particularly enlightening, but becomes relevant and influential through cognitive processing and thoughtful reflection. Other researchers have added separate categories for emotional states and imaginal experiences as sources of efficacy information, but for the purposes of this paper, I limit my investigation of sources to the four proposed by Bandura.

## **Past Performance Accomplishments**

Past performances have been demonstrated to be the most powerful source of efficacy information because they are based upon one's own mastery experiences (Bandura, 1997). Reflecting upon past successes (or failures) allows individuals to self-appraise their performances and subsequently form efficacy judgments for the future. In general, if one consistently perceives the past experiences as successes, then self-efficacy beliefs will increase, while if the past experiences are viewed as failures, self-efficacy beliefs will decrease, (Feltz et al., 2008).

Bandura (1997) stated that the value people give to new experiences and how they integrate them into memory is partly influenced by the nature and strength of the previous efficacy beliefs with which they must be integrated. Experiences that go against previously held efficacy beliefs tend to be discounted or overlooked in the memory's reconstruction of the experience, while those that are congruent with previous efficacy beliefs are readily noticed and remembered. The power of previous efficacy beliefs to weaken the influence of incongruent, new efficacy information has been illustrated in studies in which individuals continue to adhere to the previously created efficacy beliefs, even after the basis for those beliefs has been removed (Cervone & Palmer, 1990; Ross, Lepper, & Hubbard, 1975). More recently, Chase (2001) found similar results in a study that examined self-efficacy beliefs in children prior to and following completion of a task. She concluded that children with high levels of self-efficacy remained optimistic about their potential for success in a future physical activity task even after placed in a "failure situation" that was hypothesized to lower efficacy beliefs (Chase, 2001).

Current research on past experiences and self-efficacy continues to demonstrate the relationship between past performances and self-efficacy beliefs. Netz and Raviv (2004)

examined adults in Australia and found that current physical activity participation level was a positive correlate of self-efficacy for future physical activity. In studies focusing on older adults and physical activity behaviors, previous exercise behavior was found to be a strong predictor of self-efficacy and subsequent future physical activity behavior through both cross-sectional and longitudinal research designs (McAuley, 1992, McAuley, Jerome, & Marquez, et al., 2003, McAuley, Jerome, Elavsky, et al., 2003, McAuley, Morris, Doerkson, et al., 2007). Research focusing specifically on older women has yielded similar results (McAuley, Konopack, & Motl, et al., 2006, McAuley, Morris, & Motl, et al., 2007; O'Brien-Cousins, 1997, 2002, 2003).

Research on physical activity interventions with middle-aged adults has also demonstrated that performance experiences exercise influence on self-efficacy beliefs for future activity participation (Dawson & Brawley, 2000; Miller, Olgetree, & Welshimer, 2002). The researchers found that as the program progressed, participants' ratings of self-efficacy increased, potentially as a result of accumulating positive experiences with physical activity. An examination of young peoples' physical activity intentions also demonstrated that past experiences influenced self-efficacy which, in turn, influenced future physical activity intentions (Hagger, Chatzisarantis, & Biddle, 2001). These results have also been found in breast cancer survivors, those diagnosed with borderline hypertension, and multiple sclerosis patients, (Lee & Laffery, 2006; Plow, Mathiowetz, & Resnik, 2008; Rogers, McAuley, Courneya, & Verhulst, 2008).

Similar results highlighting the relationship between past performances and self-efficacy have been demonstrated in athletes as well (Chase, Feltz, & Lirgg, 2003; Chase, Magyar, & Drake, 2005; Gernigon & Delloye, 2003). Chase and colleagues (2003, 2005) examined sources of self-efficacy in gymnasts and basketball players and found that past performances were the

most salient sources of both self- and collective efficacy information. While there is very little empirical evidence to support the relationship between difficulty of past performances and self-efficacy beliefs; one older study conducted by Slobounov, Yukelson, and O'Brien, (1997) found that self-efficacy ratings changed as a function of previous dive difficulty, indicating that efficacy beliefs were raised after completing a difficult task.

**Perceptions of Success and Failure** Bandura (1997) stated that the pattern of successes and failures affect self-efficacy beliefs in such a way that performance successes generally raise self-efficacy beliefs and repeated performance failures tend to lower efficacy beliefs, especially if the failures occur before efficacy beliefs are established and do not reflect lack of effort or adverse external circumstances. In one of the few experimental studies in which efficacy beliefs concerning a past performance were manipulated, Escarti and Guzman (1999) influenced individuals' perceptions regarding the success or failure on a past performance and concluded that those who perceived their performance as a success had higher self-efficacy scores, performed the next task better and chose more difficult tasks than those who were influenced to believe their past performance was a failure. Manipulation of perceptions of success and failure on past performances and its relationship to self-efficacy beliefs was also explored by Gernigon and Delloye (2003), whom illustrated that appraisals of past performances as successes and failures resulted in increases and decreases in the self-efficacy beliefs of track athletes, respectively. For individuals or athletes in the learning or training process, failure can be devastating to efficacy beliefs and possibly lead to feelings and behaviors of learned helplessness in challenge situations (Gernigon, Fleurance, & Reine, 2000; Lane, Jones, & Stevens, 2002).

**Contextual Factors** Regardless of the task that is being attempted, Bandura (1997) stated that a host of contextual factors exist that can potentially hinder or facilitate successful



completion of the task and its influence on later efficacy beliefs. These factors can include situational barriers, assistance from others, types and amount of resources available, and the circumstances under which an activity is performed. Successes achieved with external help hold little influence on efficacy beliefs because they are likely to be attributed to the assistance rather than the individual's capabilities. Similarly, unsuccessful performances in undesirable circumstances have much weaker efficacy influence than those performed under optimal conditions. In general, the more non-ability related (i.e. contextual) factors that influence a task's outcome, the weaker the experience is in providing efficacy information (Bandura, 1997). While these statements make logical sense, there is no empirical evidence to support these claims made by Bandura. Therefore a need to validate these statements with future research exists.

### **Verbal Persuasion**

While the influence of past performances on self-efficacy relies on information from the past and is not easily modified, verbal persuasion is a means of increasing efficacy that utilizes information from the present and is much easier to manipulate. Verbal persuasion can come in the form of feedback and speeches given by coaches or others, expectations of others, or even self-talk. Confidence in one's abilities can be influenced by the encouragement, or discouragement, of other people, especially those whose opinions are greatly respected (i.e. peers, significant others, superiors). Although verbal persuasion alone has a limited influence, it can help encourage individuals to persevere in their efforts if the feedback given is within realistic standards (Bandura, 1997). The framing of the performance feedback, the expertise and credibility of the provider, and the degree of disparity between what is said and the individual's own beliefs regarding their capability are all factors that Bandura noted as influential in the process of verbal persuasion.

**Feedback** Compared to the other sources of efficacy, there has been less recent research centered on the relationship between verbal persuasion and self-efficacy. The most popular line of research on verbal persuasion as an influence on efficacy beliefs has been focused on the use of feedback. Bandura (1997) stated that the feedback given to an individual can either undermine or enhance self-efficacy and research has largely supported this claim. The most common type of methodology used to test the feedback-efficacy relationship has employed bogus feedback, which was a popular approach in the seventies and eighties (Feltz et al., 2008).

The early studies were more concerned with the feedback-performance relationship and began with Ness and Patton (1979) using weight-lifting tasks. Naturally, they found that positive feedback enhanced performance and later studies expanded to include the feedback-efficacy relationship; however, the results were somewhat inconsistent. Fitzsimmons and colleagues (1991) reported positive feedback enhanced self-efficacy and subsequent performance, while Wells, Collins, and Hale (1993) found that although participants lifted more weight after false positive feedback, their self-efficacy beliefs actually decreased. Similar results were reported by Yan Lan and Gill (1984) and Wilkes and Summers (1984).

These results indicated that the relationship between feedback and efficacy was not always consistent; however the differences may have been accounted for by the variations in the degree of persuasive influence of the feedback provider, the believability of the feedback information, and methodological issues (Feltz, 1994). Bandura (1997) stated that the altering self efficacy through bogus feedback is effective for testing the theoretical relationship between verbal persuasion and self-efficacy, but suggests using other methods that are more relevant in the field to increase efficacy rather than relying on false beliefs.

More recently, research utilizing feedback as a means of enhancing self-efficacy has been more consistent and methodologically sound. Woodgate and Brawley (2008) conducted a randomized control trial to test the effectiveness of an efficacy enhancing feedback to increase cardiac rehabilitation patients' sense of self-efficacy for completing a program of independent exercise. They found that those who received the efficacy-enhancing feedback reported stronger self-efficacy scores and intentions to exercise on post-tests than the control group. In a weight-lifting task similar to Ness and Patton's (1979) study, Wise, Posner, and Walker (2004) found that knowledge of the feedback provider's expertise in the given skill was an important factor in the influence on feedback to increase self-efficacy. Bindarwish and Tenenbaum (2006) also found that positive and negative feedback increased and decreased self-efficacy beliefs in a dart throwing task.

The form of the feedback (printed versus spoken) has also been explored as a factor in verbal persuasion's influence on self-efficacy. Bock, Marcus, Pinto, and Forsyth (2001) examined the effectiveness of different types of feedback on exercise maintenance and concluded that spoken feedback was more effective at increasing participants' self-efficacy for physical activity maintenance than written feedback. In a similar study, Akiyama and colleagues (2007) reported that individually tailored verbal feedback was more effective for increasing self-efficacy for walking than watching a video with general feedback. Annesi and Unruh (2007a) also reported that feedback through interpersonal counseling sessions helped participants in the 'Coach Approach' physical activity program maintain their activity habits over time, further emphasizing the importance of individualized feedback. A study by Opdenacker & Boen (2008) reported no differences in self-efficacy changes for participants who received face-to-face feedback compared to those who received phone-based feedback, leading researchers to

conclude that both methods of delivery were equally effective in raising self-efficacy beliefs for physical activity and that the importance lies in individual tailoring of the feedback. The results of these studies indicate that verbal feedback is superior to written feedback; however the delivery of the verbal feedback does not seem to matter as long as the content is tailored to the individual.

**Pre-game Speeches** In the sport setting, coaches have ranked verbal persuasion through pre-game speeches as the one of the most effective methods for raising the efficacy beliefs of their athletes. The majority of recent research in this area has been done by Vargus-Tonsing and various colleagues and has been fairly consistent in demonstrating that pre-game speeches from coaches significantly increased players' self-efficacy beliefs about the upcoming competition (Vargus-Tonsing, 2009; Vargus-Tonsing & Bartholomew, 2006; Vargus-Tonsing & Guan, 2007; Vargus-Tonsing, Myers, & Feltz, 2004).

**Social Support** from others is another form of verbal persuasion that has been found to increase efficacy beliefs. In a correlational study examining physical activity behaviors in adults with intellectual disabilities, Peterson et al. (2008) found that encouragement from peers, family, and hospital staff influenced participants' self-efficacy for physical activity, and subsequent activity levels. In similar studies with adolescent girls, social support from peers was related to increased self-efficacy for overcoming barriers for physical activity and smaller declines in physical activity during adolescence (Beets, Pitettie, & Forlaw, 2007; Dishman, Saunders, Motl, Dowda, & Pate, 2009). Similar results have been found in an after-school program focused on enhancing self-efficacy for lifetime physical activity through the use of social support (Lubans & Sylva, 2007).

**Goal Setting** Assigning of goals can also be viewed as a form of verbal persuasion because the person assigning the goal is essentially engaging in a form of feedback in which the goals they assign reflect beliefs about the individual's abilities (Feltz et al, 2008). Bandura (1997) points out that self-made goals are the result of self-efficacy beliefs, but he argues that goals assigned by others could be a source of efficacy information because they communicate information to the individual about the goal assigner's perceptions of their capabilities. Elston and Ginis (2004) explored this relationship when they conducted a randomized control trial to compare the efficacy beliefs for a hand grip task between a group of participants with self-selected goals and a group with goals assigned by others. As expected, those who received goals from others reported higher feelings of efficacy to successfully complete the task.

**Societal Level Persuasion** In addition to the persuasion from coaches and other important peers who are close to the individual, societal-level persuasion can also have an influence on self-efficacy beliefs, particularly in negatively stereotyped groups (Milner & Hoy, 2003). Framing a physical activity (e.g., strength training) within a negative stereotype (e.g., "girls are not strong") can affect the performance of members of the negatively stereotyped group by hindering self-efficacy judgments because they experience conflicting efficacy perceptions as a result of "stereotype threat" (Beilock, Jellison, Rydell, McConnell, & Carr, 2006; Beilock & McConnell, 2004; Stone, Lynch, Sjomeling, & Darley, 1999). Because the "stereotype threat" is most visible in areas in which performance is valued by the individual, this conflict of efficacy perceptions may be especially prominent in high-level athletes or those with a long history in their particular physical activity (Wheeler & Petty, 2001). While this area holds potential for deeper understanding of the influence of society on self-efficacy beliefs in

stereotyped groups, limited research has been conducted in the sport and exercise field, thus creating an area for future research.

**Self-Talk** Verbal persuasion from within the individual in the form of self-talk can also enhance/undermine efficacy beliefs. Self-talk can be especially useful because it can serve many functions in addition to increasing efficacy beliefs (Hardy, Gammage, & Hall, 2001). It has been a major focus in sport and exercise psychology research, but most of the studies focus on the relationship between self-talk and performance, while few examine the relationship between self-talk and self-efficacy (Feltz et al., 2008). In 2005, Hardy, Hall, Gibbs, and Greenslade demonstrated that self-talk was positively related to self-efficacy in a sit-up task. More recently, Hatzigeorgiadis and colleagues (2008) tested this relationship in an experimental design with young tennis players. They found that those players who underwent a motivational self-talk intervention reported greater feelings of self-efficacy and subsequent performance than the control group.

### **Vicarious Experience/Modeling**

In addition to increasing self-efficacy through past experience appraisals and verbal persuasion, vicarious learning is another avenue through which efficacy information is derived. Learning through vicarious experience, or modeling, is the process through which people learn by watching someone else successfully perform the desired task. By watching someone like themselves experience a positive outcome in a desired behavior, people's confidence in their own chances for success are enhanced, thus leading to higher self-efficacy beliefs (Lirgg & Feltz, 1991).

Efficacy information can be obtained through vicarious experience in a number of avenues. The first is through instructional information about how to correctly complete the task,

which can be obtained through repeated demonstrations by a proficient model. Modeling of coping strategies and successful progress toward a goal can also influence efficacy beliefs by communicating to the individual that a challenging task is attainable (Feltz et al, 2008). Social comparison with others is another source of efficacy information for individuals, especially in the sport competition setting where appraisals of opponents' physiques can provide information concerning the likelihood of beating them (Weinberg, Gould, & Jackson, 1979). Feltz and colleagues (2008) also comment on the influence of visual media as a potential source of efficacy information, particularly in the case of girls and women who are now seeing more female athletes competing on television, thus raising beliefs about their own athletic potential.

While vicarious experiences have not been found to be as influential as past performances on efficacy beliefs, McCullagh and Weiss (2001, 2002) conclude that observational learning is a key source of efficacy information and can have a profound impact on psychological variables related to self-perceptions. Literature examining the relationship between vicarious experiences and self-efficacy has examined the model characteristics that are most important to influencing efficacy beliefs, compared the effectiveness of different types of modeling on self-efficacy, and compared modeling with other interventions aimed at enhancing efficacy beliefs. However, most of the research in these areas is dated from more than ten years ago. A major limitation in this area is the limited amount of current literature examining the role of vicarious experiences on self-efficacy perceptions in the physical activity domain. In addition, the outcomes of the research studies are largely inconsistent.

**Model Characteristics** With regard to the characteristics of the model, the variables commonly examined include model status, competence, and similarity (Feltz et al., 2008). Bandura (1986) asserts that the closer the similarity between the model and the individual, the

greater influence the model has on the individual's perception; however research has demonstrated that this is not always so. Similar to verbal persuasion, this line of research dates back to the seventies and primarily focused on performance as the outcome of interest. It began with Landers and Landers (1973) published study on the effect of model similarity and model competence on children's performance on a balance task. They concluded that when learning a new task, model competence was more important than model similarity to performance.

However, Gould and Weiss (1981) concluded that contexts in which individuals are uncertain about their capabilities in a task, such as with a novel task, similarity was found to be a more important source of efficacy information (Gould & Weiss, 1981). In 1991, Lirgg and Feltz also concluded that model competence was a stronger influence on efficacy beliefs than model similarity.

Beliefs about gender appropriateness have also been shown to influence confidence ratings on a physical activity task after viewing a model demonstration, with females more likely to express low confidence when they feel the task is masculine than when they feel the task is gender-neutral (Solmon, Lee, Belcher, Harrison, & Wells, 2003). More recently, Weeks and colleagues (2005) found that there was a model gender effect on efficacy beliefs in older adult women, but not men, and that age of the model had no effect on self-efficacy beliefs to perform a series of exercises for men nor women. These inconsistent results indicate that there are differences in the importance placed on specific model characteristics across demographic and task variables, but more research is needed to better understand these relationships.

**Model Type** The type of model used also has an effect on the influence of efficacy beliefs for physical activity. Coping models are similar to learning models in that they do not repeatedly show successful behavior as in the case of mastery models, but instead progress



through challenges and adversities within the task and gradually show positive improvements (McCullagh & Weiss, 2001). Coping models have been shown to be superior to mastery models in enhancing self-efficacy for swimming and reducing fear of water in children in addition to learning of new motor skills (Kitsantas, Zimmerman, & Cleary, 2000; Weiss, McCullagh, Smith, & Berlant, 1998). In cardiac surgery patients, peer coping models consisting of former patients have been effective in enhancing current patients' feelings of self-efficacy towards undergoing surgery and participating in physical activities during rehabilitation (Parent & Fortin, 2000).

Self-modeling, or watching a videotape of oneself performing the desired task, is another type of modeling used to increase efficacy beliefs in individuals; while participant modeling is a form of modeling in which a model demonstrates the desired task, and then has the individual perform the desired task with the model physically assisting them through the movements so that the individual can get a kinesthetic sense of what the movement should feel like. Early research comparing the different forms of modeling began with Feltz and colleagues' (1979) study in which they compared the effects of participant modeling, self-modeling on videotape, and traditional (live) modeling on self-efficacy for a dive task. The researchers found that participant modeling produced a higher increase in self-efficacy, when compared to self and traditional modeling, and that self and traditional modeling were not significantly different from each other. Similar results have been found in research involving gymnastics tasks (McAuley, 1985). When compared with a control group that received no intervention, researchers reported that self-modeling lead to higher levels of self-efficacy; however when compared with peer modeling, researchers found that self-modeling did not increase self-efficacy any more or less, indicating that the two types of modeling yielded similar results (Singleton & Feltz, 1999; Stareck & McCullagh, 1999).

**Comparisons to other Interventions** In addition to comparing types of modeling to each other, research comparing modeling to other interventions aimed at increasing self-efficacy has been inconsistent as well. Soohoo, Takemoto, and McCullagh (2004) compared the effects of a modeling intervention for increasing self-efficacy and performance in a weight lifting task to that of an imagery intervention and found that while the modeling intervention produced better performance, the increases in self-efficacy were the same for both conditions. In a more recent study, Zetou and colleagues (2008) compared self-modeling to traditional verbal feedback for enhancing self-efficacy and performance in beach volleyball players. They found that the self-modeling group increased their self-efficacy beliefs and performance more than the traditional feedback group.

### **Physiological and/or Emotional States**

As mentioned previously, self-efficacy can be viewed as both a determinant and an outcome and this seems especially true in the case of physiological/emotional states and self-efficacy (McAuley, Pena, & Jerome, 2001). Athletes cognitively interpret their physiological states in order to form efficacy judgments about whether or not they can be successful in a given task; however, previously held efficacy beliefs can also influence how one interprets physiological information (Feltz et al., 2008). Physiological information can include such constructs as strength, fitness, fatigue, or pain and can be measured by body composition, aerobic capacity, heart rate, and perceived exertion levels. “Physiological information has been shown to be a more important source of efficacy information in the case of physical activity tasks than in nonphysical tasks,” (Feltz et al., 2008, p.12).

**Physiological States as Predictors of Self-efficacy Beliefs** Although physiological states are established as a source of efficacy information, few empirical studies have examined

physiological states as a predictor of self-efficacy beliefs and most of the studies focus on the relationship between self-efficacy and its influence on interpretations of physiological symptoms. Early studies provide support for the notion that efficacy beliefs are an outcome of perceptions of physiological/emotional states; however few researchers have continued to explore the relationship in more recent years.

Feltz and Mugno (1983) concluded that perceived arousal was a stronger predictor of self-efficacy than actual arousal as measured by heart rate on a dive task. An additional study which examined a dive task concluded that physiological arousal perceptions were a more influential source of efficacy information than past performances (Feltz & Albrecht, 1986). The researchers found that the divers relied more on how they felt at the time of the dive rather than drawing from successes or failures of past performance experiences to make their efficacy judgments. Furthermore, negative physiological and emotional states have been illustrated to be negatively correlated with efficacy beliefs, meaning that higher levels of negative emotions and physiological states are related to lowered levels of self-efficacy (Hauck, Carpenter, & Frank, 2008; Rudolph & Butki, 1998; Treasure & Newberry, 1998). Research examining the effects of correcting negative perceptions of physiological states or offering alternative explanations as a means of increasing self-efficacy has shown promise, particularly in those inexperienced in exercise or older populations (Johnson, 1996; Resnick, 2002; Van der Laar & Van der Bijl, 2001). In the sport domain, perceptions of physiological states have been combined with goal setting to increase efficacy beliefs in athletes (Galloway, 2003).

**Affective/Emotional States as Predictors of Self-efficacy Beliefs** While the research on physiological states and self-efficacy beliefs is somewhat limited, research that examines the relationship between affective states and self-efficacy is a bit more abundant. Kavanagh and

Bower (1985) were among the first to explore the relationship between emotional states and self-efficacy beliefs, providing empirical evidence that efficacy beliefs were raised by positive emotional states and lowered by negative emotional states. Later, this relationship was demonstrated in competitive rifle shooters and wrestlers using the Profile of Mood States (POMS; McNair, Lorr, Droppleman, 1971) and Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) to assess emotional states before competition (Prapavessis & Grove, 1994; Treasure, Monson, & Lox 1996). More recently, similar results have also been found across other physical activity tasks, such as basketball shooting and wheelchair road racing, and also using different measures of emotion/affect (Mack & Stephens, 2000; Martin, 2002).

**Self-efficacy beliefs as Predictors of Physiological States** While the focus of this section is to explore the research on efficacy as an outcome resulting from perceptions of physiological and emotional states, it is important to discuss the findings related to the effects of efficacy perceptions on interpretations of physiological and emotional states because of the reciprocal nature of the relationship. As mentioned above, the majority of the research in this area has focused on this relationship. Early research demonstrated exercise efficacy beliefs were related to lowered perceptions of effort and physical strain during exercise, in addition to a more positive affective experience during the task (McAuley & Courneya, 1992; Rudolph & McAuley, 1996). In recent years, efficacy has been shown to be related to perceptions of pain and exercise intensity (Hu et al., 2007; Motl et al., 2006). While the above studies discuss *subjective* measures of physiological states (i.e. individuals' perceptions), research using *objective* measures of physiological states has demonstrated individuals higher in self-efficacy display fewer signs of

physiological arousal (measured by heart rate, skin temperature, and pulse pressure) when completing a motor task (Sanz & Villamarin, 2001).

**Self-efficacy beliefs as Predictors of Emotional States** According to Bandura, self-efficacy plays a “pivotal role in the regulation of affective states,” (1997, p.137). Schachter’s (1964) two-factor theory of emotion states that different emotions can have the same physiological state, thus the nature and intensity of the emotional experience is based on how the individual interprets the physiological symptoms presented by their body. Early research found that those who possessed higher self-efficacy beliefs were more likely to have more optimistic patterns of thinking and positive interpretations of their emotional states than those who were lower in self-efficacy beliefs (Bandura, 1997; Kavussanu & McAuley, 1995). High efficacy beliefs have been shown to be a predictor of positive emotional states during exercise in fit young adults (Tate, Petruzzello, & Lox, 1995), sedentary college students (Treasure & Newberry, 1998), and in older adults (Katula, Blissmer, & McAuley, 1999; McAuley, Blissmer, Katula, & Duncan, 2000). More recently, these relationships have continued to emerge in other studies (Bindarwish & Tenenbaum, 2006; Kwan & Bryan, 2009; White, Kendrick, & Yardley, 2009).

### **Factors that Enhance/Restrain Sources of SE Info**

The processing of efficacy information involves two functions, delineated Bandura (1997) as separable cognitive processes. The first process centers on the types of efficacy information to which individuals choose to attend. Each of the sources of efficacy information provides distinct information regarding competence in a given task, thus the source(s) selected by the individual provides unique information upon which to base the self-appraisal. The second cognitive process pertains to the rules or heuristics that individuals utilize in order to weight and

integrate the sources of efficacy information when forming their own beliefs. While it has been established that past performances are typically the most salient source of efficacy information, Bandura (1997) asserts that there are some contexts in which the sources of efficacy information vary in the strength of their influence on beliefs; little research, however, has been conducted in this vein, so the nature of these contexts is not defined clearly. An overview of the existing literature reveals three categories or themes: developmental issues, socio-demographic issues, and task characteristics.

### **Developmental Issues**

Self-efficacy theory is not considered to be developmental theory in which changes in efficacy beliefs or sources of those beliefs are predicted as a function of chronological age; however the limited research in this area has revealed that age may be an important influence on efficacy beliefs and the sources from which they are derived (Chase, 1998). In qualitative investigations of children's efficacy beliefs for physical activity tasks, age differences do exist with regard to sources of efficacy information that are used to form efficacy beliefs in children ages 8-14. The influence of praise and encouragement from others (verbal persuasion) gained in strength as the children's age increased and even surpassed the influence of past performance on efficacy beliefs in the oldest children (Chase, 1998). Interestingly, Chase reports that support for physiological states as a source of efficacy was not found and, she attributed this to the notion that children are not as aware of their bodies as adults; however more research is needed before conclusions about the validity of physiological states as a source of efficacy information in children can be drawn.

Research involving older adults has generally found that past performances are the most salient source of efficacy information for participating in physical activities; however some

studies have supported the notion that the other three sources are most important to efficacy beliefs and subsequent activity participation (Lee, Arthur, & Avis, 2008; McAuley, Jerome, & Marquez, et al., 2003; O'Brien-Cousins & Tan, 2002). Longitudinal studies have shown that social support (verbal persuasion) and positive feelings associated with exercise (affective states) were significant predictors of exercise self-efficacy in older adults (Lee, Avis, & Arthur, 2007; McAuley, Jerome, & Elavsky, et al., 2003). Cross-sectional studies have yielded similar findings in older adults' efficacy to begin and maintain a walking program, with social support from others (verbal persuasion) and comparisons with peers' successful experiences in walking (vicarious learning) as the most significant sources of efficacy information (Lee, et al., 2007; O'Brien-Cousins & Tan, 2002).

Although the results from these studies provide some insight into the most salient sources of efficacy for people of different ages, they only include investigations of two subpopulations: children and older adults. In order to more clearly understand how the sources of efficacy vary across different age groups, longitudinal studies that track efficacy sources over a long period of time and across multiple age groups are needed.

### **Socio-demographic Issues**

Socio-demographic variables can also influence which sources an individual chooses to draw upon when forming efficacy beliefs. Considerations of characteristics of populations that have diverse socioeconomic and demographic make-ups are important when structuring interventions that are appropriate for the population. Current research in this area seems to focus on gender and race/ethnicity as the dominant variables.

**Gender** With regard to gender differences, Bengoechea, Spence, and McGannon (2005) found that “seeing other people be active in their neighborhood” (i.e. vicarious learning) was

most associated with higher levels of self-efficacy and leisure-time physical activity in women, while men's self-efficacy and physical activity were highly associated with easy access to facilities in their sample of Canadian adults. The importance of vicarious learning for women's self-efficacy and physical activity has been reported in other studies as well (Dye & Wilcox, 2006; Eyler, Mastson-Koffman, & Young, et al., 2003; Grzywacz & Marks, 2001). In examinations of specific types of vicarious learning, as mentioned in previous sections, Weeks and colleagues (2005) reported that model similarity was more important for increasing efficacy beliefs in older women than it was for men.

Gender differences have also been examined with regard to verbal persuasion and self-efficacy beliefs. Chase (1995) reported that, in children, verbal persuasion was more important for girls than it was for boys. Research specifically on women has also found support for goal setting as a means of increasing efficacy in a sample of adolescent girls (Dishman, Saunders, Felton, Ward, Dowda, & Pate, 2006).

**Race/ Ethnicity** Examinations of self-efficacy for physical activity in racially diverse populations have found that social support is cited as the most important source for increasing efficacy beliefs, especially in African American and Latino populations (Anderson, Wojcik, Winett, & Williams, 2006; Marquez & McAuley, 2006). Comparisons of African American and Caucasian populations have revealed that black girls cited family member participation in physical activity (vicarious learning) and social support from those family members (verbal persuasion) as more important for increasing self-efficacy and physical activity levels than did Caucasian girls; although Caucasian girls reported higher efficacy levels (Felton et al., 2002). Differences in the type of feedback provided to African American and Caucasian women to increase self-efficacy beliefs about physical activity have also been reported. A focus on



proximal goal attainment over outcome goal attainment seems to be more appropriate for Caucasian women while a focus on how self-management skills were appropriately used to complete exercise were more applicable for African American women (Annesi & Unruh, 2007b).

While this line of research shows promise, further study is needed to better understand how gender and race/ethnicity influence the sources of efficacy information used by individuals when forming their efficacy beliefs. Further exploration is needed to gain insight into the factors surrounding how variables might influence the salience of those sources. These factors might encompass constructs such as cultural variables surrounding racial minority groups or societal influences on gender roles. Conclusions drawn from this line of research can be especially beneficial to practitioners working with ethnically diverse populations by identifying strategies that can be used to structure interventions aimed at increasing self-efficacy to meet the needs of the specific target population.

### **Task Characteristics**

Bandura (1997) postulated that the characteristics of the given task in which the individual is trying to be successful can also affect the sources of efficacy information one chooses to draw from when forming their beliefs. While this seems logical, there is little, if any, literature that empirically tests this relationship. Some semi-relevant literature has examined the effects of mirrored environments on self-efficacy for completing a physical activity task, the order of presentation of efficacy sources, and the effects of a gender-typed task on the self-confidence levels of males and females; however the study results were largely inconclusive with regard to self-efficacy as an outcome variable (Clifton & Gill, 1994; Lamarche, Gammage, & Strong, 2009; Wise & Trunnell, 2001). Specific to vicarious experiences, Bandura (1997) argues that, in some cases, the influence of an incompetent model can override direct experiences for an

individual. He asserts that the information conveyed by the model may alter perceptions about the likelihood of failure, which can foster behavior that confirms the outcome demonstrated by the model, even if the individual has been successful in a similar task. However, as stated previously, this has not been tested empirically.

Overall, the conceptual basis for these statements by Bandura seems logical, but empirical research is needed to validate his claims. As with the developmental and socio-demographic variables mentioned above, this line of research holds much potential, but very few researchers have chosen to undertake the task of confirming the statements of Bandura. This is discussed in the next section, which addresses weaknesses in the literature and avenues for future research.

### **Directions for Future Research**

The relationship between self-efficacy and physical activity engagement, effort, and enjoyment is clearly established in the literature. Studies documenting this relationship are plentiful and robust, but the way that sources of information influence self-efficacy beliefs has not been studied extensively. In addition, the majority of research that does exist is quantitative, correlational, and a large amount of the studies reviewed utilized Caucasian populations. As a result, the conclusions from these studies are somewhat limited by their research designs as well as their generalizability across populations. Based on the literature reviewed thus far, there are several directions or lines of inquiry that researchers can pursue that would extend the knowledge-base relevant to self-efficacy in physical activities in sport. The literature to date has provided support for the four sources of efficacy information; however we are only beginning to examine how they interact to influence those beliefs. Researchers interested in making

significant contributions to the knowledge of self-efficacy should focus on these sources and how they affect self-efficacy perceptions.

### **Sources of Self-efficacy Information**

With regards to past performances, numerous studies have documented the correlational relationship between past experiences and self-efficacy beliefs; however, there are few studies that explore the *specific* factors that Bandura (1997) mentioned in his book that can affect the influence of past performance. Methodologically, the research that does exist is sound, but more experimental research needs to be conducted in order to move beyond the fact that past performances do influence efficacy beliefs to understand *how* they influence those efficacy beliefs.

Fewer studies have examined the relationship between verbal persuasion and self-efficacy beliefs than the other sources; however, the research that has focused on this area is largely experimental in design and as a result, the findings support causal relationships, such as the one between feedback and efficacy beliefs. While there are many studies in the physical activity domain that have examined the effects of manipulated feedback on efficacy beliefs, the effect of societal-level persuasion on the efficacy beliefs of stereotyped populations for physical activity tasks has not been fully explored. The majority of research in this area has been conducted in academic settings and extending this line of inquiry into the physical activity domain has potential to yield information that can guide intervention efforts.

The literature examining the relationship between vicarious experience and self-efficacy beliefs is largely dated and inconsistent in its conclusions; however, the research in this area has been largely experimental in nature, which is a strength. Despite this advantage, only general conclusions can be drawn about the nature of the relationship between vicarious experiences and

self-efficacy beliefs in physical activity. Further study is needed to clarify the inconsistencies concerning the effects different types of models have and to further explore the effect of individual and task characteristics on the effectiveness of modeling on efficacy beliefs (Law & Hall, 2009).

Research that explores the relationship between physiological states and self-efficacy largely focuses on the perspective of self-efficacy as a *predictor* for interpretations of physiological and emotional states. As a result, there are few studies that focus on self-efficacy as the *outcome* in the relationship with physiological states and this is a weakness in the literature. The extant research is consistent in supporting the conclusion that positive interpretations of physiological and/or emotional states are related to increased self-efficacy beliefs; however much more research is needed along this line to fully explore physiological and/or emotional states as a source of self-efficacy.

Overall, the main void in the literature is the lack of research that explores the specific factors that enable the sources of efficacy information to exercise their influence on beliefs. It has been well established that these four sources exist; however there is still much work to be done to fully understand *how* they work to shape perceptions of one's capabilities and how they can be manipulated to increase their power. The absence of literature examining these specific factors may be due, in part, to the feasibility of exploring the specific factors within each of the sources. For example, manipulating feedback to explore the influence of verbal persuasion on efficacy beliefs can be relatively easy, but manipulating an individual's perceptions of a past performance or a physiological state may be more difficult to control and measure.

## **Methodology and Design**

As mentioned above, many of the studies examining self-efficacy are correlational in nature, thus the first focus should be to explore these relationships using an experimental design. Manipulation of the sources could provide more insight as to how the sources actually influence efficacy beliefs. In addition, this could provide practitioners and coaches with valuable information with which to structure the exercise/sport environment to promote enhanced efficacy. From a research design perspective, an experimental design could establish causal relationships between the source and changes in efficacy beliefs, thus leading to a better understanding of how the source influences efficacy beliefs.

A second focus for future research involves investigating the relationships from a qualitative perspective. Given the nature of the relationship between the sources of efficacy information and self-efficacy, a logical next step is to explore the relationship from a qualitative perspective, as sometimes a survey instrument might not be able to ask the questions necessary to obtain the desired information. Chase and colleagues (1995, 1998, 2003) used qualitative methodology successfully in studies on the sources of self-efficacy for children and college-aged individuals in physical activity and sport settings. This type of research can also be especially helpful in studies where researchers are interested in exploring how individuals combine information from the different sources together to make judgments concerning efficacy beliefs, as well as explorations into the processes of integrating the new efficacy information with previous knowledge about one's capabilities, both of which are needed.

An additional direction for future research, not mentioned in previous work, is the need for longitudinal studies on self-efficacy beliefs. Virtually all of the research that exists on self-efficacy in physical activity is cross-sectional in nature, meaning that it measures self-efficacy

beliefs at one time point, or possibly two if the study was experimental. It is apparent efficacy beliefs can change over time, but research is needed to explore what causes those fluctuations (Feltz et al, 2008). Furthermore, research is needed to investigate whether there are also fluctuations in the sources of self-efficacy and whether their influential strength changes as a function of time.

### **Measurement of Self-efficacy**

Bandura (2006) expresses concern about instruments labeled as self-efficacy inventories, when, in fact, some instruments are actually measures of related constructs such as self-esteem, self-concept, or physical self-confidence. As a result, he devised a set of guidelines for constructing self-efficacy measures that addressed the definition and appropriate construction of self-efficacy scales in order to accurately measure beliefs. However, reviews of literature have revealed that several instruments labeled as measures of efficacy beliefs are actually measures of more global concepts of the self (Feltz et al.,2008; Moritz et al., 2000). In addition, researchers suggest that in cases where self-efficacy is not shown to be a predictor of task completion, the issues most likely stem from the way in which the self-efficacy beliefs are measured and do not reflect the soundness of self-efficacy theory (Feltz & Chase, 1998; Moritz et al., 2000). These measurement issues contribute to the lack of cohesion in the research literature, thus is it important for researchers to also focus on measurement issues with regard to efficacy beliefs in the physical activity domain.

### **Diverse Populations**

In addition to future areas of research design centered on the research methodology and measurement of self-efficacy, another avenue for researchers to explore is that of diverse populations. The majority of the studies reviewed, like most research in any field, utilized

Caucasian, American individuals for the study participants. Future research needs to address the integrity of the sources of self-efficacy for physical activity and sport in more diverse populations. Given the differences in Eastern and Western cultures, it is logical to hypothesize that some differences might exist. As mentioned in the previous section, cultural differences can play a role in the sources of efficacy information that an individual draws upon to form their beliefs (Marquez & McAuley, 2006). In addition, examinations of efficacy beliefs in stereotyped populations are warranted.

### **Summary and Implications**

The purpose of this literature review was to synthesize the current literature on self-efficacy in the physical activity domain while focusing on the information sources from which self-efficacy perceptions are derived. The relationship between self-efficacy and physical activity is clearly established; however the mechanisms through which sources of information influence self-efficacy beliefs in the physical activity domain have not been studied extensively.

**Summary** While there is ample literature to support the general relationship between past performances and self-efficacy, little literature exists on the *specific* factors mentioned by Bandura that affect the influence of past performance. The research that does exist is mostly correlational in nature; however, the few studies that did utilize experimental designs provided support for the relationships reported in the correlational studies. A large portion of the studies reviewed were limited in their generalizability because they used older adults as the population; however studies done on young adults, college athletes, and children produced similar results, indicating that the relationship between past experiences and self-efficacy beliefs is consistent across populations.

There is a smaller quantity of research examining the relationship between verbal persuasion and self-efficacy beliefs than is present in the other three sources; however, the research that does exist in this area is of a higher quality and largely experimental in design. As a result, the results obtained are more convincing. This is most likely due to the nature of feedback and the ease with which it can be manipulated. There are many studies which examined the effects of manipulated feedback on efficacy beliefs, but not much research has been conducted to examine the effect of societal-level persuasion on the efficacy beliefs of stereotyped populations for physical activity.

Research that explores the relationship between modeling and self-efficacy beliefs is largely dated and inconsistent in its conclusions. One strength of the limited research is that most of the studies are interventions, which are more convincing designs than the correlational studies discussed in the above sections. Despite that advantage, the only general conclusion that can be drawn about the nature of the relationship refers to the fact that modeling does influence self-efficacy. However, much more research is needed to clarify the inconsistencies concerning the types of modeling and further explore the impact of individual and task characteristics on the effectiveness of modeling on efficacy beliefs (Law & Hall, 2009).

The research supporting the relationship between physiological states and self-efficacy largely focuses on the perspective of self-efficacy as a *predictor* for interpretations of physiological and emotional states. While this research is fairly consistent and methodologically sound, it has drawn attention away from research that examines self-efficacy as the *outcome* in the relationship with physiological states (McAuley & Blissmer, 2000). As a result, there are few studies that focus on this relationship and a void in the literature exists. It seems ironic that physiological and emotional states have been “established” as a source of self-efficacy when so



little empirical evidence exists; however, the evidence that does exist is consistent and sound in supporting the conclusion that positive interpretations of physiological and/or emotional states are related to increased self-efficacy beliefs.

In addition, Bandura (1997) asserts that there are some contexts in which the sources of efficacy information vary in the strength of their influence on beliefs. The basis for these statements makes logical sense and this line of research has a large amount of potential; however few researchers have chosen to undertake the task of further exploration along these lines. The limited research that has been conducted in this vein has focused on the themes of developmental issues, socio-demographic issues, and task characteristics.

### **Implications**

Despite the gaps in literature and need for more research exploring the sources of self-efficacy, several sound implications exist for practitioners wishing to increase self-efficacy beliefs for physical activity. Bandura argued that performance experiences on tasks that were difficult, attempted without help, and accomplished with few failures carry stronger positive efficacy value than those tasks that are easily accomplished, done with help, and completed with repeated failures. Based on conclusions from Bandura and current literature, practitioners wishing to increase self-efficacy through past performance appraisals should provide tasks that are appropriately difficult, but with high probability of success, provide little external help, and ensure early successes. By providing these early mastery experiences, individuals are more likely to appraise their past experiences as successful, thus increasing efficacy beliefs to complete the task in the future.

Practitioners aiming to enhance self-efficacy for physical activity through verbal persuasion should focus on making the feedback realistic, individually tailored, and related to the

individuals' skill level in the activity. For novices, feedback should focus on the progress made so far. Feedback consisting of comparisons to others should be avoided, as Short and Vadocz (2002) found that this can actually lower efficacy beliefs. In addition, spoken feedback is more effective than written feedback, although whether the feedback is face-to-face or over the phone does not seem to matter. For those working specifically with athletes, implementing self-talk strategies for self-persuasion has also shown promise increasing efficacy beliefs.

Based on the research on vicarious experiences and self-efficacy, practitioners who use modeling to increase self-efficacy should utilize models that are both similar to the individual and competent in the given skill. In addition, the provision of a coping model, rather than a mastery model, appears to be more effective for instilling efficacy for performing a physical activity task. When deciding between traditional, self, or participant modeling, evidence suggests participant modeling may be superior; however both of the other types have been shown to be effective as well.

Enhancing self-efficacy through perceptions of physiological and emotional states is harder than that of the other sources, perhaps as a result of the difficulty in manipulating physiological states. Once someone has formed a perception of their physiological and/or emotional state, it is difficult to reliably manipulate that perception in order to study the resulting change in efficacy beliefs. Studies where alternative explanations or corrections of negative perceptions have helped to increase efficacy beliefs in those who are inexperienced in physical activities have shown some promise (Johnson, 1996; Resnick, 2002; Van der Laar & Van der Bijl, 2001). Practitioners working with individuals on new tasks should focus on providing information regarding the expectations associated with new experiences, such as soreness,

muscle fatigue, etc, so that the individual will appraise their physiological state in a more positive light, hopefully increasing efficacy beliefs.

## **Conclusion**

In conclusion, there is clear evidence of the relationship between self-efficacy beliefs and physical activity and/or sport; however the discussion of the gaps in the literature and future directions for research illustrates that there is still much work to be done in fully exploring and understanding the sources of self-efficacy. It is important to recognize that one of the major attractions of self-efficacy theory is the relative ease with which it can be modified to promote behavior change and/or engagement. Therefore, it is only logical that we, as researchers, continue in our quest to understand how to best modify those beliefs. By achieving a greater understanding of self-efficacy perceptions and the mechanisms through which they are formed in the physical activity setting, we can more fully utilize the functional value of these powerful beliefs to help individuals adopt more active, and thus healthier, lifestyles

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## **APPENDIX B: STUDY ONE INSTRUMENTATION**

### Barrier Self-Efficacy Scale

Instructions: A number of situations are given below that can make it hard to successfully train for a marathon. On each of the items below, please indicate the degree to which you are confident that you can be successful in overcoming the obstacles to marathon training. Please rate your confidence by recording a number from 1-100 using the scale below.

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately certain can do so					Certain can do (1-100)

- |   |       |
|---|-------|
| 1. When I am feeling tired.   | _____ |
| 2. When I am feeling pressure from work/school.                     | _____ |
| 3. During bad weather.  | _____ |
| 4. After recovering from an injury that prevented me from running.  | _____ |
| 5. During/ after experiencing personal problems.                    | _____ |
| 6. When I am feeling depressed.                                     | _____ |
| 7. When I am feeling anxious.                                       | _____ |
| 8. After recovering from an illness that prevented me from running. | _____ |
| 9. When I feel physical discomfort from running.                    | _____ |
| 10. After a vacation.   | _____ |
| 11. When I have too much work to do for school.                     | _____ |
| 12. When visitors are in town.                                      | _____ |
| 13. When there are other interesting things to do.                  | _____ |
| 14. If I don't reach my running goals.                              | _____ |
| 15. Without support from my family/friends.                         | _____ |
| 16. During a vacation.  | _____ |
| 17. When I have other time commitments.                             | _____ |
| 18. During/ after experiencing family problems.                     | _____ |

### Task Self-Efficacy Scale

Instructions: On each of the items below, please indicate the degree to which you are confident that you can be successful. Please rate your confidence by recording a number from 0-100 using the scale below.

0      10      20      30      40      50      60      70      80      90      100  
I cannot do      I am moderately      I am certain  
it at all      certain I can do it      I can do it

(1-100)

1	I can complete a marathon.	
2	I can run a marathon without stopping, except for water breaks	
3	I can run a marathon while maintaining my desired pace.	
4	I can run a marathon when I am feeling physical discomfort.	
5	I can run a marathon when I am feeling emotional fatigue.	

### Positive and Negative Affect Scale

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer next to that word. Use the following scale to record your answers. Indicate to what extent you generally felt this way during the past week; that is, how have you felt on average (e.g., at school, at home, generally from day-to-day):

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>very slightly or not at all</b>	<b>a little</b>	<b>moderately</b>	<b>quite a bit</b>	<b>extremely</b>
_____	1. interested	_____	11. Irritable	
_____	2. distressed	_____	12. alert	
_____	3. excited	_____	13. ashamed	
_____	4. upset	_____	14. inspired	
_____	5. strong	_____	15. nervous	
_____	6. guilty	_____	16. determined	
_____	7. scared	_____	17. attentive	
_____	8. hostile	_____	18. jittery	
_____	9. enthusiastic	_____	19. active	
_____	10. proud	_____	20. Afraid	

## **APPENDIX C: STUDY TWO INTERVIEW PROTOCOLS**



### **Pre-Training Interview**

- Demographic information
  - How old are you?
  - What is your ethnicity?
  - What is your year in school and major?
  - Do you have any previous running/marathon experience? If so, tell us about it
  
- Physical activity behavior patterns
  - Tell me about your previous physical activity participation up to this point (frequency, intensity, types of activities?)
  - Any previous experience in training for an athletic event?
  
- Reasons for doing marathon class
  - Why did you want to participate in this class?
  - What are the benefits you expect to gain?
  - What are your expectations for the outcome of this class?
  
- Self-Efficacy
  - How would you define success for yourself in this class? In other words, what do you hope to achieve in this class/ what is your personal goal?
  - How confident are you in your abilities to meet that goal? (0%-100%)
  - Who or what influences your rating? In other words, what made you choose the number that you did?
  - Do the sorting activity here.
  - Why are these influences important for your confidence?
  - Can you think of anything else that would influence your confidence rating?  
What about physical changes? (If they have not already mentioned this)

### **Pre-Race Interview**

- Tell me about your perceptions of the experience so far.
  - How has it been physically?
  - What about mentally?
  - What have you enjoyed the most?
  - What have you enjoyed the least?
  - Is there anything you would change at this point?
  
- Self-Efficacy
  - At this point, what is your personal goal for the race?
  - Is this different from the goal you stated at the beginning of the program?
  - Why/why not?
  - How confident are you in your abilities to meet that goal? (0%-100%)
  - Who or what influences your rating? In other words, what made you choose the number that you did?
  - Do the sorting activity here.
  - Why are these influences important for your confidence?
  - Can you think of anything else that would influence your confidence rating?

## **Post-Race Interview**

- Evaluation of experience
  - Tell me about your marathon race experience.
  - What did you enjoy most?
  - What did you enjoy least?
  - Do you feel that you met the goal you set for yourself?
  - Why/why not?
  - Do you see your experience as a success?
  - Why/ why not?
  - Is there anything you would change about your experience?
- Self-efficacy
  - How confident did you feel about reaching your goal when you stepped up to the starting line of the race? (0-100%)
  - What influenced that rating?
  - Do you feel that your confidence impacted your performance in any way?
  - Why/ why not?
- Future Running Intentions
  - Now that this experience is ending, do you plan to continue running?
  - Do you intend to complete another marathon?
  - What influence does this experience have on your decision to continue running (or not)?

### Ranking Task

Please look at the following sources of confidence and decide which sources are relevant to you. After you have eliminated the irrelevant sources, please rank the remaining sources by order of how important they are for your confidence rating.

Source	Relevant to me	Not relevant to me	Ranking (1=most important)
Feel good physically (energetic, powerful, etc).			
Parents' encouragement.			
Watched peer succeed in similar task.			
I have been successful in the past in similar tasks.			
Feel good emotionally (happy, unstressed, etc).			
Friends' or significant others' encouragement.			
Read/Heard an inspirational story about running.			
I had good runs this last week.			
Feel well rested and/or not sick.			
I tell myself that I can do it.			
I am comparable to others who have completed the task.			
I am an experienced runner.			

Are there any other sources that influence your confidence that were not listed?

Where would these rank when compared with the others?

## **APPENDIX D: STUDY THREE INSTRUMENTATION**

### **Demographic Questionnaire**

Thank you for agreeing to participate in this study. Please answer the following questions as accurately as possible. If you are unsure about an item, please ask the researcher for assistance.

- 1) Please indicate your age: \_\_\_\_\_ 2) Gender:    Male    Female
- 3) Please indicate your race/ethnicity:
- 4) Please indicate the total number of years that you have been running?
- 5) How many years you have been running in competitive races?
- 6) What is the primary running distance in which you compete?
- 7) What is your fastest time in that distance and when/where did it take place?

### **Interview Protocol**

- Past Running Experiences
  - Tell me about how you got into running
  - How often do you run now? (days/week, distances, etc)
  - Do you run alone or with someone?
  - Which would you prefer?
  - Tell me about your racing experiences. (how often, when, where, distances, etc)
  - Have they been good/ bad? Why?
  - Does anyone in your family run besides you? Why do you think they do/do not run?
  - How would you define your culture?
  - Do you feel that your culture supports your running? Why/why not?
- Self-efficacy
  - How would you define success for yourself in running? (time goal, place goal, etc)
  - How confident do you feel about your abilities to be successful in running? (0-100%)
  - Who or what influences your confidence for running?
  - Why?
  - Do you feel that your culture plays any part in your confidence for running?
  - Do sorting activity here.
  - Are there any other influences that you can think of that would influence your confidence for running?

## **VITA**

Ashley Samson is a native of Louisiana, having been born and raised in Covington. She is a lifelong athlete and grew playing soccer, running track and cross country, and competing in equestrian sport. She obtained her bachelor's degree in psychology from Northwestern State University in 2006. During her time there, Ashley was very involved as an active member of Phi Mu Fraternity and a varsity member of the university rowing team. In addition she was a member of the Order of Omega Greek Honor Society, Purple Jackets Honor Society, and was the director of the Greek Orientation program for 2005.

Upon graduating from NSU in May of 2006, Ashley moved to Denton, Texas to pursue a master's degree in sport psychology. While there she received a \$10,000 fellowship to fund her education in addition to being employed as a teaching and research assistant. During her time there, Ashley gained knowledge and experience in teaching at the college level for two years, during which she was promoted to the position of supervisor of Wellness programs. Within this position she was responsible for overseeing the curriculum development and administration of the many sections of wellness courses offered by the department. Ashley assisted in the development of standardized policies and procedures to ensure continuity across the many different class sections, supervised peers for adherence to policies, maintained records for all classes and advised students on options related to their course requirements for the kinesiology department. In addition to these responsibilities, she reported directly to the program chair to maintain communication and continued success in the program.

Ashley is currently an adjunct instructor at Louisiana State University for the 2010-2011 academic year, and for the previous two years she was a graduate teaching assistant in the Kinesiology Department. She is the instructor of record for the Sport in Society, Psychosocial



Aspects of Physical Activity, and Personal and Community Health courses. She is responsible for all curriculum development, class procedures, and class administration tasks. In addition, Ashley was previously the instructor and lab coordinator for the undergraduate tests and measurements course. In teaching this course for the past 3 years, she had the opportunity to gain experience in supervising development of curriculums, standardizing class procedures, and overseeing class administration of other graduate students who teach the lab portions of the course. Ashley also had the opportunity to involve and supervise undergraduate and graduate students in various independent research projects from conceptualization to write up for publication and/or presentation.

In addition to her duties as an adjunct instructor, Ashley was the project director for implementation of the Safe Routes to School Program at two local schools, Buchanan Elementary and Polk Elementary during the fall of 2010. This is a grant-funded project through the National Center for Safe Routes to School. Ashley's position as project director has provided her with valuable experience in successfully working with community members and school leaders to achieve a common goal. Ashley supervised all aspects of the project including planning, organizing, and executing all components of the program which comprised a 3-week walking competition, a bike safety program provided in conjunction with the East Baton Rouge Police Department, and a school-wide program for National Walk to School Day. This year, over 3,300 schools across the nation participated in National Walk to School Day on October 6<sup>th</sup> and Ashley was proud that our schools were among those numbers.

In addition to her work within higher education, Ashley is an active practitioner in the corporate wellness industry. Since moving back to Louisiana in 2008, she has been a consultant for SB Wellness, Inc., located in Baton Rouge, Louisiana. The client base ranges from small

local companies to large corporations, such as Blue Cross Blue Shield of Louisiana. In this context, she has obtained experience in managing large data sets for the creation of quarterly reports, design and implementation of incentive programs, in supervising program staff, and in providing wellness education. Ashley has given numerous workshops and lectures on a variety of health-related topics including stress management, physical activity habits, smoking cessation, blood pressure reduction, and nutrition planning.

As a result of her extended education and professional experiences, Ashley brings a diverse background of research and practical experience that began in obesity perception research with children and college athletes and has since expanded to many other projects. Furthermore, because of these varied experiences, Ashley is proficient at meeting the various needs that arise when working with diverse groups of people and contexts. As a result of her psychology training, she has knowledge and experience in assisting others in how to make healthy lifestyle decisions and to engage in behaviors that reflect those decisions.

Ashley's true passion is to share with others the physical and mental benefits that can result from a healthy lifestyle and to encourage others to make decisions that result in enhanced well-being. She believes that the purpose of her research is to better understand this phenomenon so that she may more effectively educate others in making healthier lifestyle choices. She is currently a member of several professional organizations including the American Psychological Association-Division 47 (APA), Association for Applied Sport Psychology (AASP), American Fitness and Aerobics Association (AFAA), American College of Sports Medicine (ACSM), American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD), and USA Triathlon (USAT).