10-1-2002

Training and Performance Self-Efficacy, Affect, and Performance in Wheelchair Road Racers

Jeffrey J. Martin
Wayne State University, aa3975@wayne.edu

The Sport Psychologist, 2002, **16**, 384-395

Training and Performance Self-Efficacy, Affect, and Performance in Wheelchair Road Racers

Jeffrey J. Martin
Wayne State University

In the current study, social cognitive theory was examined with athletes with disabilities. More specifically, hierarchical and self-regulatory performance self-efficacy, self-regulatory training self-efficacy, outcome confidence, and affect were examined with wheelchair road racers (N = 51). In accordance with social cognitive theory, moderate to strong significant relationships among 3 types of self-efficacy and outcome confidence were found (rs = .41 - .78). All forms of self-efficacy and positive affect (rs = .39 - .56) were also related providing additional support to social cognitive theory and the important relationships among training and performance related efficacy and affect in sport.

Sport and exercise scientists have amassed an impressive body of knowledge about the applied psychological aspects of sport and exercise (e.g., Williams, 2001). Unfortunately, only a few researchers (e.g., Campbell & Jones, 1997; Martin, 1996, 1999a, 1999b, 1999c; Martin & Mushett-Adams, 1996) have examined the psychological dynamics of disability sport. In particular, long distance wheelers with physical disabilities have rarely participated in sport psychology research. Thus, the purpose of the current study was to investigate critical psychological variables and performance in wheelchair athletes.

Social cognitive theory was used to design the current study with the goal of examining postulates of social cognitive theory with disability sport athletes. A secondary purpose of the current study was to predict performance. According to Bandura (1997), a major determinate of behavior is an individual's self-efficacy judgments. Sport psychology researchers have supported the role of self-efficacy in numerous investigations and across various sports (Feltz & Chase, 1998). Athletes who are efficacious are more likely to exert effort, devise effective performance strategies, and persist in the face of failure, compared to athletes who lack efficacy (Bandura, 1997). Of particular interest, self-efficacy is predictive of distance running performance (Gayton, Matthews, & Borchstead, 1986; Martin &

The author is with the Division of Kinesiology, Health, and Sport Studies, 266 Matthaei Building, Wayne State University, Detroit MI 48202. E-mail: aa3975 @wayne.edu.

Gill, 1991, 1995a, 1995b; Okwumabua, 1986). Runners with strong self-efficacy perform faster and place higher compared to runners with weaker self-efficacy (Martin & Gill, 1991, 1995a, 1995b).

Much sport related self-efficacy research has employed Bandura's (1997) microanalytic measurement approach reflecting the task, context, and time specific elements of self-efficacy judgments. For example, researchers have assessed athletes' perceptions of their performance efficacy to execute various wrestling maneuvers (e.g., pins; Treasure, Monson, & Lox, 1996), hockey skills (e.g., shooting; Lee, 1988), and gymnastics movements (e.g., vaulting; McAuley & Gill, 1983) and have successfully explained the importance of self-efficacy in these diverse settings. As Feltz and Chase (1998) indicate in their review of self-efficacy research in sport, self-efficacy best explains sport behavior when appropriately constructed (i.e., microanalytic approach) within the framework of social cognitive theory.

A second typical research approach, when various distinct subskills are less apparent and the sport involves a simple repetitive motor skill (e.g., running) has been to assess self-efficacy strength for various levels of difficulty for one task or movement. For instance, Martin and Gill (1991, 1995a) assessed runners' performance efficacy for running increasingly faster race times. This microanalytic approach is typically referred to as hierarchical self-efficacy because efficacy judgments are required for increasingly difficult performance standards or tasks in a linear fashion.

Researchers in exercise psychology have recently begun to assess a new form of self-efficacy: self regulatory self-efficacy (Bandura, 1997; McAuley & Mihalko, 1998). Self-regulatory self-efficacy reflects respondents' perceptions of their efficacy for executing a skill or behavior in the face of barriers, difficulties, or particular conditions. For example, researchers have examined how efficacious exercisers are when exercising while tired or lacking motivation (McAuley & Mihalko, 1998). Self regulatory self-efficacy is conceptually distinct from hierarchical self-efficacy. Assessing self-regulatory self-efficacy to manage difficult performance conditions is rare in the sport psychology literature despite the relevance of such cognitions to the challenges (e.g., anxiety) of performance. Therefore, in the current study, two types of performance self-efficacy were assessed: hierarchical performance self-efficacy and self-regulatory performance self-efficacy.

Most athletes, coaches, and sport psychologists recognize the critical importance that daily training plays in achieving optimal performance. For most athletes, competition represents only a fraction of their involvement in sport. For athletes with disabilities who have few competitive opportunities, training might represent an even greater percentage of their sport involvement (Martin, 1999a). Because the ability to train intelligently and hard is critical to achieving excellence, it is surprising that so few sport psychology researchers have investigated the psychological aspects of training behavior and focused so heavily on performance related cognitions.

Past success (i.e., enactive mastery experiences) in training and competition is considered the most critical determinant of self-efficacy among the four major antecedents (i.e., enactive mastery experiences, vicarious experiences, social influence, and physiological states) noted by Bandura (1997). Training quality and prior success are particularly critical to endurance distance runners (Jones, Swain, & Cale, 1990; Martin, 2002).

To address the lack of research examining training self-efficacy, I examined a third form of self-efficacy: self-regulatory training self-efficacy. More specifically, I examined athletes' efficacy toward overcoming conditions or difficulties that prevented them from training well. Measuring training efficacy allowed me to test the relationships among training and performance self-efficacy.

The merits of assessing both outcome confidence and self-efficacy have often been discussed in the literature (Bandura, 1997; Maddux, 1995; Martin & Gill, 1991, 1995a). Outcomes in sport (e.g., winning) are highly valued by athletes and spectators, and anecdotal reports indicate that they are often critical sources of motivation to many athletes. Thus, assessing outcome confidence would seem to be a particularly salient and important cognition in the athletic setting. Assessing athletes' confidence in their ability to achieve specific outcomes (e.g., win, place in the top three) also allowed for a comparison of the predictive utility of self-efficacy to outcome confidence as has been done previously with distance runners (Martin & Gill, 1991, 1995a, 1995b).

Finally, although self-efficacy cognitions are important influences on performance, athletes' emotional states also impact how well they perform. For example, although wheelers may be quite efficacious about their capabilities to wheel fast, a difficult day at work or a problem of a personal nature (e.g., divorce) may contribute to a lack of enthusiasm, irritability, or fatigue. Anxiety, a commonly researched topic in the sport sciences, has been linked to performance (Raglin & Hanin, 2000) with optimal anxiety promoting better track and field performance (Raglin & Turner, 1993).

Although anxiety research is prolific (Raglin & Hanin, 2000), far fewer research efforts have been devoted to the impact of negative affect (e.g., fear) other than anxiety. Additionally, the relationship of positive affect (e.g., enthusiasm) to performance has been infrequently studied, although flow states and performance have been extensively examined (e.g., Jackson, 2000). Thus, I examined both positive and negative affective states (Watson & Tellegen, 1985) to determine their relationship to efficacy and outcome confidence and their ability to predict performance.

Self-efficacy beliefs play a critical role in the self-regulation of affective states in life (Bandura, 1997) and sport (Bandura, 1990). Efficacy beliefs impact attentional biases toward aversive events, memory storage of emotional laden events, and efficacy in managing negative thoughts. Perceptions of efficacy help athletes manage the environment more effectively in order to reduce sources of negative affect (see Bandura, 1997, pp. 137-152). Scientists (e.g., Bandura, 1997) have supported the link between self-efficacy and anxiety, but few researchers have examined the relationships among self-efficacy and positive and negative affect in sport (Treasure et al., 1996). Treasure and colleagues determined that efficacy was positively related to positive affect and negatively correlated with negative affect. Although correlational in nature, their study provided scientific support to the premise that positive affect may have important efficacy building properties and that efficacy can promote positive mood states.

In summary, the current research project used social cognitive theory to examine psychological aspects of disability sport. Three forms of self-efficacy, outcome confidence, and positive and negative affect were assessed to determine their relationships to each other in order to test postulates of social cognitive theory. The assessment of related but qualitatively different forms of efficacy, outcome

confidence, and both positive and negative affect provided a basis for determining the relative influence of both affective and cognitive constructs in predicting performance.

I hypothesized that all three forms of self-efficacy, outcome confidence, and positive affect would be positively related to each other and negatively related to negative affect. In regard to performance, I hypothesized that all three forms of efficacy, outcome confidence, and positive affect would be positively related to performance, whereas negative affect would be inversely related to performance.

Method

Procedures

Permission was first obtained from the University Internal Review Board to conduct the current study. Next, permission was obtained from 3 race directors to collect data at 3 elite level road races held annually in various cities in a northern mid-western state. At all 3 races, athletes were approached at the registration booth specifically designated for wheelchair athletes and asked to participate in the present study. Athletes agreeing to participate immediately completed all questionnaires in the presence of the author.

Data were collected from 9 races over a 3-year period. Race distances were the marathon (i.e., 26.2 miles) distance held in October, a 25 kilometer (i.e., 15.5 miles) race conducted in May, and a 10-mile August race. Test-retest reliability was assessed for self-regulated training self-efficacy (SRTSE) because it was not situation specific as were the other scales. After one race, 11 athletes were mailed a self-addressed stamped envelope and the SRTSE scale, which they were asked to complete immediately. Nine athletes completed and returned the SRTSE.

Participants

Fifty-one male adult (M = 35.4 yrs; SD = 10.9 yrs; Range = 18 - 61 yrs) wheelchair long distance racers participated in the current study. As the standard deviation and range indicates, there was tremendous variation in age. Most athletes were Caucasian (n = 49) and the remainder (n = 2) were African-American. Disability designations reported by the athletes were paraplegia (n = 26), spinal cord injury (n = 9), quadriplegia (n = 6) spina bifida (n = 5), post-polio (n = 4), and amputee (n = 1). A typical race averaged about 8-15 male wheelchair entrants and either had no or few (e.g., 1-3) female competitors. Because of the lack of female athletes, all athletes in the present study were male.

Although no quantitative data defining athletes' experiential background was obtained, 3 groups of athletes appeared to dominate the entry list at all races. First, the top finishing wheelers were successful (e.g., Paralympic gold medalist) elite professional athletes, competing on the North American prize money circuit (e.g., Boston, New York, Chicago marathons) and top level amateur competitions (e.g., Paralympics), often traveling to races by plane. A second group of athletes were less elite but accomplished local athletes who belonged to regional wheelchair athletic clubs and were able to compete in the races without entailing excessive expenses. Finally, a third group of athletes were high level amateur collegiate wheelchair athletes.

Measures

All 3 self-efficacy scale formats were developed based on previous research with distance runners (Martin & Gill, 1991, 1995a, 1995b) and by following recommendations noted in the literature (Bandura, 1997; Feltz & Chase, 1998; McAuley & Mihalko, 1998). Specific items were developed based on three sources of information. First, a perusal of exercise barriers research, sport self-efficacy research, and disability sport research (e.g., wheelchair athletes) was conducted. Second, two elite wheelchair athletes were consulted. Finally, my own professional practice knowledge obtained from experience as a track coach, sport psychology consultant, and professional distance runner was helpful. For example, I had previously raced all 3 courses numerous times and had consulted with runners training for all 3 races.

Many researchers have clearly elucidated the theoretical distinctions between self-efficacy and confidence (Bandura, 1997; Feltz & Chase, 1998; McAuley & Mihalko, 1998). Despite the strong theoretical differences between efficacy and confidence, researchers have found the term "confidence" has strong face validity when constructing scales designed to assess self-efficacy. Thus, it is very common for sport self-efficacy scales to frequently employ the term "confidence" (see McAuley & Mihalko, 1998) as I have done in the current study. Finally, the current analyses were based on complete data obtained from all athletes (N = 51) competing in one of the 3 previously listed races.

Hierarchical Performance Self-Efficacy (HPSE). Athletes answered a hierarchically arranged series of 5 questions related to how confident they were in achieving their time goal. For example, one question read "How confident are you in your ability to wheel the _____ course within 30 seconds of your time goal?" Subsequent questions replaced 30 seconds with one, two, four, and six minutes. Participants answered on a 10-point Likert scale anchored by *not at all confident* and *extremely confident*. A mean HPSE score was obtained by adding strength of self-efficacy (i.e., 0-10) for each level (i.e., question) of self-efficacy and dividing by number of levels (i.e. questions).

Self-Regulatory Performance Self-Efficacy (SRPSE). Athletes answered 16 questions on a 10-point Likert scale to obtain strength of self-efficacy for each aspect of wheelchair racing represented by each question. Each stem read, "How confident are you in your ability to . . ." and was completed by questions listing a number of conditions that had to be successfully managed in order to race well. Questions were developed while considering the various race distances, course difficulty (e.g., hilly vs. flat), and typical weather conditions (e.g., temperature, humidity, rain). Items included negotiating difficult turns, wheeling uphill and downhill, racing on bumpy/uneven roads and wet/slippery roads, into strong headwinds, competing when it was hot/humid, while fatigued, performing poorly, losing, feeling bad, etc. A mean score was obtained by summing strength scores for each task (i.e., question) and dividing by the number of tasks (i.e., number of questions).

Self-Regulatory Training Self-Efficacy (SRTSE). Athletes answered 20 questions with a stem that read, "How confident are you that you can train well under the following conditions?" Twenty conditions were noted with the following key words: training alone, anxious, unmotivated, tired, not competing, personal crisis, bad weather, busy at work, training poorly, competing poorly, after a

layoff, lacking fitness, missing important activities, lack of fun, lack of social support, hungry, maintaining a hectic schedule, failure to achieve goals, on vacation, and having difficulty with disability. A mean score was obtained by summing strength scores for each task (i.e., question) and dividing by number of tasks (i.e., number of questions).

Outcome Confidence (OUTCON). Athletes answered a series of 5 questions asking how confident they were of being competitive in their races. For example, one question read "How confident are you in your ability to win the _____ race?" Subsequent questions replaced win with place in the top three, six, nine, and twelve. Participants answered on a 10-point Likert scale anchored by *not at all confident* and *extremely confident*. A mean OUTCON score was obtained by adding scores for each item and dividing by number of questions.

Positive and Negative Affect. Affect was assessed with the Positive and Negative Affective Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS allows researchers to assess both negative affect (NA) and positive affect (PA) with 10 items each. Items constituting the PA scale are active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong. Items for the NA scale include afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset. Participants responded to the stem, "Indicate the extent to which you have been feeling the following during the past few days" on a five-point Likert type scale with 1 anchored by *not at all* and 5 anchored by *extremely*. Previous sport psychology research has demonstrated adequate internal consistency (Treasure, et al. 1996).

Performance. Performance was assessed by recording athletes' time and place from official race results. Athletes' race times were then standardized on a 1,100 point scale developed for distance running based on a mathematical model developed by Gardner and Purdy (1988) and successfully employed with previous research examining long distance runners (Martin & Gill, 1991, 1995a).

Results

Preliminary Analysis

Internal consistency of the measurement instruments were assessed by examining internal reliability (N = 51) and test-retest reliability (n = 9). Descriptive statistics and correlations were then computed. Coefficient alpha (Cronbach, 1951) indicated that most scales shared a high level of inter-item agreement. The alpha coefficients for 5 of the 6 scales were strong (i.e., a = .86 - .95). The NA subscale of the PANAS was below Nunnally's (1978) criteria of .70 (a = .68) and therefore was not used any further. Test-retest reliability for the SRTSE scale was considered strong (r = .96).

Descriptive Statistics

Means, standard deviations, range of scores, skewness, and kurtosis for all 5 psychological variables are presented in Table 1. As the descriptive data indicate, most athletes were of moderate to strong efficacy. A visual trend, however, of increasing efficacy was apparent among the three efficacy scores (i.e., 6.23, 7.05, 7.88). Therefore, although not an a prior hypothesis, a subsequent analysis of

Table 1 Means, SD, Range, Alphas, Skewness, and Kurtosis for All Variables

Variable	Mean	SD	Range	Alpha	Skew	Kurt
SRTSE	06.23	01.47	3.1–8.6	.93	–.08	–.99
HPSE	07.05	01.96	1.4–10	.95	–.92	.74
SRPSE	07.88	01.31	4.4–9.9	.94	–.71	.01
OUTCON	06.62	02.78	1.0–10	.92	–.62	–.58
PA	03.64	00.66	1.8–4.9	.86	–.50	.42

Note. SRTSE = Self–regulatory training self–efficacy, HPSE = Hierarchical performance self–efficacy, SRPSE = Self–regulatory performance self–efficacy, OUTCON = Outcome confidence, PA = Positive affect, Skew = Skewness, Kurt = Kurtosis.

variance was conducted to see if this trend was statistically significant. This analysis, $F(2, 49) = 79.94$, $p < .01$ was significant, indicating there were significant differences among the 3 means. A follow-up linear trend analysis, $F(1, 50) = 158.82$, $p < .001$, was also significant, indicating that athletes were lowest in SRTSE followed by HPSE and then SRPSE. Athletes were most efficacious about managing various race conditions (e.g., wheeling uphill) in order to race well followed by efficacy for achieving their race time goals. Athletes reported the least amount of efficacy for overcoming difficult training conditions (e.g., wheeling in poor weather). Finally, most athletes were somewhat efficacious in their ability to place high and expressed moderately strong PA.

Correlations Among All Variables

To guard against type 1 error, the alpha level was adjusted from .05 to .0025 with a Bonferonni correction to account for the 20 correlations conducted. Correlations among the psychological variables can be found in Table 2 and 3. Two significant patterns of correlations were evident. First, as hypothesized, all forms of self-efficacy and outcome confidence were moderately to strongly positively related to each other, indicating that athletes efficacious in their training were also efficacious in their ability to overcome performance barriers, race close to their time goals, and confident in placing high. Second, PA was moderately related to all three forms of self-efficacy, suggesting that efficacious wheelers, as indicated by a sampling of some of the questions composing the PANAS, were also feeling excited, enthused, determined, etc.

The strength of the correlations also warrant comment as many of the relationships were quite meaningful. For instance, the effect size or variance shared was quite high (i.e., 61%) between SRTSE and SRPSE despite limited content congruence among items in both scales. Other relationships also shared moderate amounts of variance. For example, PA shared variance ranging from 15% to 32% with all 3 forms of self-efficacy.

Contrary to my hypotheses, significant and meaningful correlations among the psychological variables and performance (i.e., time and place) were virtually

Table 2 Correlations Among the Psychological Variables

	1	2	3	4
1) SRTSE				
2) HPSE	.48*			
3) SRPSE	.78*	.55*		
4) OUTCON	.46*	.41*	.48*	
5) PA	.39*	.45*	.56*	.27

Note. SRTSE = Self–regulatory training self–efficacy, HPSE = Hierarchical performance self–efficacy, SRPSE = Self–regulatory performance self–efficacy, OUTCON = Outcome confidence, PA = Positive affect.
Note. $*p < .0025$ due to a Bonferonni adjustment for 20 correlations.

Table 3 Correlations Among the Psychological Variables and Performance

	Place	Time
1) SRTSE	–.29	–.14
2) HPSE	–.05	.11
3) SRPSE	–.31	.07
4) OUTCON	–.39*	.30
5) PA	.27	.10

Note. SRTSE = Self–regulatory training self–efficacy, HPSE = Hierarchical performance self–efficacy, SRPSE = Self–regulatory performance self–efficacy, OUTCON = Outcome confidence, PA = Positive affect.
Note. $*p < .0025$ due to a Bonferonni adjustment for 20 correlations.

nonexistent (see Table 3). Compared to the numerous relationships among the psychological variables, only one significant correlation was found as athletes with strong outcome confidence placed better (i.e., higher) than athletes with lower outcome confidence. The size of this correlation was moderate and accounted for 15% of the variance in finishing place.

Discussion

The major purpose of this investigation was to examine the psychological dynamics underlying performance in wheelchair distance racers. More specifically, social cognitive theory provided a sound theoretical framework to determine relationships among various forms of self-efficacy previously unexamined in disability sport psychology research, outcome confidence, and affect. The current study

represents one of the few research efforts testing social cognitive theory hypotheses in a disability sport setting. A number of significant findings from the current investigation warrant discussion.

First, the descriptive data indicate a positive pattern of psychological readiness. Athletes reported moderate to strong efficacy cognitions. Wheelers were efficacious about their ability to train well under many difficult conditions (e.g, tired, lacking motivation), although their training efficacy was not as strong as their performance efficacy. Most wheelers expressed stronger confidence in their ability to race well given a variety of difficult race situations such as heat, humidity, and hilly race conditions than they were about their ability to train under difficult conditions. It is plausible that the difference in efficacy reflects the overall difficulty in sustaining confidence and motivation over time and fluctuating mental and physical states as required for effective training. Furthermore, previous disability sport research indicates that wheelchair athletes face environmental barriers (e.g., roads with no shoulders to train on) and lack training information, coaches, and training partners (Dattilo & Guadagnolo, 1988; Liow & Hopkins, 1996; Williams & Taylor, 1994), conditions which are clearly not conducive to effective training.

In contrast, performance self-efficacy judgments were made within a context of performance readiness more conducive to positive efficacy cognitions. For instance, the current study was conducted at major races where decreased training (e.g., tapering), increased rest, and carbohydrate loading were the norm. Finally, athletes were moderately confident about their ability to place highly in their races.

In addition to their positive set of efficacy beliefs and confidence, athletes reported positive affect leading up to the race as they scored well above ($M = 3.64$) neutral (i.e., 2.5) on the PA scale. Based on a random sample of 4 of the 10 items on the PA scale that are used to define positive affect, this group of athletes, in general, reported being quite active, alert, enthusiastic, and inspired.

A second important set of findings concerns the patterns of correlations among the psychological variables assessed. Wheelers who were efficacious about their training also tended to report strong performance efficacy and outcome confidence. The correlations among these variables supports Bandura's (1997) position that although efficacy cognitions are situation specific, efficacy can generalize, especially among similar domains (e.g., sport). Similar to Treasure et al.'s (1996) study, athletes who were efficacious tended to experience more positive affect in the previous few days compared to wheelers who were less efficacious. Again, the pattern of significant correlations among positive affect and all forms of efficacy supports Bandura's (1997) hypothesis that individuals with belief in their capabilities are more likely to experience positive affect compared to people who doubt their capabilities.

Although the correlational nature of the present study precludes definitive cause and effect relationships, the time element inherent to the measures suggests that athletes' training efficacy, based on training completed in the past, influences performance efficacy rooted in anticipatory forethought of the future (i.e., the race the next day). Although it is impossible for efficacy cognitions rooted in the future to impact efficacy cognitions based on past behavior, the alternating nature of training and competition clearly suggests that efficacy perceptions rooted in training and performance have reciprocal influences. Increases in performance efficacy can foster stronger training efficacy, and enhanced training efficacy can lead to stronger performance efficacy.

Previous research with distance runners (e.g., Martin & Gill, 1991, 1995b) has generally found more support for relationships among outcome based measures of efficacy/confidence and performance, compared to self-referenced grounded measures. In the current study, there was a high level of congruence between the measure of outcome confidence (i.e., confidence in your ability to place high) and the dependent measure (i.e., race place). Because competitive fields were generally quite small and many wheelers were familiar with their competitor's abilities (i.e., athletes raced against each other frequently), it is plausible that this knowledge contributed to the predictive power of outcome confidence compared to self-efficacy.

With relatively few athletes (e.g., 10) competing in the various wheelchair categories (e.g., male paraplegic open versus female paraplegic masters) for prize money, 15% difference in finishing place could quite likely represent a meaningful difference in race place and prize money. Contrary to hypotheses, athletes' efficacy based on achieving their time goals (i.e., HPSE) and in managing difficult race conditions (i.e., SRPSE) was unrelated to their race times, indicating the wheelers efficacious about achieving their time goals and managing difficult race conditions did not race faster compared to wheelers who were less efficacious.

In addition to the theoretical implications of the present investigation, a significant applied ramification is imbedded in these results, particularly the strong training and performance efficacy relationship. The current study represents a snapshot in the lives of these athletes and the results support a training to performance efficacy influence. However, as Rejeski (1992, p. 157) suggests, human behavior is like a motion picture and training and performance cognitions exert reciprocal influences on each other over time (Bandura, 1997). Ideally, athletes and their support team (e.g., teammates, coach, sport psychologist) will develop a pattern of effective training and successful racing which, over the course of a season and a career, positively imbue athletes with a strong sense of efficacy in both their training and racing.

Limitations of the current study warrant acknowledging. The relatively homogenous sample (i.e., adult, White, male, wheelers) limits how generalizable the current findings are. At the same time, there was considerable variation in race times, suggesting a more heterogenous sample from a performance standpoint. The limited performance opportunities and small competitive fields for elite athletes with disabilities often means that the very best in the world (e.g., Paralympic gold medalist) compete against promising younger collegiate or recently disabled older athletes. Thus, the findings of the current study should be viewed within this context and specific to the current sample.

In conclusion, the current study is one of the first research investigations examining the efficacy, affect, and performance relationship in wheelchair distance racers. The results provide further support to social cognitive theory with an under-researched population. In addition, these findings suggest that examining training self-efficacy, in addition to performance self-efficacy (as is typically done), and investigating affect are promising research directions.

References

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

Bandura, A.(1990). Perceived self-efficacy in the exercise of personal agency. *Journal of Applied Sport Psychology*, **2**, 128-163.

Campbell, E., & Jones, G. (1997). Precompetitive anxiety and self-confidence in wheelchair sport participants. *Adapted Physical Activity Quarterly*, **14**, 95-107.

Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, **16**, 296-334.

Dattilo, J., & Guadagnolo, F.B. (1988). Perceptions of road races by participants in the challenged division. *Adapted Physical Activity Quarterly*, **5**, 193-202.

Feltz, D., & Chase, M. (1998). The measurement of self-efficacy and confidence in sport. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 65-80). Morgantown, WV: Fitness Information Technology.

Gardner, J.B., & Purdy, J.G.(1988). *Computerized training programs*. Los Altos, CA: Tafnews Press.

Gayton, W.F., Matthews, G.R., & Borchstead, G.N. (1986). An investigation of the validity of the physical self-efficacy scale in predicting marathon performance. *Perceptual and Motor Skills*, **63**, 752-754.

Jackson, S.A. (2000). Joy, fun, and flow state in sport. In Y.L. Hanin (Ed.), *Emotions in sport* (pp. 135-156). Champaign, IL: Human Kinetics.

Jones, J.G., Swain, A., & Cale, A. (1990). Antecedents of multidimensional competitive state anxiety and self-confidence in elite intercollegiate middle-distance runners. *The Sport Psychologist*, **4**, 107-118.

Lee, C. (1988). The relationship between goal setting, self-efficacy, and female hockey team performance. *International Journal of Sport Psychology*, **20**, 147-161.

Liow, D.K., & Hopkins, W.B. (1996). Training practices of athletes with disabilities. *Adapted Physical Activity Quarterly*, **13**, 372-381.

Maddux, J. (1995). Looking for common ground: A comment on Bandura and Kirsch. In J. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 377-385). New York: Plenum Press.

Martin, J.J. (1996). Transitions out of competitive sports for athletes with disabilities. *Therapeutic Recreation Journal*, **30**, 128-136.

Martin, J.J. (1999a). A personal development model of sport psychology for athletes with disabilities. *Journal of Applied Sport Psychology*, **11**, 181-193.

Martin, J.J. (1999b). Loss experiences in disability sport. *Journal of Loss and Interpersonal Loss*, **4**, 225-230.

Martin, J.J. (1999c). Predictors of social physique anxiety in adolescent swimmers with physical disabilities. *Adapted Physical Activity Quarterly*, **16**, 75-85.

Martin, J.J. (2002). *Psycho-social aspects of elite youth female distance runners*. Manuscript submitted for publication.

Martin, J.J., & Gill, D.L. (1991). The relationships among competitive orientation, sport confidence, self-efficacy, anxiety, and performance. *Journal of Sport and Exercise Psychology*, **13**, 149-159.

Martin, J.J., & Gill, D.L. (1995a). The relationships of competitive orientations and self-efficacy to goal importance, thoughts, and performance in high school distance runners. *Journal of Applied Sport Psychology*, **7**, 50-62.

Martin, J.J., & Gill, D.L. (1995b). Competitive orientations, self-efficacy and goal importance in Filipino marathoners. *International Journal of Sport Psychology*, **26**, 348-358.

Martin, J.J., & Mushett-Adams, C. (1996). Social support mechanisms among athletes with disabilities. *Adapted Physical Activity Quarterly*, **13**, 74-83.

McAuley, E., & Gill, D.L., (1983). Reliability and validity of physical self-efficacy in a competitive sport setting. *Journal of Sport Psychology*, **5**, 185-191.

McAuley, E., & Mihalko, S.L. (1998). Measuring exercise related self-efficacy. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 371-390). Morgantown, WV: Fitness Information Technology.

Nunnally, J.C. (1978). *Psychometric theory*. (2nd ed.). New York: McGraw Hill.

Okwumabua, T.M. (1986). Psychological and physical contributions to marathon performance. *Journal of Sport Behavior*, **8**, 163-171.

Raglin, J.S., & Hanin, Y.L. (2000). Competitive anxiety. In Y.L. Hanin (Ed.), *Emotions in sport* (pp. 93-112). Champaign, IL: Human Kinetics.

Raglin, J.L., & Turner, P.E. (1993). Anxiety and performance in track and field athletes: A comparison of the inverted U-hypothesis with zone of optimal functioning theory. *Personality and Individual Differences*, **14**, 163-171.

Rejeski, W.J. (1992). Motivation for exercise behavior: A critique of theoretical directions. In G.C. Roberts (Ed.), *Motivation in sport and exercise* (pp. 129-157). Champaign, IL: Human Kinetics.

Treasure, D., Monson, J., & Lox, C.L. (1996). Relationship between self-efficacy, wrestling performance, and affect prior to competition. *The Sport Psychologist*, **10**, 73-83.

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, **54**, 1063-1070.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin*, **98**, 219-235.

Williams, J.(2001). *Applied sport psychology* (4th ed). Mountain View, CA: Mayfield.

Williams, T., & Taylor, D. (1994). Socialization, subculture, and wheelchair sport: The influence of peers in wheelchair racing. *Adapted Physical Activity Quarterly*, **11**, 416-428.

Manuscript submitted: February 21, 2001
Revision received: August 23, 2001