

THE EFFECT OF COMPETITIVE MOTIVATION ON
THE ATTENTIONAL FOCUS OF DISTANCE RUNNERS

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Despite several decades' worth of research devoted to understanding the attentional processes of distance runners, little progress has been made in terms of developing a theory to explain individual differences in attention during endurance sports. More recently, there has been some speculation that competitive motivation or other motivational factors may play an important role in determining the extent to which runners focus their attention on internal and task-related cues such as breathing or muscle fatigue (i.e., associative focus) or on external and task-unrelated cues such as objects or noises in the environment (i.e., dissociative focus). In this study, the hypothesis that distance runners engage in more associative focus under competitive conditions is investigated by asking participants to complete the Attentional Focus Questionnaire (Brewer, Van Raalte, & Linder, 1996) after both a 5K race and a training run of approximately the same distance. Individuals competing in one of four 5K races in Ohio were invited to participate, resulting in a total of 136 runners who returned questionnaires after finishing both the 5K race and the training run. Participants also completed the Motivations of Marathoners Scale (Masters, Ogles, & Jolton, 1993) and a measure containing demographic information. Results of the study indicate that runners associated more under competitive conditions (i.e., during the 5K race) than under non-

competitive conditions (i.e., during the training run). The amount of pre-race training reported by the runners moderates the relationship between competitiveness and association, with runners who indicated that they trained over greater distances demonstrating a sharper increase in association from training to competition than those who trained less. In contrast to the findings of previous studies, neither association nor dissociation predict finish time for the race after controlling for demographic variables, individual competitiveness, and the amount of pre-race training. The results of the study provide evidence that competitive motivation influences the attentional focus of distance runners. The discussion includes the development of a working model to explain differences in attentional focus associated with conditions of varying competitiveness as well as limitations of the study and suggestions for future research.

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Introduction

The concepts of association and dissociation as cognitive strategies employed by athletes or exercisers were first introduced by Morgan and Pollock (1977) in a study of the psychological characteristics of middle- and long-distance runners. These authors noted that elite runners tended to monitor physiological factors such as breathing and muscle fatigue (i.e., to associate) more so than non-elite runners, who tended to mentally block such sensory information from awareness (i.e., to dissociate) during competition. Morgan and Pollock (1977) hypothesized that the elite runners could afford to monitor physiological activity due to their superior physical condition, whereas non-elite runners needed to dissociate in order to overcome the pain and fatigue that might prevent them from finishing the race. Although this hypothesis has been contested (see Masters & Ogles, 1998a), the Morgan and Pollock (1977) study sparked an interest in examining association and dissociation in exercise and athletic environments.

Since the Morgan and Pollock (1977) study, close to 35 empirical studies utilizing association/dissociation as either dependent or independent variables have been published in the sport psychology literature. Researchers have examined the relationship between association/dissociation and a host of variables such as performance, training, injury, motivation, and perception of pain and exertion (Brewer, Van Raalte, & Linder, 1996; Masters & Lambert, 1989; Masters & Ogles, 1998b; Okwumabua, Meyers, Schleser, & Cooke, 1983; Pennebaker & Lightner, 1980; Schomer, 1986; Weinberg, Smith, Jackson, & Gould, 1984). Participants in these studies range from novice runners to elite

marathoners, and the researchers have employed a variety of methods for measuring attentional focus.

One piece of this growing body of literature that is conspicuously missing, however, is a comprehensive theory to account for individual differences in attentional focus during endurance activities. Several lines of correlational research suggest that competitive motivations are related to the attentional focus of distance runners (e.g., Masters & Lambert, 1989; Masters & Ogles, 1998b; Morgan & Pollock, 1977; Silva & Appelbaum, 1989). Only three studies (i.e., Heffner, Ogles, & Marsden, 2003; Ogles, Lynn, Masters, Hoefel, & Marsden, 1993-1994; Masters & Lambert, 1989) to date, however, have attempted to make a direct comparison between the attentional focus of runners in competitive conditions versus non-competitive conditions. Both of these studies had significant methodological problems, however, which resulted in the conclusions being of questionable validity, at best.

The purpose of the present study is to provide a more valid comparison between attentional focus in competitive and non-competitive conditions by improving upon the methodology of previous studies. Because the results of such a comparison could lend strong support to a motivational account of attentional focus, it makes a significant contribution toward the development of a theory to explain differences in self-reported associative or dissociative focus among runners.

Literature Review

In the sections that follow, I will present the background for the study by providing a comprehensive review of the available literature on association and dissociation among endurance athletes. In this review, I will highlight the evolution of the definition and measurement of attentional focus constructs as well as the importance of the topic for those with academic and applied sport psychology interests. In closing, I will provide an overview of factors thought to influence attentional focus in distance runners, highlighting the potential role of motivation as part of a multifactorial model of attentional focus determinants.

Attentional Focus: Definition and Measurement

Although a multitude of studies have examined association and dissociation as cognitive strategies used by individuals engaged in endurance tasks, one major difficulty in synthesizing the results of research in the area is the lack of agreement regarding the parameters of these constructs and the lack of consistency in the terminology used to label them. Morgan and Pollock (1977), in their groundbreaking study of cognitive strategies employed by marathon runners, coined the terms association and dissociation to refer to the degree to which sensory information is processed by the athlete during the race. Runners using associative strategies are thought to monitor the sensory information so as to regulate performance, whereas dissociating runners block conscious processing of this information by focusing attention elsewhere.

Many researchers studying the use of the cognitive strategies described by Morgan and Pollock (1977) have demonstrated a preference for alternative terminology.

Some of the more frequently-utilized terms include attentional focus (e.g., Brewer & Karoly, 1989; Wrisberg & Pein, 1990), distraction (e.g., McCaul & Malott, 1984), attentional style (e.g., Russell & Weeks, 1994), external/internal information processing (e.g., Fillingim & Fine, 1986), and associative/dissociative coping (Tammen, 1996).

With a few exceptions, these different terms generally refer to the same phenomena and are measured and/or manipulated in a similar manner. For the purposes of this paper, the terms will be used interchangeably to refer to association/dissociation, as I will attempt to preserve the language utilized by the authors when describing studies in the literature review.

Although there has been surprisingly little discourse on the issue of terminology, Masters and Ogles (1998a) have suggested that the lack of consensus in this area arises from at least two difficulties with current nomenclature. First, these authors assert that some researchers are reluctant to adopt the term “dissociation” as proposed by Morgan and Pollock (1977) due to the concern that this term is also used when describing psychopathology. Despite empirical evidence that pathological dissociation appears to be a qualitatively different phenomenon than the dissociation that has been observed in runners and other individuals involved in endurance tasks (i.e., Ogles et al., 1993-1994), dissociation still appears to have some negative connotation.

Alternative terminology involving the construct of attention also presents some theoretical difficulties. Masters and Ogles (1998a) point out that the use of the internal versus external focus of attention distinction does not adequately capture the complexity of the cognitive processes thought to be involved in association and dissociation during

running, exercising, or performing other tasks requiring endurance. More specifically, these authors contend that there is too much variability within the internal and external classifications to make this simple distinction useful for research purposes.

Noting this limitation, some authors have attempted to further divide the association and dissociation constructs into a larger number of factors. Padgett and Hill (1989) were the first to incorporate these new divisions into an empirical investigation. These authors placed non-associative thoughts into two categories: dissociation and external focus. Dissociation was exemplified by internal, imaginative cognitive activity (e.g., writing imaginary letters), whereas external focus referred to attention directed toward external stimuli such as competitors or surroundings. Unfortunately, the authors did not discuss their rationale for using this particular model, and the results of the study do not provide empirical support for a 3-factor model given that participants in the two non-associative conditions (i.e., dissociation and external focus) did not differ significantly from one another on the outcome measures (i.e., running times, estimated effort, and estimated passage of time).

Goode and Roth (1993) also questioned the 2-factor structure originally proposed by Morgan and Pollock (1977), suggesting instead that a 5-factor model may best capture the variability of attentional focus. These authors conducted exploratory and confirmatory factor analyses on data collected using the Thoughts During Running Scale, a 38-item inventory asking respondents to indicate the frequency with which they attend to particular foci while running. The five factors that emerged from their analyses to categorize the runners' thoughts were associative, external surroundings, interpersonal

relationships, daily events, and spiritual reflection. In contrast to the findings of Padgett and Hill (1989), however, Goode and Roth's (1993) results suggest that the additional factors generated in their analyses are differentially related to variables of interest such as change in mood during a run, providing evidence for the utility of these factors.

Most recently, Stevinson and Biddle (1998) proposed a 2-dimensional model of attentional focus in which thoughts are classified by direction (internal vs. external) as well as task-relevance (task-relevant vs. task irrelevant). Figure 1 provides examples of attentional targets falling into each of the four categories created by this two-dimensional system.

In addition to definitional difficulties, another aspect of attentional focus research that has presented some problem is the measurement of the constructs of interest. Masters and Ogles (1998a) have identified at least three methods of gathering data related to attentional focus: paper and pencil inventories, structured interviews, and tape recording thoughts articulated by the participant during the run or exercise. Each of these methods has unique strengths and weaknesses, which I will discuss in turn.

Paper and pencil inventories are, by far, the most widely used method of gathering attentional focus data. Of the 26 studies of association/dissociation cited by Masters and Ogles (1998a) in their review, 21 of the investigations utilized one of a variety of paper and pencil measures. Some of the measures employed include the Attentional Focus Questionnaire (Brewer, Van Raalte, & Linder, 1996), the Marathon Race Diary (Masters & Lambert, 1989), the Thoughts Checklist (Okwumabua et al., 1983), and the Running Style Questionnaire (Silva & Appelbaum, 1989). Although the

ease of administration and scoring associated with paper and pencil measures make these inventories popular among researchers, several weaknesses of this methodology are apparent. First, with the exception of the Attentional Focus Questionnaire, little psychometric data is available for any of these instruments. Second, these measures gather retrospective data, which are subject to criticism on the grounds of potential for error due to memory limitations.

Structured interviews have also been used by some authors (e.g., Morgan, O'Connor, Ellickson, & Bradley, 1988) to assess the attentional focus or cognitive strategy usage of runners. Using this type of methodology, researchers typically conduct interviews following the run in which they tape record participants describing their thoughts during the race. The responses are then coded using a system of classification based on Morgan and Pollock's (1977) conceptualization of association and dissociation. One major benefit of using the structured interview methodology is that researchers can ask participants to elaborate upon responses and, in so doing, avoid interpretive difficulties that might arise when participants write ambiguous responses on paper-and-pencil inventories. It should be noted, however, that no studies to date have demonstrated that the structured interview is superior to the paper and pencil method of measuring association/dissociation. Researchers using structured interviews often fail to report interrater reliability data, making it difficult to evaluate the utility of this measurement method (Masters & Ogles, 1998a). In conclusion, then, the additional time and resources required to complete a structured interview as opposed to a paper and

pencil inventory, as well as the issue of questionable reliability, may make this method less attractive to researchers.

Recognizing the need for a methodology that does not rely solely on retrospective reports of runners' attentional focus, Schomer (1986) recorded participants' articulated thoughts using a microcassette recorder and developed a classification system to categorize these thoughts as associative or dissociative. Despite the intuitive appeal of the here-and-now approach as an alternative to retrospective reports, this research design also has several problems. First, there was a notable difference in the frequency of associative thoughts reported by Schomer's (1986) participants and the frequency reported in the rest of the association/dissociation literature, suggesting the possibility that this method of measurement may experimentally induce increased associative thinking (Masters & Ogles, 1998a). In addition, Masters and Ogles (1998a) point out that the method is somewhat invasive and may interfere with the runner's natural focus of attention by forcing them to focus on their own thinking, thereby reducing their capacity to dissociate.

Why Study Attention in Sport Psychology Research?

The importance of studying attention in sport psychology research is a much less controversial topic than the definition and measurement of attentional focus. Anecdotal evidence supporting the crucial role that attention plays in sport performance is abundant, as any sports enthusiast would not be hard-pressed to provide an example of an instance where a moment of inattention made the difference between winning and losing for an individual or team. Missing the game-winning free-throw after being distracted by the

crowd or being penalized and losing a game for calling a time-out when the team has no time-outs left are but two examples of such moments, providing evidence that the ability to focus and sustain attention toward selected targets plays a significant role in the success of athletes in their sport.

In reviewing research focusing on attentional processes in sport, Abernethy (2001) notes that attention is cited as a significant contributor to the acquisition and development of expert skills in sport. He also suggests that the study of attention is particularly relevant in sports that involve the simultaneous performance of multiple skills, such as dribbling a soccer ball while looking for teammates who are open for a pass. Less clear, however, from both an empirical and an intuitive standpoint is the role that attention plays in endurance sport performance. The sections that follow will provide a review of empirical evidence for the relationship between attentional focus and performance in endurance tasks, with an emphasis on distance running. I will also examine relationships between attentional focus and other factors pertinent to performance such as perceived effort or exertion and injury.

Attentional Focus and Running Performance

The majority of association/dissociation studies have examined the relationship between attentional focus and performance in a running task. The tasks employed in these studies vary greatly in length, however, from one mile to a marathon. Likewise, the individuals recruited to participate in the studies are diverse in terms of skill and experience, ranging from novice to elite distance runners.

Generally, investigations of attentional focus and running performance fall into two categories based on the study design: experimental (or quasi-experimental) and correlational. Experimental studies involve the manipulation of attentional focus in order to determine if and how running performance is affected. These studies have been conducted with both novice and experienced runners. Correlational research, on the other hand, primarily utilizes more experienced runners as participants, examining relationships between self-reported focus of attention and performance in a competition (e.g., a marathon).

Experimental/quasi-experimental studies. Pennebaker and Lightner (1980) reported the first experimental study of attentional focus. These researchers had participants jog 1800 meters on successive days for two weeks, alternating between a cross-country course and a lap course. Pennebaker and Lightner (1980) hypothesized that participants would perform better on the cross-country course than on the lap course because the cross-country course would promote greater processing of external stimuli, which would interfere with the processing of internal cues that lead to feelings of fatigue. Their hypothesis was supported by the data, as participants had significantly faster times on the cross-country course (i.e., external focus condition) than they did on the lap course. Unfortunately, however, the authors did not include any direct measurements of attentional focus in the study. Thus, the validity of their data in addressing questions of the effects of manipulating attentional focus rests rather unsteadily on the assumption that the two courses induced different patterns of attentional focus.

One other study used a similar methodology, relying on alterations of environmental stimuli to induce the desired attentional focus. Wrisberg, Franks, Birdwell, and High (1988) had participants exercise on a treadmill twice; once while viewing themselves in a mirror (self-focus condition) and once while watching a movie (external focus condition). The performance outcome measure in this study was endurance on the graded exercise task (i.e., time to exhaustion). Wrisberg et al. (1988) found no significant differences between groups on this performance measure (even using an alpha level of .10). It is quite possible, however, that this finding is a reflection of inadequate power to detect differences, as these researchers utilized only 20 participants for a 2 X 2 mixed factorial design.

Okwumabua et al. (1983) took a slightly different approach to the manipulation of attentional focus. These authors provided verbal instructions to each group of participants, who were members of three university fitness classes, regarding the use of one of the cognitive strategies to be investigated. One class was instructed to associate (i.e., monitor body signals such as temperature and fatigue), one class was instructed to dissociate (i.e., focus on something unrelated to running and repeating a mantra), and one class was instructed to use relaxation techniques (i.e., a variation of progressive muscle relaxation). The results of the study indicated that there were no significant differences between the three groups in performance on a 1.5-mile run. Importantly, however, the authors found that participants, as a whole, did not adhere well to the cognitive strategy instructions and that all participants became more associative as they completed more running trials. Thus, since the manipulation of attentional focus was unsuccessful, the

results of the Okwumabua et al. (1983) study cannot address the question of the impact of different foci of attention on running performance. This study does, however, highlight the importance of manipulation checks, which were in fact used in the majority of other investigations utilizing a similar methodology.

Weinberg et al. (1984) also utilized verbal instruction as a means of manipulating attentional focus. The participants, who had to report running at least 15 miles per week in order to meet inclusion criteria, were all instructed to complete as many laps on a track as they were able to run in a period of 30 minutes. Participants in the experimental groups were provided with further instruction to use one of three designated cognitive strategies during the run: dissociation (concentrating on pleasant ideas or imagery unrelated to exercise), association (focusing on bodily signals such as exertion, muscle fatigue, and breathing), and positive self-talk (repeating encouraging statements to oneself). Weinberg et al. (1984) found no significant differences between groups (including the control group) on the measure of performance, which was the number of completed laps. Additionally, results of the manipulation check indicated no between-group differences on the participants' estimates of the percentage of time spent using the cognitive strategy in which they were instructed, with the mean of the entire sample being 71.5%.

The results of the Weinberg et al. (1984) study, then, suggest that participants adhered fairly well to the cognitive strategy instructions (or at least reported that they did) and that the manipulation had little or no impact on task performance. The use of participants who had some experience with distance running certainly improves the

generalizability of the findings to athletes, yet, as the authors point out, it may be problematic in other respects. For example, if participants were unable to use the assigned strategy effectively due to a priori preferences that developed as a result of experience, then the null findings are of questionable validity. Weinberg et al. (1984) are not the first to suggest such an alternative explanation for their findings. Other researchers (Sachs, 1984) have likewise suggested that experienced runners who have a favored cognitive strategy may experience difficulty when asked to use a non-preferred strategy.

Saintsing, Richman, and Bergey (1988) looked at improvements in running performance among students in a physical conditioning class who had received instruction in one of three cognitive strategies: maintaining a task-specific focus (association), focusing on thoughts that were not specific to the running task (dissociation), or “do[ing] anything they needed to do to become fired up emotionally to aid their performance” (p. 35). The control group was given a 2-minute lecture on the physical benefits of running. Over a period of two weeks, participants completed multiple runs using their assigned cognitive strategy. In their final analyses, the authors used only the difference score between the first (pre-instructional) and last (post-instructional) timed runs to determine improvement, demonstrating that participants in the association group showed greater improvements than both the dissociation and psyching-up groups, which did not differ significantly from the control group in terms of improvement.

Data from Saintsing et al.'s (1988) manipulation check, however, leave open the distinct possibility of alternative interpretations of the data. As a check on the effectiveness of the cognitive strategy manipulation, participants were asked to estimate the percentage of time that they adhered to the experimental instructions. The results were fairly dismal: the association group averaged 62% of the time, the dissociation group averaged 43%, and the psyching-up group fell in between with an average of 56%. More importantly, these rates may differ significantly (although the authors do not report such an analysis), leaving better adherence to instructions as a viable alternative explanation for the superiority of the associative cognitive strategy in producing improvements on a running task.

Padgett and Hill (1989) conducted two studies in which the effects of cognitive strategy manipulation on endurance performance (i.e., cycling and running) were examined. In the running study, 12 members of a university track team ran a mile on three consecutive days after being provided with different instructional sets on each day. Thus, on any of the three testing days, participants either received instructions to focus on pleasant images or thoughts that were not exercise-related (dissociation), were asked to attend to environmental stimuli such as cars or objects on the track (external focus), or were read a brief passage about running that contained no instruction to use a particular cognitive strategy. Participants in the external focus condition completed the 1-mile course significantly faster than participants in the control group whereas the dissociation group did not.

Finally, Fillingim and Fine (1986) examined the effects of internal versus external information processing (i.e., association vs. dissociation) on performance in a 1-mile run. Using a repeated-measures design, these authors asked participants to complete the mile run under two experimental conditions. In the word-cue (external information processing) condition, participants listened to a tape and counted the number of times that a designated word was repeated while they were running. In the breathing (internal information processing) condition, participants were instructed to focus on their bodies (e.g., heart rate and breathing). Participants in the control condition received no instructions related to information processing. The results of this study indicated that there were no significant differences in finish times for the mile run that could be attributed to the experimental manipulation. It should be noted, however, that the authors did not include a formal manipulation check and instead reported anecdotal evidence to support their contention that the manipulation was effective.

In summary, the results of the previously reviewed experimental and quasi-experimental studies are mixed with respect to the influence of attentional focus manipulation on running performance. One study (i.e., Saintsing et al., 1988) suggested that an associative focus (but not a dissociative focus) facilitates improvement on a running task over a short period of time, whereas the results of two other studies (i.e., Padget & Hill, 1989; Pennebaker and Lightner, 1980) supported the authors' hypotheses that an external focus of attention improves performance and an internal focus does not. In the remaining four studies (i.e., Fillingim & Fine, 1986; Okwumabua et al., 1983;

Weinberg et al., 1984; Wrisberg et al., 1988), the manipulation of attentional focus did not appear to have an impact on performance.

The development of conclusions from the experimental or quasi-experimental studies must take into account, however, the methodological limitations of this line of research as well as those of the individual studies. Since the limitations of the individual studies were addressed earlier (e.g., small sample size, failure to use manipulation checks), I will only address the limitations that apply to this area as a whole to avoid redundancy. Two major limitations of this research will be discussed: effectiveness of altering attentional focus and failure to measure and account for attentional focus in control groups.

At least two studies (Okwumabua et al., 1983; Saintsing et al., 1988) have suggested that attentional focus is difficult to manipulate with verbal instruction. Other authors (e.g., Weinberg et al., 1984) have reported more favorable results, yet rates of adherence range from approximately 40% to 70% in terms of time spent using the appropriate attentional focus during the running task. Needless to say, such adherence rates are far from ideal. Also, none of the reviewed studies incorporated measures of social desirability (e.g. Crown & Marlowe, 1960) to address the potential for participants to overestimate their compliance with the instructions due to demand characteristics, so it is possible that the true adherence rates are even lower than reported.

Weinberg et al. (1984) have suggested that adherence to verbal instructions may be especially problematic for experienced athletes who have already developed a preference for one type of attentional focus and are asked to maintain the non-preferred

focus. In this scenario, it would be important for the researchers to address both the runner's motivation to use the assigned strategy as well as offering more extensive instruction and practice in the use of the non-preferred focus. No studies to date have addressed these issues, however.

An alternative method of manipulating attentional focus is available, as well. First utilized by Pennebaker and Lightner (1980), this method involves altering environmental stimuli to promote different foci of attention. Unfortunately, these authors did not include a measure of attentional focus to determine the effectiveness of the manipulation. Wrisberg et al. (1988), who used a similar methodology, did include a *de facto* measure of attentional focus, yet the results of their manipulation check are somewhat difficult to interpret given the nature of the data they reported. Rather than reporting a percentage of time using a particular focus of attention during the task, as is commonly reported in other studies, they reported the frequency of participants' reports of using the assigned focus (i.e., indicating that 19 of the 20 participants reported using the external focus successfully and that 16 of the 20 reported using an internal focus successfully). Given this lack of data to effectively address the effectiveness of this form of attentional focus manipulation, then, it is impossible to say whether or not this method represents an improvement over the verbal instruction method. Thus, manipulation effectiveness continues to be a cause for concern.

A second major limitation of this line of research is a widespread inattention to the appropriateness of comparisons between experimental and control groups. Surprisingly, in most cases, researchers have not attempted to measure the attentional

focus of the control groups. Instead, they seem to rely on the assumption that members of the control group, on average, do not demonstrate a tendency to maintain one form of attentional focus to a significantly greater extent than another. Although there is no empirical evidence to suggest that association is used more frequently than dissociation in a certain population or vice versa, there is also no evidence to support the assumption that they should, on average, be used at a roughly equal frequency. Inclusion of measures to assess attentional focus in control groups, then, would significantly improve the validity of performance comparisons between control and experimental groups.

Correlational Studies. Since Morgan and Pollock's (1977) initial report of elite marathon runners' preference for association over dissociation, a host of studies have included or focused upon correlations between attentional focus and running performance. The majority of these studies have been conducted with marathon runners in a naturalistic setting, although one laboratory study reported a correlational analysis for attentional focus and performance on a running task.

Okwumabua (1985) conducted one of the first studies of attentional focus and performance in a marathon. In this study, there was no evidence of a relationship between association/dissociation and marathon finish time. Likewise, Schomer (1986) re-examined Morgan and Pollock's (1977) finding that elite marathoners demonstrate a preference for association over dissociation and concluded that there were no differences in the amount of association used by novice versus superior marathoners. It is possible, however, that this finding is an artifact of Schomer's method of measuring attentional focus, which involved the tape-recording of thoughts verbalized by participants during

the run. Masters and Ogles (1998a) have suggested that this method is intrusive and may actually induce association, as participants are required to focus internally in order to monitor and report cognitive activity.

Silva and Appelbaum (1989) administered the Running Styles Questionnaire to a group of Olympic marathon hopefuls and conducted additional interviews in an effort to examine the relationship between association/dissociation and performance. These authors conducted discriminant function analyses to separate runners finishing in the top 50 from those runners finishing after the top 50. The results of the analysis suggested that top-50 finishers used both association and dissociation in a flexible manner as needed and, overall, associated more throughout the race than the lower finishers. The lower finishers, on the other hand, were predominantly dissociative from the beginning to the end of the race.

At least three other studies, all of which utilized marathon runners as participants, have demonstrated a relationship between attentional focus and running performance. Both Heffner and Ogles (2002) and Masters and Lambert (1989) found significant negative correlations between association and finish time for a marathon ($r = -.32$ and $-.30$, respectively). The results of a study reported in an article by Masters and Ogles (1998b) also reported a significant positive correlation between dissociation and average marathon finish times ($r = .43$). Thus, it appears that association is related to faster finish times whereas dissociation is related to slower times in a marathon.

In summary, the majority of the correlational research suggests a relationship between attentional focus and running performance. More pointedly, association appears

to be related to faster running, whereas dissociation is related to slower running. Several limitations of this area of correlational research should be noted here, however. First, causation cannot be determined using such a research design. The bidirectionality of the observed relationships between association/dissociation and performance can be a significant barrier to the development of theory and theory applications, especially given the inconclusive findings of the experimental/quasi-experimental studies reviewed previously. Second, significant concerns have been raised regarding methods of measuring attentional focus. As noted previously, the validity of all varieties of available measures (e.g., paper-and-pencil measures, tape recordings of verbalized thoughts) has been questioned. Because no plausible alternatives to the currently available measures have been developed, however, Masters and Ogles (1998a) suggest the use of multiple measures of attentional focus to improve validity.

Attentional Focus and Performance on Other Exercise Tasks

In addition to investigations focused on the relationship between attentional focus and running performance, several studies have examined association/dissociation and performance in other exercise or endurance tasks such as walking and leg extension. Most of the studies reviewed here used an experimental or quasi-experimental design. In these studies, attentional focus was generally manipulated through verbal instruction.

Experimental/quasi-experimental studies. Morgan, Hortsman, Cynerman, and Stokes (1983) used verbal instructions to manipulate attentional focus in a study of endurance walking. Half of the participants were provided with a rationale and procedural information regarding the use of dissociation. These instructions required that

they focus on a point or object directly in front of them and repeat the word “down” to themselves with every leg movement. The instructions also suggested that, by using the dissociative technique, they would experience reduced discomfort or exertion as compared to the previous trial in which they were not instructed to dissociate. Although there were no differences between the dissociation group and the control group in terms of physiological measures such as heart rate and blood lactate concentration, participants in the dissociation group had significantly better endurance times walking at 80% of their VO₂ max than the control group. According to these authors, the results provide strong evidence of the role of psychological factors in performance on an endurance task without supporting the existence of physiological mediators. The conclusions drawn about the effectiveness of dissociation, however, are somewhat questionable. As Schomer (1986) points out, the use of a rhythmic mantra or pseudo-mantra such as “down” would draw attention to pacing, which would be classified as a more associative or internal focus. Thus, although the study provides evidence that cognitive strategies do affect performance in an endurance task, it is unclear which cognitive strategy was used by participants in the experiment.

In the second study reported by Weinberg et. al (1984), the effects of association, dissociation, and positive self-talk on endurance performance were examined using a leg-extension task (i.e., muscular endurance). The methodology utilized in this study was nearly identical to that of Study 1, which was described in a previous section. After receiving verbal instruction regarding the use of the assigned cognitive strategy (or lack thereof, in the case of the control group) participants held one leg horizontally for as long

as they could. A main effect for cognitive strategy was found, with participants in the dissociation and positive self-talk conditions keeping their legs extended significantly longer than association or control group participants.

Spink (1988) also utilized the leg-extension endurance procedure to investigate the effect of two cognitive strategies on task performance. Participants assigned to the dissociation condition were instructed to focus on images or thoughts unrelated to the task. Instructions to the dissociation/analgesic group were the same, with the addition of an analgesic suggestion. Participants in this group were told that “recent research has indicated that the technique that you have been shown is a very effective method in reducing the discomfort and pain associated with endurance exercise” (p. 100). Analysis of endurance times indicated that the dissociation/analgesic group outperformed both the dissociation group and the control group, which did not significantly differ from one another.

Weinberg (1985) manipulated both self-efficacy (high vs. low) and cognitive strategies (dissociation vs. positive self-talk coping) to determine the impact on performance in the leg-extension endurance task. The cognitive strategy manipulation involved verbal instructions to either focus on something pleasant but unrelated to the task (dissociation) or to provide self-encouragement continuously throughout the task with positive statements (positive self-talk coping). Although self-efficacy was found to play a role in endurance (i.e., higher self-efficacy was associated with greater endurance), no main effect or interactions involving cognitive strategy were found. Since no control

group was included, however, the results suggest only that the two cognitive strategies were equally effective or ineffective in facilitating performance.

Finally, Rejeski and Kenney (1987) examined the effects of varying the cognitive complexity of distraction tasks (dissociation) on exercise performance. Using an isometric contraction task as the measure of endurance, these authors instructed participants to engage in either a simple cognitive task (i.e., counting backward from 1000) or a complex cognitive task (i.e., sequential arithmetic) while maintaining a level of contraction that was 40% of their maximum. Results indicated that both of the dissociation groups outperformed the control group but did not differ significantly from one another in endurance time.

Results of studies examining the effects of attentional focus on performance in a non-running task are suggestive of the effectiveness of dissociation (particularly when paired with an analgesic suggestion) in enhancing task performance. However, these studies are subject to the same criticisms discussed in the previous sections. First, two of the four studies (Morgan et al., 1983; Spink, 1988) failed to include a manipulation check, which is particularly problematic given the concerns with the effectiveness of verbal instruction manipulations. Adherence rates reported in the other two studies were similar to those reported previously, with participants reporting that they used the assigned cognitive strategy, on average, 62% of the time in the Weinberg (1985) study and 74% of the time in the Weinberg et al. (1984) study. Second, control groups were either not utilized (Weinberg, 1985) or were not assessed regarding their spontaneous use of cognitive strategies, which limits confidence in the authors' conclusions regarding the

effectiveness of the strategies. Additionally, it is unclear to what extent the results of studies incorporating endurance tasks such as leg-lifting can be generalized to running, as the two endurance tasks seem to be strikingly dissimilar.

Correlational study. Brewer, Van Raalte, & Linder (1996) asked participants to complete a 12-minute stair-climbing exercise, after which they completed a self-report measure of attentional focus (the AFQ). Results of this study indicated that greater association scores on the AFQ were significantly correlated with better performance on the exercise task ($r = .37$), as indicated by a greater number of stairs climbed in the allotted time. This finding is consistent with the results of the correlational running studies in which faster performances were found to be related to a greater frequency of associative thoughts.

Attentional Focus and Perceived Effort/Exertion

Many of the studies reviewed in the previous sections on performance also examined the relationship between attentional focus and perception of effort or exertion. Most of these studies used experimental or quasi-experimental designs, whereas the physical activities in which the participants engaged were more heterogeneous. Again, since the focus of the present study is on distance runners, studies will be grouped separately by the exercise task utilized.

Running studies. Pennebaker and Lightner (1980) indicated that participants reported equivalent amounts of fatigue following completion of two courses designed to induce a different focus of attention: a lap course (internal focus condition) and a cross-country course (external focus condition). This finding is especially noteworthy,

however, given the fact that participants ran faster on the cross country course than on the lap course. Thus, even though their physical output was greater on the cross country course, their level of self-reported fatigue did not increase along with their pace. The authors conclude, then, that greater attention to external stimuli reduces capacity to focus internally and results in less experience of fatigue and exercise-related symptoms.

Filligim and Fine's (1986) findings were consistent with those of Pennebaker and Lightner (1980). Participants who jogged one mile while completing a simple cognitive task (i.e., word-counting) reported feeling less fatigue, shortness of breath, and cramping than participants who were instructed to attend to their breathing and heart beat. Wrisberg et al. (1988) also reported that participants in their study reported greater perceived exertion in the self-focus condition than in the external focus condition, although this finding emerged only in the taper-down period of a graded exercise task in which participants ran to the point of exhaustion.

Weinberg et al. (1984) allowed participants to set their own pace in a 30-minute run. After the participants completed the run, they were asked to rate their fatigue and experience of exercise symptoms (e.g., shortness of breath, racing heart, upset stomach). The results of this study suggested that cognitive strategy usage (i.e., association, dissociation, or positive self-talking coping) did not have an impact on perceptions of fatigue or exercise symptoms. Importantly, performance did not differ between groups, as it did in the Pennebaker and Lightner (1980) study.

Padgett and Hill (1989), in their examination of the differential effects of dissociation and external focus on endurance performance, found that participants in both

of the experimental groups reported greater effort expenditure than participants in the no-imagery control group. They also found, however, that participants in the experimental groups had faster finish times than control group participants, which suggests that the relationship between cognitive strategies and perception of effort may be mediated by actual effort.

The results of two correlational studies of marathon runners have produced conflicting results regarding the relationship between attentional focus and perceived exertion. Schomer (1986) reported a strong, positive linear relationship between the proportion of time spent associating during a training run and participants' ratings of perceived exertion (although the exact correlation was not provided). Heffner and Ogles (2002), however, reported that none of the attentional focus variables (i.e., AFQ scale scores for association, dissociation, and distress) included in a regression equation to predict perceived exertion were significant after controlling for sex, age, competitiveness, training, skill, and experience.

The previous studies provide some evidence that attentional focus is related to runners' perceived exertion or effort. Data from three experimental studies (i.e., Fillingim & Fine, 1986; Pennebaker & Lightner, 1980; Wrisberg et al., 1988) suggest that an external or dissociative focus reduces perception of fatigue or exertion as compared to an internal or associative focus, and one correlational study reported a positive relationship between association and perceived exertion. Still other studies (Heffner & Ogles, 2002; Weinberg et al., 1984) found no relationship between attentional focus and perceived exertion.

Padgett and Hill's (1989) findings highlight a significant interpretative difficulty in this area of the literature, however. It can be troublesome to attempt direct measurement of the relationship between attentional focus and perception of effort or exertion, as performance sometimes varies with focus of attention and may be a mediator of any observed relationship between the variables of interest (e.g., Padgett & Hill, 1989). Although performance, or physical output, can be held constant by having participants run at a designated percentage of their VO_2 max (e.g., Beaudoin, Crews, & Morgan, 1998), this represents a substantial threat to the external validity of the study and is all but impossible in more naturalistic settings such as a marathon. Thus, although it may not always be prudent to experimentally control for physical output in these studies, this factor should certainly be incorporated into the discussion of results of both experimental and correlational studies linking attentional focus to perceived effort or exertion.

Other exercise tasks. Pennebaker and Lightner (1980) found that listening to clips of street sounds (external focus of attention) while walking on a treadmill resulted in reduced perception of exercise symptoms and fatigue as opposed to listening to a magnified version of their own breathing. Weinberg et al. (1984), on the other hand, found no significant differences in reports of exercise symptoms among groups that were instructed in the use of a cognitive strategy (i.e., dissociation, association, positive self-talk coping) and the control group that was not provided with instructions for a leg-lift endurance task.

In addition to these walking and muscular endurance studies, several investigations have utilized cycling as the experimental endurance task. Johnson and

Siegel (1992) had participants complete a 15-minute cycle ergometer task at 60% VO_2 max after receiving instruction in the use of association or dissociation. This study was unique in that it involved instruction in two different forms of dissociation: internal and external. In the internal dissociation condition, participants were asked to attempt to recall all of their teachers' names from kindergarten through college. In the external dissociation condition, the experimenters engaged the participants in a conversation while they pedaled. The authors reported that, although post-exercise heart rates did not differ among the three experimental groups and the control group, ratings of perceived exertion did differ. Specifically, the association condition had higher ratings of perceived exertion than the internal dissociation condition, suggesting that an internal focus of attention increases perception of fatigue resulting from exercise as compared to an external focus of attention. In support of this finding, Padgett and Hill (1989) reported that an internal focus during a 30-minute period of exercising on a stationary bicycle produced a greater perception of effort than cycling while distracted (i.e., external focus).

Russell and Weeks (1994), however, found no differences in ratings of perceived exertion in a small sample ($N = 7$) of cyclists who rode under varying attentional focus conditions (association, dissociation, control). Although these findings are consistent with Weinberg et al. (1984), they add minimal support for the conclusion that attentional focus does not influence perceived exertion. Unfortunately, the most parsimonious explanation for Russell and Weeks' (1994) null findings is probably a lack of adequate statistical power to detect differences in means on a 1-item scale (Borg, 1973).

Similar to the previous section, the majority of studies (Johnson & Siegel, 1992; Padgett & Hill, 1989, Pennebaker & Lightner, 1980) reviewed here suggest that an associative or internal focus of attention results in a greater perception of exertion than a dissociative or external focus. Of the two studies that reported no differences in ratings of exertion due to attentional focus manipulations, however, one (Russell & Weeks, 1994) utilized a very small sample and the other (Weinberg et al., 1984) reported differences between experimental groups in physical output. The latter finding, which suggested that individuals in the dissociation condition reported a similar amount of perceived exertion to participants in the association and control conditions even though the dissociators had better endurance times, may actually fall in line with the other studies. That is, when physical output does not differ between conditions, ratings of perceived exertion favor dissociation over association (Johnson & Siegel, 1992; Pennebaker & Lightner, 1980). In addition, when perceived exertion is roughly equivalent among the attentional focus conditions, measures of physical output (i.e., endurance) favor dissociation (Weinberg et al., 1984).

Attentional Focus and Injury

Some authors (e.g., Morgan & Pollock, 1977; Schomer, 1987) have suggested that attentional focus is also related to an individual's likelihood of becoming injured as a result of running. The general line of reasoning to support this suggestion is as follows: The function of physical pain is to serve as a warning signal from the body that physical damage may occur if one chooses to persist in what he or she is presently doing. When individuals attempt to block out the warning signal by distracting attention from the pain

(i.e., dissociating), then damage is more likely to occur. Thus, we might conclude from this argument that runners who dissociate more would also be more likely to sustain physical injury as a result.

Despite the logical acceptability of this argument, there is no empirical support for the contention that dissociation results in a greater probability of injury. Masters and Lambert (1989), for example, demonstrated in an observational study of marathon runners that the amount of dissociative focus during the race did not differentiate runners who had experienced a running-related injury from those who did not. Later, Masters and Ogles (1998b) reported the results of two more correlational studies of marathon runners (one retrospective and one prospective) that supported the same conclusion; that dissociation did not predict injury. They did find, however, that association predicted injury at the 4-month follow-up period.

What Determines Attentional Focus?

Although the attentional focus literature is a relatively small body of research, extant studies have demonstrated relationships between association/dissociation and a number of key variables including performance, perceived effort or exertion, and injury in endurance tasks. In addition, these relationships have been explored using divergent methodological approaches.

Despite such significant empirical progress, little headway has been made in constructing a unifying theoretical framework to account for variations in attentional focus. Some researchers (e.g., Tammen, 1996) have suggested that association and dissociation represent two different approaches to coping with the discomfort of

prolonged exercise activity, yet this theory is highly speculative and has yet to be supported empirically. In fact, as Masters & Lambert (1989) have pointed out, the available data seem to refute the claim that dissociation is used to cope with pain while running. In a study of marathon runners, these authors found that participants associated more during the competition but were more likely to dissociate during training runs (Masters & Lambert, 1989). If it is safe to assume that competitive runs are more intense and have greater potential to induce pain than training runs, then the Masters and Lambert (1989) findings certainly argue against the classification of dissociation as a means of coping with pain.

Other authors have placed attentional focus within a framework of self-regulation. Crews, Lochbaum, and Karoly (2001), in a review of self-regulation research, classify attentional focus as a cognitive/imaginal factor related to performance in sustained tasks involving physical activity. A significant problem with this classification as a self-regulatory mechanism, however, is that it conceptualizes attentional focus as a volitional and goal-directed activity. As Stevinson and Biddle (1998) have suggested, the degree to which attentional focus represents a conscious attempt to target a particular stimulus or set of stimuli is unknown and will require empirical investigation. Further, there is evidence to argue against attentional focus as an entirely volitional activity, as participants in experiments designed to manipulate attentional focus have reported significantly less than 100% adherence to their assigned cognitive strategy (e.g., Okwumabua et al., 1983; Weinberg et al., 1984). In summary, then, it seems that attentional focus may be influenced by both volitional and non-volitional factors.

Although neither of the aforementioned theories have been fully developed anywhere in the literature, it appears that both of them fall short of providing a comprehensive understanding of determining factors of attentional focus. That is not to say, however, that the conceptualization of attentional focus as a coping and/or self-regulatory mechanism in endurance activities is completely off the mark. On the contrary, it is quite possible and, intuitively speaking, quite likely that attention plays a role in coping with the pain or exertion of distance running and mobilizing physical and psychological resources toward a goal. Such determinants don't seem to be sufficient, however, to fully account for the attentional focus of individuals involved in endurance activities. It seems reasonable to suggest, then, that attentional focus during running is a complex phenomenon that is multifactorially determined. A host of variables have been suggested as potential determinants of attentional focus, including age, training history, running ability or experience, and motivational variables.

In a correlational study designed to examine the use of various cognitive strategies in a group of masters-level track and field athletes, Ungerleider, Gold, Porter, and Foster (1989) found a significant relationship between age and attentional focus. More specifically, athletes in the age range of 30 to 44 were significantly more likely than older athletes to associate while competing (82.1% vs. 72.3%). Heffner and Ogles (2002), on the other hand, did not find a correlation between age and associative focus. They did, however, report a negative correlation between age and dissociative focus, suggesting that older marathon runners reported less dissociative thinking during competition than younger runners.

Physical training variables have also been investigated in relation to attentional focus. Masters and Ogles (1998b) reported a negative correlation between training miles prior to a marathon and dissociative thinking, indicating that a greater preference for dissociation is related to lower amounts of physical training. Similarly, Heffner and Ogles (2002) found a significant bivariate correlation between association and physical training ($r = .30$). In this study, higher scores on the association scale of the AFQ were related to a greater number of training miles per week prior to the marathon. The results of this study were similar to the exploratory findings of Okwumabua (1985), which indicated that greater frequencies of associative thinking were related to longer training runs. Thus, the available evidence suggests that associative thinking is correlated with higher amounts of training, whereas dissociative thinking is related to less physical training.

The results of two experimental studies provide support for the potential role that experience may play in attentional focus. Okwumabua et al. (1983) found that all participants in their study, regardless of the cognitive strategy group to which they were assigned, engaged in more associative thinking over a 5-week period of timed 1.5-mile running trials. Additionally, Brewer et al. (1996) reported that cross country runners associated more in a stair-climbing task than college students with no running background, suggesting that experience in an endurance sport may be related to attentional focus in even a novel endurance activity.

It is important to note that the findings of the Okwumabua et al. (1983) and the Brewer et al. (1996) studies may be due to differences in physical training or

preparedness, as discussed in the previous section. The distinction between experience and training is not particularly important, however, as they are virtually inseparable in these studies. That is, participants could not have a significant amount of training without having a significant amount of experience, and vice versa. It is possible that participants who had more experience with or training in the task in both studies may have been able to monitor their bodies and focus on task-related stimuli more consistently than participants with less experience or training because they had become desensitized to symptoms of exertion. Thus, acclimation to the task of running could be responsible for the relationships among training, running experience, and attentional focus.

Taken together, the results of correlational and experimental studies provide some evidence that the intensity or the effort involved in the run is also related to attentional focus. Tammen (1996) conducted an experiment to examine the effect of changing running pace on attentional focus. Using a small ($n=8$) sample of elite distance runners, the author had participants complete a graded exercise task in which they ran four 1500-meter trials at a submaximal pace and one 2300-meter trial at the pace of maximal oxygen consumption. Given the small sample size, the author elected to report trends in the data rather than completing a repeated-measures statistical analysis. Inspection of the pattern of associative thinking suggested that, as the pace of the run and perception of effort increased, so too did the reported frequency of associative thoughts. In addition, athletes reported during the post-experimental debriefings that they were able to concentrate on their bodies more at a pace that is similar to training or racing, whereas they had more difficulty doing this at a slower pace. Obviously, the small sample size

employed in Tammen's (1996) study as well as some significant problems with the design of the experiment (e.g., increasing distance as well as pace for the maximal oxygen consumption trial) make any conclusions drawn from the study somewhat tentative. At the very least, however, Tammen's (1996) work provides a starting point for further experimental investigations of the relationship between pacing or effort and attentional focus.

The results of correlational studies examining the relationship between effort and attentional focus have been mixed. As described in a previous section, Schomer (1986) reported data to support a "strikingly strong relationship" (p. 52) between greater effort and more frequent associative thoughts, whereas Heffner and Ogles (2003) found no relationship between attentional focus and perceived exertion after controlling for potential confounds such as sex, age, competitiveness, training, skill, and experience. On the other hand, these authors did report a pattern of increasing internally-focused attention that paralleled the increasing levels of perceived exertion estimated by runners over the course of a marathon. This latter finding would provide support for the results of both Schomer (1986) and Tammen (1996).

There has been some suggestion that attentional focus may be, at least in part, a function of motivation. In the following section, I will review the empirical evidence for this claim and, in so doing, develop the hypotheses for the present study.

Attentional Focus and Motivation of Distance Runners

Masters and Lambert (1989) were the first to report a relationship between motivation for running and attentional focus. Using a sample of marathon runners, the

authors examined the correlation between the participants' reasons for running and their cognitive strategy usage. The results of the study indicated that, of the eight factors included in the Masters Reasons for Running a Marathon Scale (i.e., life meaning/purpose, health orientation, solitude/rejuvenation, drive/competition, weight concern, anxiety dissipation, social esteem, and self-esteem), only the drive/competition factor was correlated with attentional focus. More specifically, there was a significant positive correlation between association scores and the drive/competition factor ($r = .31$), indicating that the more competitive runners were more likely to focus on internal states while running than the less competitive marathoners.

As a part of the validation process for their Motivations of Marathoners Scale (MOMS), Masters, Ogles, and Jolton (1993) examined the correlation between competitive motivations and attentional focus. Consistent with the results of the Masters and Lambert (1989) study, these authors found a significant positive correlation ($r = .24$) between self-reported competitiveness and association in a training run. This finding is particularly interesting given that one would expect to find a weaker relationship between competitiveness and association in a non-competitive run where both fast and slow runners are more likely to dissociate (Masters & Lambert, 1989).

Masters and Ogles (1998b) later reported the results of two correlational studies suggesting that competitive motivations are related to attentional focus in a marathon. In one of the studies, the authors found a significant negative correlation between scores on the competition factor of the MOMS (Masters et al., 1993) and dissociation scores

($r = -.36$), suggesting that runners who are less competitive tended to be more dissociative than the competitive runners. More recently, Heffner and Ogles (2002) reported a significant positive correlation between scores on the association scale of the Attentional Focus Questionnaire (Brewer, et al., 1996) and scores on the competitiveness scale of the Sport Orientation Questionnaire (Gill & Deeter, 1988), indicating that the more competitive marathon runners focused internally to a greater extent than the less competitive runners ($r = .29$).

The results of other correlational studies also support the relationship between motivation and attentional focus. Numerous studies have demonstrated a greater preference for association than dissociation in competition (e.g., Masters & Lambert, 1989; Morgan & Pollock, 1977; Ogles et al., 1993-1994; Okwumabua, 1985). If it is safe to assume that competitive conditions produce more competitive motivations, then these studies present additional evidence for a relationship between motivation and attentional focus.

The Masters and Lambert (1989) study, in which marathon participants completed measures of attentional focus for both a complete marathon and a training run of unspecified length, provides a more direct comparison of runners' attentional focus under varying competitive conditions (i.e., a non-competitive training run and a marathon). These authors found that, whereas there was a clear preference for association during the competitive run, participants tended to favor dissociation or both strategies when completing a training run. The results of this study were significant because they provide the first direct comparison between the attentional focus of runners during training

conditions as opposed to competitive conditions, which provides more solid support for the role of motivations in the attentional focus of distance runners.

There are several significant problems with the design of the Masters and Lambert (1989) study, however. First, the researchers employed one open-ended question to determine the extent to which runners associated and dissociated during specific 5-mile sections of the race. Participants were asked to describe what they thought about during the 5-mile sections, and these statements were then coded according to Schomer's (1986) classification system. The same basic approach was used to determine attentional focus preferences for the training run, only this run was not broken into sections. Such an approach is likely to be an unreliable measure of attentional focus, as participants may have difficulty recalling specific thoughts and were not asked to provide the duration or frequency with which they were engaged in each listed thought.

An additional problem with the design of the Masters and Lambert (1989) study is that the comparison of attentional focus between the training run and the competitive run is confounded by presumed differences in the length of the runs both between and within subjects. It is highly unlikely, for example, that the length of the training run was even close to the length of the marathon, as few (if any) runners train over such distances. Likewise, there is no indication from the report of the study procedures that participants were asked to run a uniform distance before completing the measure of attentional focus for a training run. Given the potential impact of such confounds, it would seem to be unwise to draw firm conclusions regarding the differential influence of competitive and non-competitive motivations on attentional focus.

Another study by Ogles et al. (1993-94) reached similar conclusions regarding runners' greater preference for association under competitive conditions. Using a different method of assessing attentional focus, the *de novo* Thinking Styles Questionnaire, these authors found that the frequency of associative thoughts almost doubled under competitive conditions compared to training run conditions (52.9 percent of the time during the competitive run versus 28.8% of the time during the training run). This study's methodological weaknesses are virtually the same as the Masters and Lambert (1989) study, however, including the failure to incorporate a measure of attentional focus for which adequate psychometric data are available and the lack of standardization of running distances both between and within subjects.

Heffner, Ogles, and Marsden (2003) recently conducted an investigation in which they attempted to explore the effect of different competitive orientations on attentional focus experimentally by manipulating the motivations of novice runners. Unfortunately, the manipulation was not effective in producing differential motivations in the two experimental groups. The authors speculated that the failure of the experimental manipulation may have been due to the fact that participants were not pre-screened to be sure that they could complete the 2-mile course and that there was little incentive for them to complete the course as quickly as possible. These potential explanations seem reasonable given the authors' observation that some of the participants completed the course by walking rather than running. Additionally, the sampling of novice runners is problematic in that the results of the study might not be generalizable to the more experienced runners.

In summary, the results of the Masters and Lambert (1989), the Ogles et al. (1993-1994), and the Heffner et al. (2003) studies are inadequate to compare the results of divergent competitive motivations on the attentional focus of runners. The primary purpose of the present study is to address this research question by building upon the strengths of the previous studies and attempting to remedy the weaknesses. Toward this end, I conducted a correlational investigation of the influence of competitive vs. non-competitive motivations on the attentional focus of a sample of runners with varying levels of acclimation to the task of running. In order to address the methodological problems inherent in the Masters and Lambert (1989) and the Ogles et al. (1993-1994) study, I utilized a more widely-accepted measure of attentional focus for which psychometric data is available. In addition, I asked that participants complete the measure of attentional focus once after the competitive run and again after completing a run of the same or similar distance in order to minimize potential confounds. Finally, in order for the results to be generalizable to experienced runners as well as novice runners, I recruited participants at a race that is likely to include both experienced and highly trained runners as well as novice runners with less training (i.e., a 5K race).

Hypotheses

I proposed two major hypotheses for the study. First, I believed that associative focus would be more frequent in the competitive run condition than in the training run condition, as previous studies (e.g., Masters & Lambert, 1989; Ogles et al., 1993-94) have suggested that association tends to increase as competitiveness increases. Second, I expected that the hypothesized increase in association when comparing training runs to

competitive runs would be moderated by acclimation to the task of running (which was operationally defined as the number of miles run per week in the two months preceding the race). Specifically, I expected greater acclimation to be associated with a greater increase in association from training to competition. This hypothesis is based, in part, upon the previously discussed empirical evidence for a positive correlation between training or experience and association under competitive conditions (e.g., Heffner & Ogles, 2002; Morgan & Pollock, 1977) as well as on Schomer's (1986) seemingly opposite finding that marathoners' race experience did not have an influence on frequency of association reported during a training run.

Figure 2 provides a graphical depiction of the expected findings based on the first two hypotheses. For the purpose of clarity and ease of interpretation, the task acclimation variable was transformed into a categorical variable (high vs. low training). As can be seen in the graph, it was expected that, on average, runners would report more association during competition than during training, as shown by higher overall frequency of association among both the high and low task acclimation groups in the competitive condition as opposed to the training run condition. I expected, however, that runners with a higher level of task acclimation (i.e., more pre-race training) would demonstrate greater increases in association from training to competition than runners with less task acclimation. This prediction is reflected by the larger associative focus differential between the high and low task acclimation groups in the competitive condition versus the training run condition.

I also conducted a secondary analysis to examine factors that predict performance in a competitive run. Based on the results of previous correlational research focusing on marathon runners (e.g., Heffner & Ogles, 2002; Masters & Lambert, 1989; Masters & Ogles, 1998b; Silva & Appelbaum, 1989), I expected that the number of training miles per week (i.e., task acclimation), the Competition scale score on the MOMS, and the three attentional focus variables (i.e., association, dissociation, and distress) would predict finish time for the 5-kilometer race after controlling for demographic variables that would clearly exert a significant influence on times (i.e., sex and age). More specifically, I predicted that training miles, MOMS Competition, and association would be negatively correlated with finish time, whereas dissociation and distress would be positively correlated with the participants' finish time.

Method

Participants

Participants were recruited at four 5K races: the National City Jeep Davis 5K in Barberton, OH; the Christine Wilson Memorial 5K in Dublin, OH; the Powell Spring 5K in Powell, OH; and the 5K Run for the Poor in Milford, OH. In order to be included in the study, participants had to be in good physical health, age 18 or older, and capable of completing a continuous 5K run (i.e., walkers were excluded). A total of 259 runners were approached during the race registration periods by the researchers and asked to participate in the study. Of those 259 runners, 188 (72.6%) agreed to participate and 71 (27.4%) declined. Because direct contact with the researchers was not the only method

by which runners learned about the study (e.g., two of the race directors made announcements about the study over a loudspeaker), the above statistic is not likely to be an accurate representation of the percentage of runners who knew about the study and chose not to participate. Rather, these data speak to the general receptiveness of the runners with whom the researchers communicated directly to participate in the study.

Participants were asked at the time that they registered for the race whether they would be running or walking in order to screen out the walkers. In addition, a time cut-off was established to exclude potential participants who were likely to have walked all or part of the race. Separate cut-offs were established for women and men. For men, the cut-off pace was 11 minutes per mile (34:06 finish time), whereas the cut-off for women was 12 minutes per mile (37: 12 finish time). Due to the unavailability of empirically established time cut-offs to separate individuals who ran the entire race from those who walked all or part of the race, the time cut-offs listed above are best characterized as arbitrary. Four participants were excluded from the final analyses because their finish times for the race surpassed the cut-off point. Two additional participants were excluded because they did not meet the age requirement. A total of 245 participants who met the inclusion criteria completed Part 1 of the study (i.e., the post-race questionnaire) and 136 of those participants also completed Part 2 (i.e., the post-training run questionnaires) for a 55.51% return rate.

The mean age for the sample of runners who completed at least Part 1 of the study ($n=245$) was 40.49 ($SD=10.71$), and the mean finish time was 25.52 minutes (25:31) with a standard deviation of 4.33 minutes (4:20). This sample included 144 males (58.78%)

and 97 females (39.59%). Information about the sex of four participants (1.63%) could not be obtained.

For participants who completed both parts of the study ($n=136$), the mean age was 41.90 ($SD=10.44$). The mean finish time was 25.56 minutes (25:34) with a standard deviation of 4.39 minutes (4:23). There were 75 males (55.15%) and 61 females (44.85%) who completed both parts of the study. The race or ethnicity of the sample was 95.59% white/Caucasian ($n=130$) and 0.74% Hispanic ($n=1$). Five participants (3.68%) did not provide information about their race or ethnicity. Most of the participants were married (77.94%), with a smaller percentage being either single (14.71%) or divorced (5.88%). Two participants (1.47%) did not report on marital status.

Measures

Demographics and running experience questionnaire (see Appendix A). This questionnaire requested demographic information as well as information related to training habits and experience with competitive running.

Motivations of Marathoners Scale (see Appendix B). The Motivations of Marathoners Scale (MOMS; Masters, Ogles, & Jolton, 1993) is a 56-item instrument designed to survey a broad range of motivations for participating in marathons. The nine motivational factors included in the MOMS are health orientation, weight concern, self-esteem, life meaning, psychological coping, affiliation, recognition, competition, and personal goal achievement. Good internal consistency reliability (Cronbach's alpha for each scale ranging from .80 to .92) and test-retest reliability (ranging from .71 to .90) have been reported by the authors. Construct validity has also been established (Masters

et al., 1993). Only the 4-item competition scale score of the MOMS was utilized in the data analyses for the present study, and the obtained internal consistency reliability for this scale was .84.

Attentional Focus Questionnaire (see Appendix C for post-race version and Appendix D for post-training run version). The AFQ (Brewer, Van Raalte, & Linder, 1996) is a 30-item inventory assessing focus of attention during an endurance run. The questionnaire contains three subscales: association (11 items), dissociation (12 items), and distress (7 items). Respondents rate the frequency (on a scale of 1 to 7, with 1 being “I did not do this at all” and 7 being “I did this all the time”) with which they engage in each of the three cognitive activities during the race. Items on the association scale include “monitoring your pace,” “monitoring specific body sensations (e.g., leg tension, breathing rate),” and “paying attention to your rhythm.” Examples of items on the dissociation scale are “singing a song in your head,” “writing a letter or paper in your head,” and “thinking about pleasant images.” Items on the distress scale include “focusing on how much you are suffering,” “wishing the run would end,” and “thinking about how much you want to quit.” Internal reliability coefficients obtained for the two administrations of the AFQ in present study (i.e., post-race version and post-training run version) were in the acceptable range (Cronbach’s alpha = .84 and .89 for the association scale, .69 and .78 for the dissociation scale, .79 and .90 for the distress scale). Heffner and Ogles (2002) reported a small significant correlation ($r = .12$) between the dissociation scale and the distress scale of the AFQ. None of the other correlations among the scales reached the level of significance.

Procedure

Participants were approached at the registration area for the 5K races and asked whether they planned to walk or run in the race. If the individuals indicated that they planned to run, the researchers handed them a flyer (see Appendix E), provided a brief overview of the study, and invited them to participate. Those who agreed to participate were asked to provide their name and race number and were given instructions regarding where to find the researchers after completing the race.

A table was set up at the finish area with clipboards for participants to complete the post-race version of the AFQ. As participants approached the table they were handed a clipboard with the post-race version of the AFQ and the packet of questionnaires to take home and complete after the 5K training run. This packet contained the demographics and running experience questionnaire, the MOMS, the AFQ (post-training run version), and detailed instructions regarding the training run (see Appendix F for complete text) and subsequent completion of the AFQ (post-training run version). The training run instructions requested that the runners complete a run of approximately five kilometers (3.1 miles) at a pace that would be consistent with their normal pace for training (i.e., not a speed workout) and complete the post-training run version of the AFQ as soon as possible afterward. The instructions also encouraged participants to complete the training run and the questionnaires and return them within two weeks following the race.

A cover letter (see Appendix G) describing the purpose and inclusion criteria for the study was also included with the packet. In addition, participants were provided with a business reply envelope to return the study materials to the researchers. Participants

were encouraged to read the cover letter and ask any questions that they had about the study before completing the questionnaires. For participants who provided e-mail addresses when they completed the post-race version of the AFQ, e-mail reminders were sent approximately one week after the date of the race.

Results

Preliminary analyses

Several preliminary analyses were conducted to determine the degree to which the sample of runners who volunteered to participate were representative of the entire group of runners who participated in the four 5K races. Information about the sex, age, and finish times for non-participants was gathered from the race web sites. Non-participants who did not meet the age or finish time criteria for the study (see Participants section) were excluded from the analyses that follow.

The first set of preliminary analyses compared the finish time and age of the runners who completed at least Part 1 of the study ($n=245$) to runners who did not participate ($n=559$). The results of independent samples t -tests showed that the runners who participated in at least the first portion of the study ($M=40.49$, $SD=10.71$) were significantly older than the non-participants ($M=38.43$, $SD=11.52$), $t(792) = -2.37$, $p=.02$. Participants who completed at least Part 1 of the study also had faster finish times for the race ($M=25.52$ min., $SD=4.33$ min.) than non-participants ($M=26.46$ min., $SD=4.32$ min.), $t(796)=2.80$, $p=.01$.

The second set of preliminary analyses compared the finish time and age of runners who completed Part 1 of the study only to participants who completed Parts 1

and 2. Runners who completed Part 1 only were significantly younger ($M=38.66$, $SD=10.83$) than runners who completed both parts of the study ($M=41.90$, $SD=10.44$), $t(237)=-2.34$, $p=.02$. The mean finish time for participants who completed Part 1 only ($M=25.48$, $SD=4.28$) did not differ significantly from the runners who completed Parts 1 and 2 ($M=25.56$, $SD=4.39$), $t(237)=-0.13$, $p=.89$.

As a final preliminary analysis to examine the representativeness of the sample, a chi-square test was conducted to determine whether there was a relationship between sex and the part of the study completed (Part 1 only, Parts 1 and 2, or none). The chi-square test indicated that there was no relationship between the two variables, $\chi^2(1, 793)=2.89$, $p=.24$.

Next, a series of paired-samples t -tests were conducted to check on the effectiveness of the training run instructions. Because participants were asked to complete this run as they would normally complete a training run that was not a speed workout, we expected that participants would report slower times and less distress for the training run than for the competitive run. In the first comparison, the mean difference between the finish time for the 5K race and the completion time for the training run was significant ($M_{diff}=-8.41$, $SD=13.21$), $t(118)=-6.95$, $p=.00$. In the second comparison, the difference between the AFQ-Distress scale score for the race and the AFQ-Distress score for the training run was significant ($M_{diff}=3.80$, $SD=7.45$), $t(132)=5.88$, $p=.00$. Given the results of these analyses indicating that participants completed the race faster than they completed the training run and that they experienced more distress during the race than

during the training run, it seems safe to conclude that the “manipulation” of motivation was effective in that it produced the expected differences in behavior and cognition.

A final set of preliminary analyses was included to determine whether any of the four races at which data were collected could be considered an outlier in terms of participant characteristics. In order to examine this possibility, a MANOVA was conducted to determine if there were significant differences among the four races in terms of finish times, age of participants, and attentional focus during the race (i.e., association and dissociation). The results of the MANOVA indicated that there were significant differences among the races in finish time, $F(3, 233)=4.93, p=.00$; age, $F(3,233)=5.07, p=.00$; association, $F(3,233)=2.69, p=.05$; and dissociation, $F(3, 233)=3.14, p=.03$. Examination of the post-hoc tests (Tukey’s HSD method) revealed no consistent pattern of differences such that any of the four races could be considered outliers, however. Additionally, a chi-square test indicated that there was no relationship between race and sex, $X^2(1, 241)=2.43, p=.49$.

Descriptive statistics for the sample of runners who completed both parts of the study are provided in Table 1. Table 2 contains bivariate correlations between variables included in the regression analyses that follow.

Tests of the Major Hypotheses

Three sets of analyses were conducted to examine the three major hypotheses of the study. The first analysis was a paired samples *t*-test to examine the hypothesis that runners would associate more in the race than in the training run. The results of this analysis indicated that the difference between AFQ-Association scale scores for the race

and AFQ-Association scores for the training run was significant ($M_{diff}=13.90$, $SD=13.95$), $t(132)=11.49$, $p=.00$. Thus, on average, runners did associate significantly more in the competitive condition than they did in the non-competitive training run.

The second hypothesis suggested that greater acclimation to the task of running (i.e., greater number of training miles per week) would be associated with a greater increase in association from training to competition. Because there was some variability in the manner in which participants completed their training runs, I endeavored to minimize concerns about alternative explanations for the findings by statistically controlling for some of the variability. Although experimental control is most certainly preferable to statistical control of these variables, the naturalistic nature of the study precluded the tight experimental control that is possible only in the laboratory. I utilized statistical control, then, to address variability in both the setting of the training run (i.e., indoor vs. outdoor) and the time difference between the training run and the competitive run. The decision to statistically control the former was based on the possibility that associative focus might be greater during an indoor run than an outdoor run, as suggested by Pennebaker and Lightner (1989). The latter was controlled due to the possibility that lack of uniformity in the reduction of effort from race to training conditions might influence the difference between the amount of association reported in the race versus the training run.

The analysis conducted to predict differences in associative focus between the race and the training run, then, was a hierarchical multiple regression in which the time difference between the training run and the race as well as the setting of the training run

were entered in the first block as covariates and the task acclimation variable (i.e., number of miles run per week) was entered in the second block. Diagnostic procedures indicated that there were no significant problems with outliers, cases with a high leverage value, violations of assumptions, or multicollinearity. Table 3 provides a summary of the regression analysis. As can be seen in the table, the first block of variables consisting of the two covariates did not account for a significant amount of variance in the association difference score, $F(2, 109)=2.46, p=.09, \Delta R^2=.04$. The addition of the task acclimation (training miles) variable, however, resulted in a significant increase in the variance accounted for, $F(1, 108)=6.84, p=.01, \Delta R^2=.06$.

The final regression analysis considered variables that were expected to predict finish time for the 5K race (see Table 4). Diagnostic procedures for this analysis did not identify any difficulties with violations of the assumptions of the test, multicollinearity, or cases with a high leverage value. One outlier (i.e., a case lying 3.0 or greater standard deviations from the mean) was identified. The regression analysis was conducted both with and without the outlier, and there were no differences in the statistical conclusions, so the outlier was included in the final analysis. In this analysis, two demographic variables, sex and age, were entered in the first block. Together, these two variables accounted for a significant amount of variance, $F(2, 120)=21.04, p=.00, R^2=.26$. The second block included a motivational variable (MOMS-Competition scale score) and a measure of task acclimation (number of miles run per week). The addition of the second block of variables to the regression model produced a significant *R*-square change, $F(2, 118)=35.40, p=.00, \Delta R^2=0.28$. The last block of variables included the three subscale

scores of the AFQ (i.e., Association, Dissociation, and Distress). These variables together produced a significant change in *R*-square, $F(3, 115)=5.80$, $p=.00$, $\Delta R^2=.06$. With all of the predictors entered in the model, all of the variables except two of the attentional focus variables were significant. Neither the AFQ-Association scale score nor the AFQ-Dissociation scale score demonstrated a significant relationship with finish times for the 5K race with all of the other variables statistically controlled.

Discussion

Three hypotheses were proposed for the present study. First, it was expected that runners would report more associative focus under competitive conditions than under non-competitive conditions. The results of the analysis comparing self-reported associative focus between two conditions with varying levels of competition (i.e., a training run of approximately 5K and a 5K race) indicated that, on average, runners reported more association during the race than during the training run. This finding is similar to the results of previous investigations (Masters & Lambert, 1989; Ogles et al., 1993-94) that supported a relationship between frequency of associative focus and the level of competitiveness of a run.

Although it would be quite premature to label these findings robust after taking into consideration the methodological limitations of the studies by Masters and Lambert (1989) and Ogles et al. (1993-94) as well as those of the present study (see the Limitations section that follows), the fact that the findings have been replicated several times using disparate methods of measuring attentional focus seems promising in its potential to shed some light on the question of what determines attentional focus.

Additionally, the use of samples of runners that are diverse in their running experience and skill (i.e., ranging from seasoned marathon runners to relatively inexperienced participants in a 5K race) further supports the generalizability of the aforementioned findings. Thus, the results of the present study as well as previous studies that compared attentional focus under conditions of varying competitiveness suggest that motivational factors may play a key role in the frequency of associative focus. This study improves upon previous studies by using runners as their own controls in a repeated measures design. As a result, differences in the competitive circumstances of the two runs become a more salient and persuasive explanation for differences in association.

The second hypothesis suggested that greater acclimation to the task of running (i.e., greater number of training miles run per week) would be correlated with a greater increase in association from training to competition. Consistent with this hypothesis, the number of miles run per week in the two months preceding the race significantly predicted the change in associative focus between training and race conditions. Runners who were more acclimated to the task by virtue of training over greater distances prior to the race demonstrated a greater increase in association when comparing the training run to the competitive run, whereas participants who indicated that they ran less prior to the race showed less of an increase in associative focus. This relationship held after controlling for the effects of the training run setting and the finish time differences between the training run and the competitive run, both of which might reasonably have influenced association difference scores for the training and competitive runs.

Although no studies to date have utilized task acclimation as a moderating variable while examining the relationship between motivation and associative focus, the results of the present study seem to be consistent with the findings of previous studies suggesting that task acclimation is related to association in competitive conditions but not necessarily under non-competitive conditions. Heffner and Ogles (2002), for example, reported a significant positive correlation ($r=.30$) between AFQ-Association scale scores under competitive race conditions and the amount of training reported prior to a marathon. Likewise, Okwumabua (1985) found a relationship between the amount of associative thought reported during a marathon and the length of training runs prior to the marathon.

Okwumabua et al. (1983) also provided experimental evidence that task acclimation can result in greater associative thinking under competitive conditions. In this study, where participants were assigned to one of three attentional focus groups (i.e., association, dissociation, and relaxation), all runners became increasingly associative over the course of the 5-week study period in which they completed a series of timed 1.5-mile runs. It is unclear, however, whether timed runs would result in the same level of competitive motivations that one might expect to find in a race. Thus, conclusions about the relationship between association and task acclimation under competitive conditions based on the results of the Okwumabua et al. (1983) study should be made with caution.

Only one study to date has examined the relationship between task acclimation and association during a run that was specifically designated as non-competitive, and Schomer (1986) did not find a significant relationship between these two variables in the

context of a training run. Schomer (1986), however, utilized a slightly different definition of task acclimation than Heffner and Ogles (2002) or Okwumabua (1985). By classifying runners into categories of acclimation based on the number of marathons completed rather than the training completed prior to the marathon, Schomer's (1986) results may be due to differences in the definition of acclimation rather than true differences in the relationship between acclimation and association under training conditions as opposed to competitive conditions.

Taken together, all of these studies indicate that the amount of association reported during competitive runs is positively correlated with the participants' levels of task acclimation. Under non-competitive conditions, however, task acclimation does not seem to affect the amount of associative focus. The hypothesis that task acclimation would predict differences in association between a training run and a competitive run was a logical outgrowth of these findings. More specifically, if participants do not differ in the amount of association reported during a training run as a function of task acclimation but do demonstrate differences during competitive run (i.e., with greater task acclimation being related to a greater amount of association), it seemed reasonable to suggest that runners with greater task acclimation would report a greater increase in associative focus from training to competition than runners with less task acclimation. The results of the present study provided support for this hypothesis.

The findings from the first two hypothesis tests can be integrated to form a working model that may be used to explain differences in associative focus under competitive and non-competitive conditions. It should be noted here that the term

“working model” is utilized to emphasize the tentativeness of the conclusions that follow and the need for more research, particularly of an experimental nature. Although somewhat speculative, a working model represents progress in an area of research that is plagued by a lack of a solid theoretical base and stimulates future research by offering further testable hypotheses.

Earlier in the paper, I suggested that attentional focus appears to be multifactorially determined. I further proposed that these determining factors most likely span across a continuum of volition, ranging from entirely non-volitional to completely volitional. A motivational account of attentional focus is capable of capturing the entire width of this volitional continuum and integrating a variety of related factors. For example, runners in the present study reported, on average, a tendency to associate more under competitive conditions as opposed to non-competitive conditions. This difference is believed to be a result of a variety of volitional and non-volitional factors that stem from motivational differences.

In describing their experience of the competitive run, participants in the present study reported faster pace and greater distress than they did in the non-competitive training run. Although causal conclusions cannot be drawn from this correlational evidence, it seems reasonable to suggest that competitive motivation produces a faster pace through greater effort expenditure, which also produces greater strain on the body and a resultant increase in distress. As the strain on the body increases, physiological indicators of fatigue and/or pain become more salient and force themselves into conscious awareness (i.e., non-volitional association). Tammen’s (1996) experimental

evidence of greater association resulting from increased intensity of running provides some support for this hypothesis, as does the finding that association increases toward the end of a marathon when physiological indicators of fatigue are most evident (Heffner & Ogles, 2002).

Competitive motivation, along with its cognitive and behavioral correlates (i.e., greater distress and faster pace) is also likely to activate self-regulatory mechanisms, of which attentional focus is an integral part. Morgan and Pollock (1977) suggested that association functions much like a thermostat (dubbed a “percestat” by the authors, p. 400) to prevent the fuel source from being over- or under-utilized. In less abstract terms, association is beneficial in that it can help runners to regulate pace by monitoring critical information such as internal indicators of fatigue and external indicators of performance (e.g., elapsed time). As a means of self-regulation, association may have both volitional and non-volitional components.

If association represents an important aspect of the self-regulatory process involved in distance running, it should be expected that runners would associate more under competitive conditions than under non-competitive conditions. This finding would be expected because peak performance in competition will not be achieved if energy expenditure is not monitored and regulated to maintain efficiency (Morgan & Pollock, 1977). Thus, when peak performance is desired, the use of association as a means of monitoring physical performance will be more frequent.

One factor that may interfere with the utilization of association for the purpose of self-monitoring is a negative affective response to the physiological indicators of fatigue.

In the present study, I found that runners who were more acclimated to the task of running reported greater increases in association from training to competition than runners who were less acclimated. This finding may be due, in part, to improved tolerance of, or desensitization to, physiological indicators of exertion that results in less negative affect in experienced runners versus inexperienced runners. Although this hypothesis has not been tested directly, one investigation has demonstrated that association was not related to negative affect in a group of experienced runners (Goode & Roth, 1993). Additionally, Pennebaker and Lightner (1980) found that inexperienced runners who listened to the sound of their own breathing while exercising (i.e., associated) reported feeling more tense than runners who listened to street sounds (i.e., dissociated), although the term “tense” is rather ambiguous and it is unclear whether the participants were reporting on negative affect as opposed to a physical state. More research is necessary to examine this hypothesis.

One alternative motivational explanation for the results of the second hypothesis test in the present study is that individual competitiveness drives pre-race training (i.e., task acclimation) and thus might account for the variability in associative frequency differences between training and competition rather than task acclimation per se. Because this hypothesis could be investigated using data from the present study, I conducted a supplementary analysis to examine this possibility (see Table 5). The supplementary analysis was identical to the original test of the second hypothesis except that the MOMS-Competition scale score was entered in the second block along with the task acclimation variable (i.e., number of miles run per week in the two months preceding

the race). It was expected that, if individual competitiveness was driving the relationship between task acclimation and associative frequency difference, then competition should be a significant predictor of associative frequency difference and task acclimation should no longer be significant. Results of this analysis indicated that this was not the case, as task acclimation remained a significant predictor and individual competitiveness was not a significant predictor. Further, despite the significant bivariate correlation between the number of miles run per week and MOMS-Competition scale score ($r=.29, p=.00$), this finding was not due to multicollinearity, as tolerance values for the task acclimation and competitiveness variables were .84 and .91, respectively.

The final hypothesis was that the number of miles run per week in the two months preceding the race, the MOMS Competition scale score, and the three attentional focus variables (i.e., association, dissociation, and distress) would predict finish time for the 5-kilometer race after controlling for sex and age, which would exert an obvious influence on finish times. I predicted that training miles, MOMS Competition, and association would be negatively correlated with finish time, whereas dissociation and distress would be positively correlated with the participants' finish time. The results of the study indicated that both training miles and the MOMS-Competition scale scores were significant predictors, demonstrating a negative relationship with finish time. Thus, faster finish times were associated with a higher number of training miles and higher MOMS-Competition scale scores. Distress was also found to be a significant predictor of finish time, with higher distress showing a relationship with slower finish times. Despite the fact that association showed a significant bivariate correlation with finish time,

neither association nor dissociation were significant predictors of finish time with all of the other variables entered in the regression equation.

Because the finding that neither association nor dissociation predicted finish time was contradictory to numerous studies that demonstrated relationship between attentional focus and performance (e.g., Heffner & Ogles, 2002; Masters & Lambert, 1989; Silva & Appelbaum, 1989), an additional set of analyses was conducted to investigate the possibility that association and dissociation might be covariates in the relationship between either task acclimation or individual competitiveness and finish time for a race. That is, individuals may associate or dissociate more due to variability in task acclimation or individual competitiveness, factors that are likely to predict finish time. The relationship between attentional focus and finish time, then, would only be an artifact of the relationship between task acclimation or individual competitiveness and finish time.

The first analysis to investigate this possibility was conducted in the same manner as the test of the third hypothesis except that the second block of predictors (number of miles run per week and MOMS-Competition) was dropped from the regression. Thus, age and sex were entered in the first block and the three attentional focus variables were entered in the second block. The results of this analysis are summarized in Table 6. As can be seen in the table, both blocks of variables accounted for a significant amount of variance in finish time. Unlike the previous analysis in which the measures of competitiveness and task acclimation were entered into the regression equation prior to the attentional focus variables, both association, $F(1, 127)=5.69, p=.02$, and dissociation, $F(1,127)=7.19, p=.01$, were significant predictors of finish time and distress,

$F(1,127)=3.35, p=.07$, was not a significant predictor. Taken along with the significant bivariate correlations among AFQ-Association scale scores, MOMS-Competition scale scores, the number of miles run per week in the two months prior to the race, and finish times for the 5K race, the results of this regression analysis suggest that either one or both of the variables in question (i.e., individual competitiveness or task acclimation) may produce an artifactual relationship between association and finish time.

In order to determine which of the two variables might produce such an artifactual relationship, two more hierarchical multiple regression analyses were conducted (see Tables 7 and 8). Again, these analyses were conducted in a manner that was identical to the original test of the third hypothesis with the exception of one of the variables in question (i.e., task acclimation and individual competitiveness) being excluded from the equation each time. Thus, the first regression included sex and age in the first block of variables, MOMS-Competition in the second block, and the three attentional focus variables in the third block. An examination of the regression coefficients for the final model containing all of the variables indicated that the AFQ-Association scale score was no longer a significant predictor of finish time, $F(1, 125)=1.89, p=.17$. In the second regression, number of miles run per week replaced MOMS-Competition in the second block, and once again the AFQ-Association scale scores did predict finish time, $F(1, 115)=0.32, p=.57$.

The results of these two regression analyses suggest that both individual competitiveness and task acclimation may produce an artifactual relationship between association and finish time for a 5K race. These findings, although correlational, would

seem to indicate that association is a by-product of other factors that lead to faster finish times rather than a contributor in and of itself. One distinct possibility is that competitive motivation results in greater effort expenditure, which results in both a greater amount of associative thought and better running performance. The results of the present study demonstrated correlations between motivation, association, and running performance. In order to develop a causal model such as the one described above, however, experimental research is needed.

Limitations

One clear limitation of the present study is the lack of random sampling, as the sample of runners who participated in the study are best classified as a convenience sample. Accordingly, the representativeness of the sample was a significant concern, and several analyses were completed to determine the degree to which the runners who participated were representative of the runners who participated in the races. The results of these analyses indicated that the sample of runners who completed at least Part 1 of the study were older and had faster finish times than the population of runners that participated in the race. In addition, there was greater attrition of younger runners following completion of Part 1. In conclusion, then, the results of this study may not be generalizable to younger runners and those with slower finish times. The degree to which the population of runners participating in the four races at which data were collected is representative of 5K runners in general is unknown, however, so the overall significance of the aforementioned problems with representativeness is unclear.

Another limitation of the study, and one that is characteristic of this line of research as a whole, is the reliance on retrospective self-reports of attentional focus. With regard to the issue of measurement, Masters and Ogles (1998b) have pointed out that all of the available methods of measurement used in this line of research are problematic in some respect. In this study, the method of measurement (i.e., paper-and-pencil inventories completed immediately after the race and after the training run) introduces the possibility of bias in terms of inaccurate or incomplete recall of thoughts during the race. I attempted to minimize difficulties with recall by asking participants to complete the post-race version of the AFQ immediately following the race, but it was impossible to exercise such control over the time delay between the completion of the training run and the completion of the post-training run version of the AFQ.

Another problem specific to the AFQ is the interpretative difficulties that arise when differences in the amount of association, dissociation, and/or distress are potentially attributable to differences in overall frequency of thoughts recorded. For example, two respondents may report that they divided their attention evenly between association, dissociation, and distress throughout the run. However, because interpretation of the anchors for the scale on which respondents indicate the frequency of the thoughts (i.e., 1 - "I did not do this at all" to 7--"I did this all the time") may differ, the first respondent may average a 6 on all three scales and the second respondent may average a 4. Thus, if one were to compare the associative focus of the two participants, it would appear as if the first respondent associated more during the race. An alternative and quite plausible

explanation would be that the first respondent simply reported a greater overall frequency of thoughts.

The primary impact of this interpretative difficulty is on between-subjects designs that utilize the AFQ as a measure of attentional focus. Within-subjects designs would most likely not be affected by this problem, as the interpretation of the scale anchors should not differ within individuals across time. Thus, the results of the analyses to investigate the first two hypotheses in the present study, which involve within-subjects comparisons of attentional focus, would not have been influenced by such a response bias. The interpretation of the analysis to examine the third hypothesis, however, is potentially complicated by this difficulty with the AFQ.

One final limitation of the present study is that it is unclear to what extent runners participating in a 5K race are representative of runners in general. Although it seems reasonable to suggest that 5K runners are more representative of all runners than are marathon participants, it also seems likely that there are a substantial number of individuals who run regularly as part of an exercise regimen but never participate in any formal race. Runners who participate in formal races may differ from runners who do not participate in races in any number of ways that could potentially have an impact on attentional focus, such as competitiveness or socioeconomic status. Thus, one can only generalize the findings of the present study with any degree of confidence to runners who participate in races.

Conclusions and Suggestions for Further Research

The results of this study provide evidence that motivational processes play a role in the attentional focus of runners who participated in a 5K race. Although causation cannot be determined due to the correlational nature of the study, there was a clear tendency for runners to report more associative focus under competitive conditions than under non-competitive running conditions. The level of acclimation to the task of running, which was defined as the amount of pre-race training, acted as a moderating variable. Specifically, runners with higher amounts of task acclimation reported greater increases in the amount of associative thought from training to race conditions.

In the present study, I utilized the term “task acclimation” to reflect greater awareness of and more comfort with the physical and mental components of distance running that are believed to accompany higher amounts of training. It should be noted that the term “task acclimation” was coined for the purpose of this study and has not been discussed or investigated elsewhere in the literature. In fact, one might argue that the attachment of this term to its operational definition in the present study (i.e., number of miles run per week in the two months preceding the race) is somewhat premature given the alternative implications of a greater amount of pre-race training (e.g., better physical conditioning). I propose, however, that the construct of task acclimation encompasses a broad spectrum of training sequelae, including better physical conditioning, increased desensitization to physiological indicators of fatigue, and reduced distress. Nevertheless, it is fair to suggest that acceptance of this construct definition should be made cautiously in the absence of solid empirical validation.

A secondary purpose of the study was to examine factors that are related to performance in a 5K race, with emphasis on the attentional focus variables. Age, gender, task acclimation, competitiveness, and distress all demonstrated a relationship with finish time for the race. Despite the fact that numerous studies of marathon runners (e.g., Heffner & Ogles, 2002; Masters & Lambert, 1989; Silva & Appelbaum, 1989) have indicated that association and dissociation are related to running performance, these two variables did not show a relationship with performance in the present study. Supplementary analyses suggested that two factors, individual competitiveness and task acclimation, may act as mediators of the relationship between attentional focus and performance in a 5K race. That is, when these variables were removed from the analysis, association and dissociation became significant predictors of finish time.

One difficulty in interpreting the results of this study is that the difference in associative thought during competitive and non-competitive conditions may be attributed to differences in the pace of the run as well as motivation. In fact, some experimental evidence suggests that increases in pace or effort are related to increases in the amount of associative focus (Tammen, 1996). Under naturalistic conditions, however, these constructs inevitably become intertwined. That is, it would be difficult to imagine a running situation in which competitive motivation could increase without a corresponding increase in effort and pace. Under laboratory conditions, it may be possible to disentangle the constructs due to the possibility of exercising control over the runner's pace. By having control over the runner's pace, it would be possible to alter

pace while keeping motivation constant and vice versa. Such an experiment may prove useful in further developing a theory to explain variability in attentional focus.

It is also suggested that future research incorporate measures of task acclimation and individual competitiveness into research designs in order to determine whether the relationship between attentional focus and running performance is mediated by these two variables. If this is the case, then the experimental manipulation of association in an effort to improve performance will continue to prove fruitless, as association is more likely to be a by-product of factors that are related to better performance rather than a determinant of better performance.

Identification of improved methods of defining task acclimation also seems warranted. In the present study, task acclimation was defined as the number of miles of training per week in the two months prior to the 5K race. Two problems with this definition are that it is confounded with motivation and that acclimation to race conditions may be just as important as acclimation to running in general in terms of facilitating more associative thought during competition. One potential remedy for the latter problem is to create a measure of task acclimation that combines acclimation to running in general with acclimation to the specific race conditions. The former problem is not so easily addressed under naturalistic conditions, but under experimental conditions, pre-race training could be actively manipulated independent of competitive motivation.

Because obtaining accurate and reliable measurements of the construct(s) of interest is so crucial to theory development, further conceptual clarification and improved

methods of measuring attentional focus are clearly desirable. Stevinson and Biddle's (1998) recent attempt to revisit the issues of nomenclature and construct validation, for example, should be lauded and replicated. Further studies examining current methods of measurement and exploring alternative methods are also encouraged. In addition to these areas of research, it would be helpful to have some empirical basis to support Masters and Ogles' (1998b) suggestion that multiple methods of measurement be utilized rather than a single measure in order to justify the additional resources necessary to incorporate multiple measures. Additional attention to the influence of social desirability on AFQ responses also deserves further attention, as it may cloud the interpretation of studies of attentional focus. Based on the results of the AFQ validation study reported in Appendix G, studies utilizing a between-subjects design or the Dissociation or Distress scale scores of the AFQ may be particularly affected.

Because the extant association/dissociation research conducted under naturalistic conditions relies exclusively on runners as participants, the question as to whether the findings of the present study as well as investigations using similar methodology apply to other sports remains unanswered. Studies utilizing athletes participating in other endurance sports (e.g., swimming, cycling) may be particularly beneficial given the similarities between these other forms of exercise and running. Undoubtedly, the heretofore restricted focus that characterizes this area of research leaves open the opportunity for further exploration of generalizability across subpopulations of athletes and exercisers.

In conclusion, the results of the present study have provided additional support for a motivational theory of attentional focus. A working model was developed to incorporate these findings along with the results of previous investigations into a more comprehensive explanation of attentional focus determinants. In addition to synthesizing the results of this study with the extant research, the working model helped to elucidate several empirical gaps that should be filled through further investigation. Given the strength of the initial correlational evidence linking motivation to attentional focus, continued development and testing of motivational theories of attentional focus is likely to be a fruitful area of research.

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	Internal	External
Task-relevant (association)	Fatigue, muscle soreness, breathing, perspiration, cramp, nausea, blisters (Inward monitoring)	Conditions, route, strategy, drinks stations, split times, distance markers (Outward monitoring)
Task-irrelevant (dissociation)	Daydreams, fantasies, math puzzles, imagining music, poetry, philosophy (Inward distraction)	Scenery, environment, spectators, other runners, fancy dress, chatting (Outward distraction)

Figure 1. Two-dimensional method of classifying attentional focus proposed by Stevinson and Biddle (1998).

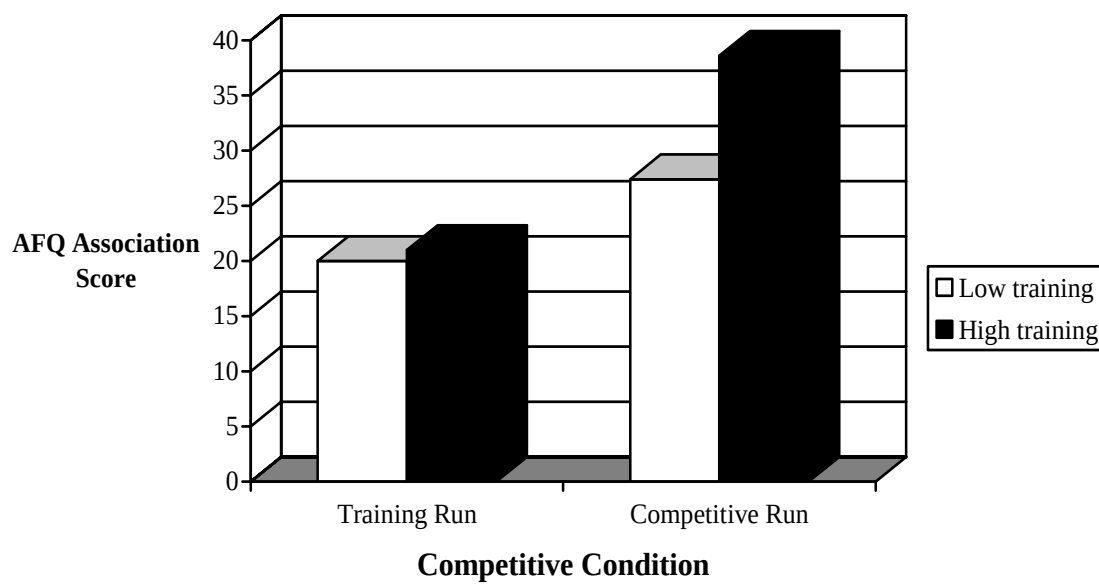


Figure 2. Hypothesized differences in association by level of training across competitive conditions.

Table 1

Descriptive Statistics for Runners who Completed Parts 1 and 2 of the Study (n=136)

Variable	Mean	SD	Range
Finish time (in min.)	25.56	4.39	17.89-37.02
Age	41.90	10.44	22.00-76.00
Number of miles run per week	19.71	11.05	3.00-57.50
Number of cross-training hours per week	1.67	2.39	0.00-14.00
Number of 5K races in past 24 mos.	8.59	9.25	0.00-60.00
Number of 10K races in past 24 mos.	1.23	2.06	0.00-12.00
Number of half-marathons in past 24 mos.	0.99	1.69	0.00-8.00
Number of marathons in past 24 mos.	0.74	1.77	0.00-10.00
MOMS-Health Orientation	5.39	1.04	2.00-7.00
MOMS-Weight Concern	4.77	1.57	1.00-7.00
MOMS-Personal Goal Achievement	4.81	1.55	1.00-7.00
MOMS-Competition	2.87	1.61	1.00-7.00
MOMS-Recognition	2.16	1.19	1.00-6.67
MOMS-Affiliation	2.65	1.37	1.00-6.83

Note: MOMS=Motivations of Marathoners Scale; AFQ=Attentional Focus Questionnaire.

(table continues)

Table 1: continued

Descriptive Statistics for Runners who Completed Parts 1 and 2 of the Study (n=136)

Variable	Mean	SD	Range
MOMS-Psychological Coping	3.37	1.48	1.00-6.78
MOMS-Life Meaning	2.68	1.33	1.00-6.29
MOMS-Self-Esteem	4.10	1.29	1.00-7.00
Race AFQ-Association	52.05	11.47	13.00-76.00
Race AFQ-Dissociation	28.13	8.90	12.00-60.00
Race AFQ-Distress	17.57	7.53	7.00-41.00
Training AFQ-Association	38.14	13.06	12.00-72.00
Training AFQ-Dissociation	33.29	10.82	15.00-72.00
Training AFQ-Distress	13.39	7.88	7.00-49.00

Note: MOMS=Motivations of Marathoners Scale; AFQ=Attentional Focus Questionnaire.

Table 2

Pearson Correlations between Variables Included in the Tests of the Hypotheses

Variable	1	2	3	4	5	6	7	8
1. Finish time	----	.08	-.47**	-.54**	-.26**	.13	.12	.10
2. Age		----	.11	-.05	-.06	-.22**	-.16*	-.06
3. Miles run per week			----	.31**	.27**	-.09	.00	.00
4. MOMS- Competition				----	.21*	-.00	.18*	.20*
5. Race AFQ- Association					----	-.04	.05	.40**
6. Race AFQ- Dissociation						----	.17**	.16
7. Race AFQ- Distress							----	.26**
8. Training AFQ- Association								----
9. Training AFQ- Dissociation								
10. Training AFQ- Distress								

Note: MOMS=Motivations of Marathoners Scale; AFQ=Attentional Focus Questionnaire.

* $p < .05$. ** $p < .01$.

(table continues)

Table 2: continued

Pearson Correlations between Variables Included in the Tests of the Hypotheses

Variable	9	10
1. Finish time	.02	.21**
2. Age	.01	.04
3. Miles run per week	-.10	-.14
4. MOMS- Competition	.01	.19*
5. Race AFQ- Association	.20**	.01
6. Race AFQ- Dissociation	.38**	.05
7. Race AFQ- Distress	.05	.54**
8. Training AFQ- Association	.04	.39**
9. Training AFQ- Dissociation	----	-.04
10. Training AFQ- Distress		----

Note: MOMS=Motivations of Marathoners Scale; AFQ=Attentional Focus Questionnaire.

* $p < .05$. ** $p < .01$.

Table 3

Summary of the Regression Analysis to Predict Differences in Associative Focus Between the Race Condition and the Training Run Condition

Variable	R^2	R^2 Change	df	F -ratio for R^2 Change	$Beta^a$
Block 1	.04	.04	2, 109	2.46	
Finish time difference ^b					0.11
Training run setting ^c					0.06
Block 2	.10	.06	1, 108	6.84	
Miles run per week					0.25**

aValues are standardized regression coefficients. bSelf-reported training run time – official finish time for the race. cDummy-coded variable: 1=indoor, 2=outdoor.

* $p < .05$. ** $p < .01$.

Table 4

Summary of the Regression Analysis to Predict Finish Time

Variable	R^2	R^2 Change	df	F -ratio for R^2 Change	$Beta^a$
Block 1	.26	.26	2, 120	21.04	
Age					0.18**
Sex					0.37**
Block 2	.54	.28	2, 118	35.40	
Miles run per week					-0.31**
MOMS-Competition					-0.40**
Block 3	.60	.06	3,115	5.80	
Race AFQ-Association					0.01
Race AFQ-Dissociation					0.10
Race AFQ-Distress					0.22**

Note: MOMS=Motivations of Marathoners Scale; AFQ=Attentional Focus Questionnaire.

^aValues are standardized regression coefficients.

* $p < .05$. ** $p < .01$.

Table 5

Summary of the Supplementary Regression Analysis to Predict Differences in Associative Focus Between the Race Condition and the Training Run Condition

Variable	R^2	R^2 Change	df	F -ratio for R^2 Change	$Beta^a$
Block 1	.04	.04	2, 109	2.46	
Finish time difference ^b					0.11
Training run setting ^c					0.06
Block 2	.10	.06	2, 107	3.39	
Miles run per week					0.25**
MOMS-Competition					0.00

aValues are standardized regression coefficients. bSelf-reported training run time – official finish time for the race. cDummy-coded variable: 1=indoor, 2=outdoor.

* $p < .05$. ** $p < .01$.

Table 6

Summary of the First Regression Analysis to Examine Association and Dissociation as Artifacts

Variable	R^2	R^2 Change	df	F -ratio for R^2 Change	$Beta^a$
Block 1	.25	.25	2, 130	21.76	
Age					0.03*
Sex					0.49**
Block 2	.34	.09	3, 127	13.25	
Race AFQ-Association					-0.17*
Race AFQ-Dissociation					0.20**
Race AFQ-Distress					0.14

Note: AFQ=Attentional Focus Questionnaire.

^aValues are standardized regression coefficients.

* $p < .05$. ** $p < .01$.

Table 7

Summary of the Second Regression Analysis to Examine Association and Dissociation as Artifacts

Variable	R^2	R^2 Change	df	F -ratio for R^2 Change	$Beta^a$
Block 1	.25	.25	2, 129	21.49	
Age					0.13*
Sex					0.40**
Block 2	.45	.20	1, 128	45.26	
MOMS-Competition					-0.45**
Block 3	.54	.09	3,125	8.59	
Race AFQ-Association					-0.09
Race AFQ-Dissociation					0.16*
Race AFQ-Distress					0.24**

Note: MOMS=Motivations of Marathoners Scale; AFQ=Attentional Focus Questionnaire.

^aValues are standardized regression coefficients.

* $p < .05$. ** $p < .01$.

Table 8

Summary of the Third Regression Analysis to Examine Association and Dissociation as Artifacts

Variable	R^2	R^2 Change	df	F -ratio for R^2 Change	$Beta^a$
Block 1	.26	.26	2, 119	20.56	
Age					0.23**
Sex					0.46**
Block 2	.43	.18	1, 118	36.30	
Miles run per week					-0.40**
Block 3	.47	.04	3,115	2.63	
Race AFQ-Association					-0.04
Race AFQ-Dissociation					0.13
Race AFQ-Distress					0.13

Note: AFQ=Attentional Focus Questionnaire.

^aValues are standardized regression coefficients.

* $p < .05$. ** $p < .01$.

Appendix A

Demographics and Running Experience Questionnaire

1. Gender _____ Age _____ Height _____ Weight _____

2. Race/Ethnicity _____ Marital status _____

3. How much have you run during the past 2 months?

Days per week _____ Miles per week _____ Hours per week _____

4. How much have you cross-trained (e.g., cycled) during the past 2 months?

Days per week _____ Miles per week _____ Hours per week _____

5. In the past 24 months, how many times have you completed a:

5K race? _____ 10K race? _____ half-marathon? _____

marathon? _____

6. In the past 24 months, what was your best finish time for a:

5K race? _____ 10K race? _____ half-marathon? _____

marathon? _____

7. In the past 24 months, what was your approximate average finish time for a:

5K race? _____ 10K race? _____ half-marathon? _____

marathon? _____

8. Did you meet your goal time for this 5K race? Yes No

If no, why not? _____

Appendix B

Motivations of Marathoners Scale (MOMS)

Please rate each of the following items according to the scale below in terms of how important it is as a reason for why you run. A score of 1 would indicate that the item is “not a reason” for running; a score of 7 indicates that the item is a “very important reason” for running; and scores in-between represent relative degrees of each reason.

	Not a reason					Very important	
							Reason
	1	2	3	4	5	6	7
1.	_____						To help control my weight.
2.	_____						To compete with others.
3.	_____						To earn respect of peers.
4.	_____						To reduce my weight.
5.	_____						To improve my running speed.
6.	_____						To earn the respect of people in general.
7.	_____						To socialize with other runners.
8.	_____						To improve my health.
9.	_____						To compete with myself.
10.	_____						To become less anxious.
11.	_____						To improve my self-esteem.

Appendix B (continued)

Motivations of Marathoners Scale

- | | | |
|-----|-------|--|
| 12. | _____ | To have something in common with other people. |
| 13. | _____ | To add a sense of meaning to life. |
| 14. | _____ | To prolong my life. |
| 15. | _____ | To become less depressed. |
| 16. | _____ | To meet people. |
| 17. | _____ | To become more physically fit. |
| 18. | _____ | To distract myself from daily worries. |
| 19. | _____ | To make my family or friends proud of me. |
| 20. | _____ | To make my life more purposeful. |
| 21. | _____ | To look leaner. |
| 22. | _____ | To try to run faster. |
| 23. | _____ | To feel more confident about myself. |
| 24. | _____ | To participate with my family or friends. |
| 25. | _____ | To make myself feel whole. |
| 26. | _____ | To reduce my chance of having a heart attack. |
| 27. | _____ | To make my life more complete. |
| 28. | _____ | To improve my mood. |
| 29. | _____ | To improve my sense of self-worth. |
| 30. | _____ | To share a group identity with other runners. |
| 31. | _____ | It is a positive emotional experience. |

Appendix B (continued)

Motivations of Marathoners Scale

- | | | |
|-----|-------|---|
| 32. | _____ | To feel proud of myself. |
| 33. | _____ | To visit with friends. |
| 34. | _____ | To feel a sense of achievement. |
| 35. | _____ | To push myself beyond my current limits. |
| 36. | _____ | To have time alone to sort things out. |
| 37. | _____ | To stay in physical condition. |
| 38. | _____ | To concentrate on my thoughts. |
| 39. | _____ | To solve problems. |
| 40. | _____ | To see how high I can place in races. |
| 41. | _____ | To feel a sense of belonging in nature. |
| 42. | _____ | To stay physically attractive. |
| 43. | _____ | To get a faster time than my friends. |
| 44. | _____ | To prevent illness. |
| 45. | _____ | People look up to me. |
| 46. | _____ | To see if I can beat a certain time. |
| 47. | _____ | To blow off steam. |
| 48. | _____ | Brings me recognition. |
| 49. | _____ | To have time alone in the world. |
| 50. | _____ | To get away from it all. |
| 51. | _____ | To make my body perform better than before. |

Appendix B (continued)

Motivations of Marathoners Scale

52. _____ To beat someone I've never beaten before.
53. _____ To feel mentally in control of my body.
54. _____ To get compliments from others.
55. _____ To feel at peace with the world.
56. _____ To feel like a winner.

Appendix C

Attentional Focus Questionnaire—Post-Race

Please rate how much you engaged in the following activities during the race.

	1 -----	2 -----	3 -----	4 -----	5 -----	6 -----	7 -----
	I did not					I did this	
	do this at all					all the time	
_____ 1.	letting your mind wander						
_____ 2.	monitoring specific body sensations (e.g., leg tension, breathing rate)						
_____ 3.	trying to solve problems in your life						
_____ 4.	paying attention to your general level of fatigue						
_____ 5.	focusing on how much you are suffering						
_____ 6.	singing a song in your head						
_____ 7.	focusing on staying loose and relaxed						
_____ 8.	wishing the run would end						
_____ 9.	thinking about school, work, social relationships, etc.						
_____ 10.	focusing on your performance goal						
_____ 11.	wondering why you are even running in the first place						
_____ 12.	making plans for the future (e.g., grocery list)						
_____ 13.	getting frustrated with yourself over your performance						
_____ 14.	writing a letter or paper in your head						
_____ 15.	paying attention to your form or technique						

Appendix C (continued)

Attentional Focus Questionnaire—Post-Race

- _____ 16. reflecting on past experience
- _____ 17. paying attention to your rhythm
- _____ 18. thinking about how much you want to quit
- _____ 19. focusing on the environment (e.g., scenery)
- _____ 20. thinking about competitive strategy or tactics
- _____ 21. counting (e.g., objects in the environment)
- _____ 22. monitoring your pace
- _____ 23. thinking about how much the rest of the run will hurt
- _____ 24. meditating (focusing on a mantra)
- _____ 25. encouraging yourself to run fast
- _____ 26. trying to ignore all physical sensations
- _____ 27. concentrating on the run
- _____ 28. wondering whether you will be able to finish the run
- _____ 29. thinking about pleasant images
- _____ 30. monitoring the time of the run
- _____ 31. other _____

Race number: _____

Finish time for this 5K race: _____

What was your goal time for this 5K race? _____

Appendix C (continued)

Attentional Focus Questionnaire—Post-Race

E-mail address (for correspondence regarding this study only): _____

Would you like feedback about your attentional style? Yes No

(If yes, please provide an e-mail address or contact the researcher via e-mail)

Appendix D

Attentional Focus Questionnaire—Post-Training Run

Please complete a training run of approximately 5 kilometers. As soon as possible following the completion of the run, please rate how much you engaged in the following activities **during the training run.**

- | | | | | | | |
|----------------|---------|---------|---------|---------|---------|--------------|
| 1 ----- | 2 ----- | 3 ----- | 4 ----- | 5 ----- | 6 ----- | 7 |
| I did not | | | | | | I did this |
| do this at all | | | | | | all the time |
-
- _____ 1. letting your mind wander
 - _____ 2. monitoring specific body sensations (e.g., leg tension, breathing rate)
 - _____ 3. trying to solve problems in your life
 - _____ 4. paying attention to your general level of fatigue
 - _____ 5. focusing on how much you are suffering
 - _____ 6. singing a song in your head
 - _____ 7. focusing on staying loose and relaxed
 - _____ 8. wishing the run would end
 - _____ 9. thinking about school, work, social relationships, etc.
 - _____ 10. focusing on your performance goal
 - _____ 11. wondering why you are even running in the first place
 - _____ 12. making plans for the future (e.g., grocery list)
 - _____ 13. getting frustrated with yourself over your performance
 - _____ 14. writing a letter or paper in your head

Appendix D (continued)

Attentional Focus Questionnaire-Post-Training Run

- _____ 15. paying attention to your form or technique
- _____ 16. reflecting on past experience
- _____ 17. paying attention to your rhythm
- _____ 18. thinking about how much you want to quit
- _____ 19. focusing on the environment (e.g., scenery)
- _____ 20. thinking about competitive strategy or tactics
- _____ 21. counting (e.g., objects in the environment)
- _____ 22. monitoring your pace
- _____ 23. thinking about how much the rest of the run will hurt
- _____ 24. meditating (focusing on a mantra)
- _____ 25. encouraging yourself to run fast
- _____ 26. trying to ignore all physical sensations
- _____ 27. concentrating on the run
- _____ 28. wondering whether you will be able to finish the run
- _____ 29. thinking about pleasant images
- _____ 30. monitoring the time of the run
- _____ 31. other _____

Finish time for the training run: _____

Date that you completed the training run: _____

Where did you complete the training run? (e.g., indoor vs. outdoor; street vs. trails)

Appendix E

Recruiting Flyers

WANTED:

RESEARCH PARTICIPANTS

Be part of a study of attentional focus and performance in a 5K run

Participation involves:

- 1) Completing a brief questionnaire after the race today
- 2) Taking home another brief questionnaire to be completed after a training run of approximately 5K

Eligibility requirements: Must be 18 years of age or older and must be able to run a complete 5K (no walkers, please)

All study participants will receive individualized feedback about their attentional style upon request

Look for us at the finish line!

Appendix F

Training Run Instructions

For the second part of the study, we would like you to complete the questionnaire that follows as well as a training run of approximately five kilometers (3.1 miles). The pace of the run should be consistent with your normal pace for training, although we ask that you don't make it a speed workout. As soon as possible after completing the run, please complete the questionnaire marked "AFQ—Post-training run version." We would like you to complete the training run and all of the questionnaires and return them to the researchers in the envelope provided within two weeks following the completion of the 5K race.

Appendix G

Cover Letter

Dear Runner:

I am a doctoral student in clinical psychology at Ohio University and, as a part of my dissertation research, I am conducting a study of distance runners in an effort to understand how psychological factors relate to focus of attention and performance during a run. I appreciate your interest in participating in this study.

In order to participate in the study, you must to be 18 or older, be able to complete a 5K run, and generally be in good health. If you choose to participate you will be asked to complete a brief questionnaire following the 5K race and to take home another brief set of questionnaires to be completed and mailed back to the researcher within two weeks following the race. **In order to complete one of the questionnaires that you would be taking home, we ask that you complete a training run of approximately 5 kilometers in distance and fill out the questionnaire as soon as possible after the run.** The total time required to complete all questionnaires is approximately one half-hour.

If you choose to participate in this study and meet the criteria for inclusion (see above), please complete the enclosed questionnaire packet (which will take approximately 20 minutes) and return it in the enclosed self-addressed, stamped envelope. None of the questionnaires pose any known risks. Participation is completely voluntary, and you may withdraw from the study at any time without any negative consequences. Your individual responses to the questionnaire items will be kept strictly confidential. Returned questionnaires will only be accessed by the principal investigator,

the project advisor, and trained research assistants. If the results of this study are accepted for publication, we are required to retain the questionnaires for a period of five years following publication. Following this five-year period, all study materials will be destroyed. In addition, all results will be analyzed as a group; individual responses will not be analyzed. Please note, however, that we will be checking the accuracy of self-reported finish times for the 5K race using your race number and the official race results. If you would like to know the results of the study or to receive individualized feedback about your attentional style, please visit the following web site:
<http://oak.cats.ohiou.edu/~jh407791>.

By completing the forms you are implicitly agreeing that the risks of this research have been explained to your satisfaction and that you understand that no compensation is available from Ohio University and its employees for any injury resulting from your participation in this research. If you have any questions about this research or have experienced a research-related injury, please contact Dr. Ben Ogles at (740) 593-1077. If you have questions about your rights as a research subject, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740) 593-0664. We appreciate your consideration of this research and wish you the best in your athletic pursuits.

Sincerely,

Jaimee Heffner, M.S.

Doctoral Candidate

Ben Ogles, Ph.D.

Dissertation Adviser

Appendix H

Description of AFQ Validation Study

Before beginning the present study, I conducted a pilot study to provide further validation for the self-report measure of attentional focus (Attentional Focus Questionnaire; Brewer, Van Raalte, & Linder, 1996) that was selected for use in the dissertation study. The Attentional Focus Questionnaire (AFQ) is a commonly used measure of attentional focus in the sport psychology literature, yet no authors to date have addressed the potential for item responses to be influenced by the desirability of endorsing items on the questionnaire. Edwards (1957) has conducted a significant amount of research on the manner in which individuals' responses on personality inventories are related to the social desirability of the items. This author suggests that interpretation of scores on such inventories are complicated by the possibility that items may be endorsed not only because the respondent feels that the item is characteristic of himself or herself, but also because the respondent feels that the items should be characteristic of herself or himself. In order to rule out the latter as a potential confound in interpreting scores on the AFQ, I examined the degree to which responses on the Attentional Focus Questionnaire (AFQ) are influenced by the desirability of the questionnaire items.

In order to examine this potential influence, I asked participants to complete the AFQ twice. On the first version of the questionnaire, they were asked to complete the measure by indicating how frequently they engage in the activities listed. On the second version I asked them to rate each item on the AFQ on a continuum of desirability. In

addition, I asked participants to complete the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960).

Method

Participants

Participants were recruited from the psychology department subject pool using the on-line registration system. Instructions on the sign-up sheet indicated that individuals must be 18 years of age and must run at least twice per week in order to participate. A total of 83 participants completed the questionnaires. Five participants were excluded from the final analyses, however, as they indicated on the questionnaires that they ran zero miles per week in the last two months. Of the remaining 78 respondents, 40 (51.3%) were male and 38 (48.7%) were female. Seventy (89.7%) of the participants reported that their race or ethnicity was white/Caucasian, three (3.8%) were African American, one (1.3%) was Hispanic, two (2.6%) were Asian/Pacific Islander, and one (1.3%) marked “other.” The number of miles run per week, as reported by the sample of participants, ranged from 1 to 40, with the mean being 9.83 ($SD=9.21$). In terms of race experience, the sample averaged 2.11 5-kilometer races, ranging from 0 to 35 races completed in the past two years. Nine of the participants indicated that they had completed a 10-kilometer race in the past two years, four completed a half-marathon, and two completed a marathon.

Measures

Attentional Focus Questionnaire. The AFQ (Brewer, Van Raalte, & Linder, 1996) is a 30-item inventory assessing focus of attention during an endurance run. The

questionnaire contains three subscales: association, dissociation, and distress.

Respondents rate the frequency (on a scale of 1 to 7, with 1 being “I did not do this at all” and 7 being “I did this all the time”) with which they engage in each of the three cognitive activities during the race. Items on the association scale include “monitoring your pace,” “monitoring specific body sensations (e.g., leg tension, breathing rate),” and “paying attention to your rhythm.” Examples of items on the dissociation scale are “singing a song in your head,” “writing a letter or paper in your head,” and “thinking about pleasant images.” Items on the distress scale include “focusing on how much you are suffering,” “wishing the run would end,” and “thinking about how much you want to quit.” Internal reliability coefficients reported for the measure are in the acceptable range (Cronbach’s alpha = .79 and .66 for the association scale, .77 and .66 for the dissociation scale, .85 and .88 for the distress scale; Brewer et al., 1996).

Marlowe-Crowne Social Desirability Scale. The M-C SDS (Crowne & Marlowe, 1960) is a 33-item measure of the degree to which individuals attempt to present themselves in a manner that is socially acceptable. The items on the scale represent attitudes and traits that represent either socially desirable or undesirable characteristics. The response format is true-false. Some examples of items that fall into the socially desirable category are, “I have almost never felt the urge to tell someone off,” and, “I am always careful about my manner of dress.” Example items that describe an attitude or trait that is socially undesirable include, “At times I have really insisted on having things my way,” and, “I like to gossip at times.” Crowne and Marlowe (1960) report an internal reliability coefficient of 0.88, which is in the acceptable range.

Demographics and running experience questionnaire (see Appendix C). This questionnaire requested demographic information such as age and sex as well as information related to training habits, history of injury, and experience with competitive running.

Procedure

At the time that they signed up for the study, participants were given a time and place to report for the experiment. All sessions took place in Porter Hall classrooms. When the participants arrived they were given a packet containing a consent form as well as the M-C SDS and two versions of the AFQ (one to record attentional focus for a typical run and one to rate the desirability of each item). Participants were asked to complete all of the enclosed questionnaires and return them to the researcher. Participants were given a debriefing form after they have completed the experiment.

Results

Because it was unclear whether the instructions provided to participants with respect to the rating of the social desirability of AFQ items were adequate for the intended purpose, the social desirability ratings were not analyzed. Instead, I calculated correlations between the M-C SDS and the three subscales of the AFQ. Results indicated that both the dissociation scale ($r=-.35$) and the distress scale ($r=-.27$) were significantly correlated with the M-C SDS score, whereas the association scale of the AFQ was not ($r=.07$).

Discussion

The results of the validation study indicate that the tendency to present oneself in a way that is socially acceptable is related to lower frequency of reported dissociation and distress during running. Such a tendency was not related to the frequency of associative thoughts. Because the primary focus of the present study was on association rather than dissociation or distress, the results of this validation study did not necessitate the inclusion of a measure of social desirability, particularly given the concern that the response rate might be negatively impacted by increasing the size of the questionnaire. Future studies, however, might benefit from incorporating a measure of social desirability into the research design in order to control for favorable self-presentation in AFQ responses.