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The After-Exercise Shower: Its Effect Upon Mood

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THE AFTER-EXERCISE SHOWER: ITS EFFECT UPON MOOD

By

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ABSTRACT

This study attempted to investigate the effect of a shower intervention on mood following different kinds of distraction from daily activity, such as reading, exercising, or sitting quietly. The Profile of Mood States was used in a pre-post design in order to determine if a "shower" intervention was associated with mood change. Overall, the first hypothesis, which stated that across all mode of activity a shower would result in greater positive mood chances than the same modes without a shower, was verified. The second hypothesis stated that a shower following exercise would result in the greatest positive mood changes overall. Exercise was shown to result in positive mood changes, as was a shower, and the combined condition also resulted in positive mood changes. However, the shower alone created the greatest decrease in TMD and also created a greater decrease in fatigue and confusion and a greater increase in vigor than exercising combined with showering. Thus, while a shower following an exercise did result in positive mood changes, they were not the greatest positive mood changes, and the second hypothesis was partially verified.

INTRODUCTION

Enjoyment is an important element in the adoption and maintenance of exercise programs (Lutz, Lochbaum, & Turnbow, 2003). Exercise has been shown to lead to positive changes in affect (Barabasz, 1991; Ewing, Scott, Mendez, & McBride, 1984; Kerr & Kuk, 2001), and various explanations for this phenomenon have been offered. Among these are distraction from daily life activities, positive fulfillment of outcome expectations, and also reasons of a physiological or hormonal nature. Other factors could also be accountable. However, causal factors underlying such pre-post change have not been definitively identified. This is not to say that interesting speculation has not been forthcoming. Different modes of exercise have been suggested to provide different levels of stress relief, while some research has also attempted to identify which specific physical activities might provide different levels of affective benefit (Berger & Owen, 1988). Research has also investigated the importance of length of involvement in physical activity in creating mood benefits (Barabasz, 1991; Berger & Owen, 1988; & Cramer, Nieman, & Lee, 1991), along with the potential importance of self-selection of type of activity (Barabasz, 1991; & McGowan, Talton, & Thompson, 1996). Exercise has been conceptualized as a form of leisure, creating similar benefits as other leisure activities (Iwasaki & Mannell, 2000). Some of the most interesting speculation to date regarding affect improvement post-exercise might be the presence of a potential "shower effect" (Raglin & Morgan, 1987) – which suggests that the after exercise shower might in fact mediate post-exercise mood.

CHAPTER I

Literature Review

Researchers in exercise physiology continue to maintain a keen interest in the link between exercise and mood. Enjoyment is an important element in the adoption and maintenance of exercise programs (Lutz, Lochbaum, & Turnbow, 2003). Exercise has been shown to lead to positive changes in affect (Barabasz, 1991; Ewing, Scott, Mendez, & McBride, 1984; Kerr & Kuk, 2001), and various explanations for this phenomenon have been offered. Among these are distraction from daily life activities, positive fulfillment of outcome expectations, as well as reasons of a physiological or hormonal nature; other factors could also be accountable. However, causal factors underlying such pre-post change have not been definitively identified. This is not to say that interesting speculation has not been forthcoming. Different modes of exercise have been suggested to provide different levels of stress relief, while some research has also attempted to identify which specific physical activities might provide different levels of affective benefit (Berger & Owen, 1988). Some of the most interesting speculation to date regarding affect improvement post-exercise might be the presence of a potential "shower effect" (Raglin & Morgan, 1987) – the concept that the post-exercise shower might in fact mediate post-exercise mood.

Exercise and Stress Reduction

Hans Selye (1973) reported that when stress is not very intense or chronic, it may be alleviated by deviation from the stressful situation. Selye cited physical activities such as sports and dancing as good examples of stress-relieving activities. In fact, stress-related anxiety has been found to be reduced in female subjects after bouts of acute exercise (Rejeski, Thompson, Brubaker, & Miller, 1992). According to Bartholomew (2000), high doses of aerobic exercise caused subjects to experience lower reactivity to psychological stress. Yoga was found to be a significant reducer of stress in college-age subjects even after a single day of participation (Berger & Owen, 1988). Iwasaki and Mannell (2000) reported that leisure activities, such as exercise, helped counteract the negative effects of stress on both physical and mental health. In a study involving jogging, racquetball, basketball, swimming and cycling, exercise was found to significantly reduce state anxiety, but quiet rest did not provide similar results (Raglin & Morgan, 1987). Ewing et al. (1984) also reported a significant increase in positive affect due to

exercise distinct from the more generalized sense of stress reduction associated with not exercising.

Physiology, Affect and Arousal

According to Selye (1976), the hormones that enter the body's circulatory system during any reaction to physiological stress, including exercise, cause mental changes in humans. He claimed that bodily changes occurring during stress act upon a person's mentality, but the reverse is true as well. Selye stated that physiological stress acting upon the body can be described as a sort of "floating anxiety" (1976, p. 175), which is the perception of a general sense of unease and discomfort.

Collardeau, Brisswalter, and Audiffren (2001) found an improvement in reaction time (or RT) induced by prolonged exercise, and offered increased arousal level as an explanation. McMorris and Graydon (1997) noted that during exercise, arousal is peripherally induced and homeostasis is maintained until exhaustion. Arousal level induced by maximal exercise may not in and of itself be sufficient to overload the central nervous system's resources, and therefore should not negatively affect the accuracy of cognitive functioning. However, the arousal of the central nervous system, or CNS, along with the physical fatigue of the skeletal-motor system have been suggested as possible mechanisms underlying discrepancies in results from research dealing with exercise, arousal, cognition, and anxiety (Tomporowski & Ellis, 1986).

McGowan, Talton, and Thompson (1996) found that as heart rates increase due to physical activity, negative affect decreases and positive affect increases. Changes in affect correlated positively with the average exercise heart rate of subjects, thus, as heart rate increased, mood improved. Scores on the Total Mood Disturbance (TMD) of the Profile of Mood States were observed to be mildly negatively correlated with average exercise heart rate ($r = -.37$). In other words, as the average heart rate of exercising subjects increased, TMD tended to decrease slightly. Moreover, there was a significant negative relationship found between the depression ($r = -.40$, $p < .04$) and anger ($r = -.40$, $p < .04$) subscales on the Profile of Mood States and average exercise heart rate in the weight-lifting subjects employed in their study.

Turnbull and Wolfson (2002) noted that exercising subjects were physiologically aroused by their activities, and had little trouble identifying that the source of this physiological arousal was the exercise they had just completed. The exercising participants in their study exhibited significantly higher positive mood scores overall than the non-exercisers. Physical exertion

combined with a positive or neutral outcome or feedback was found to elevate moods in positive directions in their subjects. Raglin and Morgan (1987) suggested that perhaps it is the activation of various physiological systems by exercise that produces a more sustained reduction than quiet rest in blood pressure, along with a decrease in anxiety. Thus physical activity has the potential to provide positive benefits, but there might be a possibility that different types of physical activity lead to different affective outcomes.

Types of Exercise and Affect: Different physical activities

Physical activities that are aerobic, noncompetitive, predictable, and rhythmical tend to produce more positive affect or be more stress reducing than other activities (Berger, 1984). Investigation involving different sports with differing characteristics then becomes important in gaining a full understanding of the effect of exercise and physical activity upon affect. Berger and Owen (1988) suggested that different forms of physical activity could in fact be placed upon a continuum of their stress reduction benefits, with different modes of exercise (running, yoga, fencing) potentially providing different depths of stress alleviation. Dyer and Crouch (1988) pointed out that few studies have compared different exercise groups, and they suggested that some activities could have immediate energizing effects, while other activities fail to produce positive effects until after some sort of as of yet undefined time delay. Ekkekakis and Petruzzello (1999) noted the importance of taking into account the role of individual differences, mediator variables, and interactions upon the reaction individuals have to exercise. There could, therefore, be many different variables influencing the relationship between exercise and affect.

Broad categories of exercise. Both aerobic and anaerobic activities influence anxiety, arousal, and affect. Craft and Landers (1998) used 30 studies in a meta-analysis and found that running seemed to produce the largest effect size of any activity, but the effect was not significantly different from that produced by anaerobic exercise. However combinations of aerobic and anaerobic exercise have not been studied often. More common has been a focus on each, separately. Bartholomew (2000) found that relatively high doses of aerobic exercise were related to a low reactivity to subsequent psychological stress. Furthermore, the completion of intense exercise was likely to impact several personal judgments. Ekkekakis and Petruzzello (1999) found that maximal exercise could lead to affective responses that run the gamut of possible outcomes, from positive to negative change. They also observed that maximal exercise may result in no change at all. In a study conducted by Ewing, Scott, Mendez, and McBride

(1984) aerobic exercisers were found to exhibit an enhanced positive mood after exercise sessions, as well as significant reductions in negative affect. Female aerobic dancers were found to report more mood benefits than controls in a study conducted by McInman and Berger (1993). However, in the Petruzzello, Landers, and Hatfield meta-analysis (1991), no difference was found in effect sizes between studies employing protocols of different intensities or durations. It may thus be important to consider a broad spectrum of research when examining aerobic exercise and affect, and to understand that many studies have reported varying and conflicting findings thus limiting their generalizability (Ekkekakis & Petruzzello, 1999).

The effect of anaerobic exercise on affect and stress has been studied less extensively, but results are nonetheless interesting. For example, anaerobic exercise was found to provide an effect size for improved affect that is not different than that of aerobic exercise (Craft & Landers, 1998; Petruzzello, Landers, Hatfield, et. al, 1991). Berger and Owen (1988) found that participants in yoga and fencing (different modes of anaerobic exercise) reported mood benefits. Weight lifting, another anaerobic activity, has also been found to reduce total mood disturbance, tension, depression, and anger (McGowan, Pierce, & Jordan, 1991; McGowan, Talton, & Thompson, 1996). Thus, it seems that both aerobic and anaerobic exercise can produce positive mood benefits.

Specific modes of exercise. Berger and Owen (1988) desired to develop a taxonomy of different modes and methods of exercise that would rank activities from the most stress reducing and mood enhancing to activities that have a minimal impact upon stress and mood. They examined activities such as swimming, conditioning, yoga, and fencing, that are different from each other in their aerobic demands, competitive nature, predictability, and rhythmic and repetitive qualities. Only yoga was determined to be a significant source of reduction in state anxiety. In fact, yoga participants were found to be below the POMS Total Mood Disturbance norms even before exercising, and exhibited even more positive moods after exercising. Nor was lengthy participation in yoga found to be a necessary requirement for the appearance in mood benefits as an improvement in mood was found after the first day of yoga class. Berger and Owen also found that participants in the low intensity exercises of fencing and yoga reported mood benefits, despite traditionally held views that exercise must at least be of moderate intensity for this to occur. They also found that while physical conditioning was associated with increases in fatigue, it was not associated significantly with any mood benefits. Thus, a

taxonomy based on exercise benefits could not be established. However, exercise-dependent mood changes were investigated in other studies.

Dyer and Crouch (1988) compared mood variations in exercising subjects who were involved in different activities. Their research design incorporated weight trainers, aerobic dancers, and runners. No significant difference in mood states was found between runners and the aerobic dancers except for fatigue (the runners reported lower levels of fatigue). Runners were found to be less depressed, less confused, and more vigorous than non-active controls. Runners also had a more positive mood profile than the non-exercising subjects, and a somewhat more positive mood profile than the weight-lifters. However their mood profile was not significantly different from that of the aerobic dancers. In the McInman and Berger (1993) study, aerobic dance was associated with greater mood benefits than was the case with non-active subjects. The aerobic dance sessions appeared to be especially useful in enhancing moods of female exercisers. McNair, Lorr, and Droppleman (1971) found that single bouts of jogging and weight-lifting resulted in significantly reduced total mood disturbance and tension, depression, and confusion states. This was not the case in both control and karate groups.

Karate, running, and weight-lifting were employed in a study by McGowan, Pierce, and Jordan (1991). The results showed that participating in a single bout of exercise significantly reduced levels of total mood disturbance, tension, depression, anger, and confusion. The running and weight-lifting groups showed significant differences from pre-to post-exercise while the karate and the non-active groups did not. It was suggested that the karate group failed to show affect improvement due to the lower work demands involved in karate. However, Berger and Owen (1988) found that yoga, an exercise with traditionally low work demands, did indeed result in affect improvement. Also, McGowan et al. mentioned that participants in their control group (members of a lecture class) were subjected to a quiz on the day of data collection. It is possible that this quiz could have affected the levels of different subscales of affect being monitored.

Kerr and Kuk (2001) reported that running was associated with a significant increase in pre-post positive emotions, and a significant decrease in reported unpleasant emotions. Anecdotal evidence suggests that runners who miss a day of running are in a worse mood than on days when they run. Conboy (1994) studied naturally occurring deprivation using the Profile of Mood States to determine mood states in the runners on the days they missed a run, and compared those to the days they did not miss their run. Results indicated a significant difference

in mood states between run days and no run days. Runners demonstrated more positive mood on run days. Conboy's work illustrated that all types of runners felt withdrawal in the form of a worse mood on days when they did not run. It remains unclear as to whether running created the positive changes in mood, or not running created the negative changes in mood.

Different activities were incorporated in the Raglin and Morgan (1987) study. Exercise modes of jogging, racquetball, basketball, swimming, and cycling on a stationary ergometer were used to examine changes in state anxiety. Overall, state anxiety was reduced significantly following exercise treatment. Following quiet rest, however, anxiety reduction was not significant. Thus, a single bout of exercise was found to reduce anxiety. It may be concluded that sometimes exercise reduces anxiety or improves overall mood, and sometimes it does not. Thus it seems difficult to determine which specific sports or exercises produce the improved mood. According to Craft and Landers (1998), a significant main effect for type of exercise was not found, and while all exercise types were significantly different from zero, no two exercise types were significantly different from each other. It is possible, however, that it is not the exercise mode per se that determines the degree of change in affect.

Self-Selection of Activity

It is also quite likely that participants, when afforded the opportunity to self-select an activity will choose one that will provide comfort and enjoyment. McGowan, Talton, and Thompson (1996) suggested that it is possible that the weight-lifting students that they studied enjoyed, or at least expected to enjoy, lifting weights upon class registration, and this in and of itself could have ultimately influenced their feelings after exercise class. Barabasz (1991) found that when subjects select their own aerobic exercise, a single bout of vigorous aerobic activity could provide mood benefits. Berger and Owen (1988) pointed out that enjoyment is an individual phenomenon, and since students picked the classes in which they participated, they most likely found these classes enjoyable and pleasing. They implied that this might influence the extent of any changes in affect level of these students.

Kerr and Kuk (2001) reached similar conclusions. If exercise and mood measurements were not carried out in the individual's usual and self-chosen exercise environment, any mood changes that might have occurred could have thus been lost or changed in some way. They pointed out that for regular exercisers, exercise lead to some positive affect. They also found a significant decrease in total reported unpleasant emotions in both high and low intensity

exercisers who exercised in their usual exercise environment with their usual activity mode. Kerr and Kuk claimed that this type of research could allow for greater ecological validity than the lab experiments using treadmills or bike ergometers. They suggested that in order to maximize the mood benefits of exercise, it is important to allow exercisers to set and achieve their own specific physical goals and strategies. Raglin and Morgan (1987) also had their subjects select their own exercise mode and intensity, choosing from jogging, racquetball, basketball, swimming, or cycling, when examining state anxiety and blood pressure in their subjects aimed at maximizing ecological validity. They found improved affect across all of the exercise modes the subjects chose to participate in. It is, thus, important to allow subjects to choose their own exercise mode, environment, and intensity.

Single Bout of Exercise

Exercise duration was an additional factor affecting mood state and emotions. Despite commonly held beliefs, long-term exercise intervention was not found to be significantly related to positive increases in mood (Cramer, Nieman, & Lee, 1991). Berger and Owen (1988) found that long-term participation was not necessarily needed for mood benefits to occur from taking part in physical activity.

Interestingly, evidence exists that a single bout of exercise can contribute positively to an individual's mood state. Barabasz (1991), for instance, found that a single bout of acute aerobic exercise had a significant beneficial effect on mood. Berger and Owen (1988) reported that yoga activity significantly reduced stress from the first day of involvement in the activity. Using a single bout of the subjects' self-selected mode of exercise, Kerr and Kuk (2001) found significant decreases in unpleasant emotions and improved overall affect. More specifically, participation in a single bout of exercise was found to significantly reduce total mood disturbance, tension, depression, anger, and confusion (McGowan, Pierce, & Jordan, 1991). McGowan, Talton, and Thompson (1996) supported the notion that a single bout of physical activity provided significant differences in tension, depression, anger, and vigor, while it did not affect fatigue or confusion; also, college students in this study tended to exhibit significant decreases in negative affect following a single session of a weight-lifting workout. Overall, it is evident that a single session of physical activity is all that is needed for an improvement in affect.

The Time Span of Affect Measurement

Many studies have examined the duration effect of exercise upon affect, anxiety, and stress. Dyer and Crouch (1988) measured mood profiles at four different points during the day in relation to physical activity. The data were collected 3 hours before the activity, 10 minutes before, 10 minutes after, and 3 hours after the activity. Findings indicated that fluctuations of moods occurred over the 24-hour period for runners, but there was not necessarily a pre-to post-event change with runners. They suggested that running may have produced a delayed energizing effect. Short-term changes in mood, however, were found to have occurred in aerobic dancers from pre-to-post activity (McInman & Berger, 1993). Raglin and Morgan (1987) measured blood pressure and state anxiety before an exercise treatment and again 20 minutes and 1, 2, and 3 hours post-treatment measuring a variety of activities. Exercise was found to have a short-term positive effect on exercise participants. Thus, exercise appears to have positive effects upon affect within a variety of timeframes around the exercise itself.

Alternate Explanations for Positive Affect Changes

A considerable amount of research has sought to determine if exercise, whether aerobic or anaerobic, strenuous or not, long-term or short-term, influences affect level. However others have attempted to provide alternate explanations for the increase in positive affect levels or decrease in stress that appears to be associated with exercise.

Berger and Owen (1988) suggested that it may not be the exercise per se that results in a decreased stress level, but rather the deep abdominal breathing associated with it. They pointed out that rapid shallow breathing is a common symptom of stress. It was also noted that it may be the opportunity to take time out of one's day for a chosen activity that reduces stress. Morgan (1985) suggested, similarly, that it might be the distraction from stress that creates the positive mood effects of aerobic exercise, and not the exercise itself.

Iwasaki and Mannell (2000) speculated that physical activity in general, exercise, and any form of leisure allowed individuals to take a much-needed break from stressful situations. This facilitated regrouping and refreshment that enabled improvement in individuals to deal with their problems. Leisure was seen as providing an opportunity to promote positive mood or decrease negative mood. Exercise buddies provided emotional support and esteem support, or even tangible aid to their fellow exercisers, thus assisting with mood benefits that could be attributed to the exercise itself. The researchers also pointed out that leisure or exercise contributed to

feelings of self-determination and empowerment, and that these activities enabled better stress coping. The researchers then went on to state that people used leisure and exercise in varying degrees for companionship, coping, and/or mood enhancement.

Using meta-analysis Craft and Landers (1998) concluded that exercise was found to be as effective as therapy, behavioral intervention, or social contact in alleviating depression (or increasing positive affect) in 30 studies examining clinically depressed populations. This illustrates that while exercise can have a positive effect on subjects, it could also be the social aspect of the exercise that creates positive affect. However, it also indicates that exercise may not be a singular method for creating positive mood changes. Other mediating aspects might play a part as well.

Kolt and Kirkby (1994) found that anxiety and affect levels in competitive gymnasts were strongly related to how many injuries the gymnasts had experienced in the past. Health then becomes a mediating variable and competing in a healthy state would tend to result in positive affect.

Another affect mediating variable could be the motivation of the exercisers. Lutz, Lochbaum, and Turnbow (2003) discussed the impact of motivational orientations of exercisers upon feelings reported by subjects post-exercise. The reason an individual chooses to engage in physical activity is found to have an impact upon their post-exercise affect. Similarly, McAuley and Duncan (1989) found that the competitive aspect of physical activity, along with positive and negative outcomes, strongly influenced the affective outcome of the participants involved. Winners reported more positive affect than losers. The losers reported more intense negative affect. Subjects who had low expectations for their performance but succeeded beyond their expectations displayed positive affect, while those subjects who expressed high expectations disconfirmed experienced intense negative affect. It was also found that individuals cared about their physical performance even if the competitive environment was laboratory-based.

Feedback was found to influence the affect levels of subjects post-exercise. Exercisers were found to experience a more highly improved affect than non-exercisers following positive and neutral feedback (Turnbull & Wolfson, 2002). Those exercisers that were given negative feedback were found to be in a significantly worse mood than non-exercisers post-activity. Turnbull and Wolfson stated that improved mood was not necessarily an inevitable result of exercise. When physical exertion was combined with negative outcome or negative feedback, it

yielded a reverse effect, in turn leaving people frustrated, depressed, or even angry. Thus, feedback can alter the affective outcome of exercise, which helps to illustrate further that post-exercise affect can be affected by many different factors.

The Shower Effect

In the Kerr and Kuk study (2001), exercise interventions were found to be associated with a significantly more improved positive affect than in the non-exercise condition (control group). However, the instrument used to measure affect was administered before showering. In fact, it seems that most researchers do not even note if measurements are taken before or after showers, and it makes it difficult to determine whether or not a shower effect has been considered. Little published research mentions showers in relation to affect or stress.

Raglin and Morgan (1987) reported that the differential effects they noted for subjects in exercise and quiet rest groups were not in agreement with earlier research findings. They suggested that this outcome may in part be due to the fact that the subjects who exercised showered following exercise. The researchers suggested that the anxiety-reducing effect attributed to exercise could actually be attributed to the post-exercise shower. Thus, Raglin and Morgan implied that there may be a "shower effect" – an anxiety reducing or negative affect reducing influence of a shower.

On the other hand, the shower could be a mediating variable, associated with greater increases in positive affect than those experienced by subjects who exercise but do not shower. It has already been shown in numerous studies that exercising subjects experience a greater increase in positive affect and decrease in negative affect, along with a decrease in anxiety from pre-to-post physical effort in comparison to those subjects who did not exercise (Berger & Owen, 1988; Ewing, Scott, Mendez, & McBride, 1984; McGowan, Pierce, & Jordan, 1991; McInman & Berger, 1993; Raglin & Morgan, 1987). The traditional post-exercise shower might further increase positive affect.

Raglin and Morgan (1987) measured the blood pressures and state anxiety levels of healthy males before and after a 5-minute shower at a constant temperature. They found that while the decreases in blood pressure were not significant, a reduction in state anxiety was noticed. They therefore designed a study using hypertensive subjects in an effort to determine the influence of showering upon anxiety. They were unable to conclude that a shower effect existed for hypertensive subjects. This study is the only published research discussing the

influence of a shower upon affect. Further investigation of this phenomenon needs to thoroughly examine this possibility. Does the shower simply increase positive affect post-exercise or does it stand alone in creating positive affect in the absence of exercising.

Conceptual Model

As the aforementioned literature implies, deviation or disengagement from stressful stimuli can result in a reduction of the intensity of stress or anxiety responses and a positive increase in affect, which could be modified by a shower. This notion is illustrated in Figure 1.

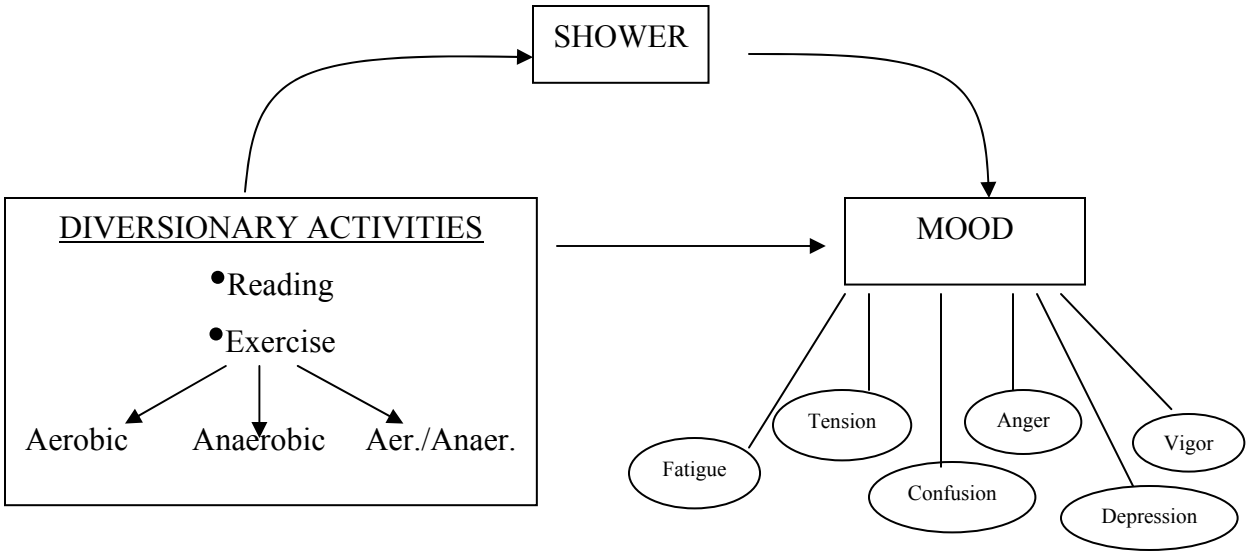


Figure 1. Diversion Model of Affect Improvement

Purpose of the Study

The purpose of this thesis research is to determine the effect of post-exercise showering on scores on each of the 6 subscales and the Total Mood Disturbance measure of the Profile of Mood States (McNair, Lorr, & Droppleman, 1971).

Research Hypotheses

Two research hypotheses were tested in this study:

1. Shower across all modes of activity will result in greater positive mood changes than the same modes without shower.

2. Shower following exercise will result in the greatest positive mood changes compared to reading and just showering.

Rationale for hypotheses. Raglin and Morgan (1987) suggested that effects of showering upon mood are positive and that post-exercise shifts in affect in positive directions may be due to this intervention. Thus, a significant post-activity reduction in state anxiety would be anticipated. Since anxiety is but one factor in affect, the POMS scale was used to measure both negative and positive moods. If anxiety is reduced by taking a shower, scores on other subscales may be similarly influenced. If the shower is a mediating effect, and exercise has already been proven in numerous other studies to improve mood, then exercise and shower combined should lead to an even greater increase in positive mood.

CHAPTER II

Methods

Participants

The population sampled was the regularly-exercising gymnasia of each university student population at two large southeastern universities. Volunteers were recruited to participate in this study via word of mouth at the two university gyms. Subjects were between the ages of 18 and 25 yrs. and were undergraduate and graduate students. Subjects were regular exercisers, participating in exercise of their own choice at least 4 days a week at their university gym complex. No subjects were varsity athletes, however all were engaged in their exercise routine of choice for at least 3 months prior to data collection.

Of the 31 participants, 12 (38.7%) were male, while 19 (61.3%) were female. Participation according to exercise activity is provided in Table 1.

Table 1
Subject activities

Physical activity	Number of subjects
Treadmill running	11
Elliptical machine	4
Stationary bike/Spinning	1
Aerobics	4
Kick-boxing	1
Martial arts	2
Weight training	8

Instrumentation

The Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971: Appendix A). The POMS consists of 65 adjectives rated on a 5-point Likert-type scale, comprising six subscales: Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-Inertia, and Confusion-Bewilderment. Adding up the five negative subscale totals and subtracting the one positive subscale total (Vigor-Activity) provides the Total Mood Disturbance (TMD) scale. The POMS is appropriate for use with individuals 18-years and older.

The original POMS instructs people to respond according to how they have felt over the past week. Instead of examining such a broad spectrum of affect, the "right now" response set was employed in this study to gauge immediate emotions and fluctuations. Participants were instructed to respond to items with respect to how they are feeling right at this moment. The "right now" POMS has been used successfully in previous studies of exercise and affect (Berger & Owen, 1988; Dyer & Crouch, 1988; Ewing, Scott, Mendez, & McBride, 1984). The response format ranges from "Not At All" (0), through "A Little" (1), "Moderately" (2), "Quite a Bit" (3), to "Extremely" (4). Each subscale contains a different number of items, creating possible score ranges from 0 to anywhere from 28 to 90. TMD scores can range anywhere from -32 to 200. The higher the score, the greater the total mood disturbance, or the more negative the mood of the individual.

Test-retest reliability coefficients range from .65 to .74 (McNair, Lorr, & Droppleman, 1971); the low reliability coefficients have been noted to be acceptable due to the transitory nature of affect. Validity tests have shown that high tension scores on the POMS correlate highly (r=.80) with other measures of anxiety (McNair, Lorr, & Droppleman, 1971). Spielberger (1972) found that the internal consistency coefficients of four of the six POMS scales were .90 or greater, while two of the shorter scales, Confusion and Vigor, which contain 8 items or less, had internal consistency of at least .84.

Effort. To control for the perceived effort expended in each exercise session, a one-question form (Appendix D) was given to each participant along with the second POMS survey after each exercise session. The form asked each participant to rate their perceived effort in that particular exercise session on a 5-point Likert-type scale, where 1 = "Minimal Effort," and 5 = "Maximal Effort."

Procedure

Volunteers were recruited via word of mouth at two large southeastern universities. Prior to meeting for the first day of data collection, potential subjects were questioned regarding the nature of their physical exercise routine and informed of procedures, but not the specific purposes of the study. Participants were then given a chance to ask questions about their participation and then were provided a copy of the Informed Consent Form (Appendix B) to examine. They were asked to bring with them to each day of data collection their usual exercise paraphernalia, leisure reading of their choice, and everything they would need in order to shower.

Subjects participated for 6 consecutive days, and data were collected at the time and place of each participant's usual physical activity location within their respective university gymnasium complex. Each subject participated in one of six different treatments in random order on each day of data collection: physical activity/exercise and shower, exercise and no shower, reading and shower, reading and no shower, control and shower, and control and no shower. Prior to the first day of data collection, the order of the six treatments for each subject was determined using a random numbers table, however subjects remained ignorant of the order of treatments. The study's design is illustrated in Table 3.

Table 2
Experiment design

	Treatment					
	Shower			No Shower		
Survey Administration	Exercise	Reading	Control	Exercise	Reading	Control
Pre-Activity	X	X	X	X	X	X
Post-Activity	X	X	X	X	X	X

At the beginning of the first day of data collection, participants were provided with another copy of the Informed Consent Form, asked to read it carefully, and given an opportunity to ask and have answered any questions or concerns regarding participation in the study. Following the question and answer period, they were given a pen or pencil and asked to sign and date the informed consent form. They were also given a demographics sheet (Appendix C) to fill out on the first day of data collection.

On each day of data collection, participants were asked to fill out the "right now" POMS (Appendix A) prior to, as well as directly after administration of each treatment. After the initial administration of the POMS, subjects were told whether they would be participating in exercise, leisure reading, or the third option (never referred to as "control"). All distributed POMS surveys distributed were identical. All POMS forms were coded on the back for the purpose of identifying the treatment and trial number. The code was known only to the researcher. Participants were asked to list the last four numbers in the upper right hand corner of each POMS for the purpose of matching the forms. Scripts utilized by the researcher to provide instructions for participants may be found in Appendices E-G.

Exercise and shower. During this treatment, subjects completed the POMS and then participated in their usual physical activity (either aerobic or anaerobic). After exercising as usual, subjects were escorted to the closest gymnasium showers where they completed a 5-minute shower. Subjects were then given a chance to dry themselves off and dress. They then were administered the POMS.

Exercise and no shower. During this treatment, subjects participated in their usual physical activity, whether aerobic or anaerobic, as usual. They completed the POMS survey before and after exercising and took no shower.

Reading and shower. For this treatment, subjects completed the POMS survey, and were then escorted to a quiet area adjacent to their usual exercise location that was free from distraction. They spent the next 45 minutes reading recreationally (material of their own choosing). At the end of the 45-minute time period, each subject was then escorted to the gymnasium showers to complete a 5-minute shower, dry themselves off and dress. They then completed the POMS survey once again.

Reading and no shower. In this treatment, subjects completed the POMS survey and then were relocated to a quiet area adjacent to their usual exercise location free from distraction. They spent the next 45 minutes reading recreationally (material of their own choosing). At the end of this time period, each subject completed the POMS.

Control and shower. Each subject also participated in one treatment in which, they completed the POMS, and instead of exercising or reading, they were immediately escorted to the closest shower facility. They then completed a 5-minute shower and were given a chance to dry off and get dressed before being asked to complete the POMS once again.

Control and no shower. In this treatment, each subject was asked to fill out the POMS, then were lead to a quiet seating area where they sat quietly without television, reading materials, or homework for 5 minutes. They then completed the POMS once again.

CHAPTER III

Results

Prior to hypothesis testing, descriptive statistics were computed for all the variables in the study to ensure univariate normality. With three exceptions, skewness and kurtosis were all within the (-2) – 2 range. Plotting the 3 exceptional values, which ranged between 2.18 – 2.59 indicated a minor violation of normality distribution. Thus, it was decided to test the study's hypotheses without any adjustments.

In addition, effort perceptions were examined after exercise engagement with and without shower. No significant differences were obtained between the two modes (M = 3.10, SD = 0.83 vs. M = 3.22, SD = 0.80). Thus, the study's hypotheses could be tested.

To test the study's hypotheses addressing the effect of showering on overall mood, RM ANOVA was employed using Total Mood Disturbance (TMD) as a dependent variable. The ANOVA results are presented in Table 4.

Table 3
ANOVA results for TMD by shower by mode by time

Effect	Wilks' Λ	F	*p*	1-β
Shower	.832	6.057	.020	.663
Mode	.919	1.286	.292	.256
Time	.520	27.639	.000	.999
Shower * Mode	.774	4.240	.024	.696
Shower * Time	.753	9.860	.004	.860
Mode * Time	.907	1.491	.242	.292
Shower * Mode * Time	.403	21.444	.000	1.000

Significant (p = .02) shower effect was revealed. This effect is shown in Figure 2. Across time and mode, people who took showers exhibited better general mood state than when omitting showers (M = 13.93, SD = 2.20 vs. M = 21.58, SD = 2.89; ES = 0.34).

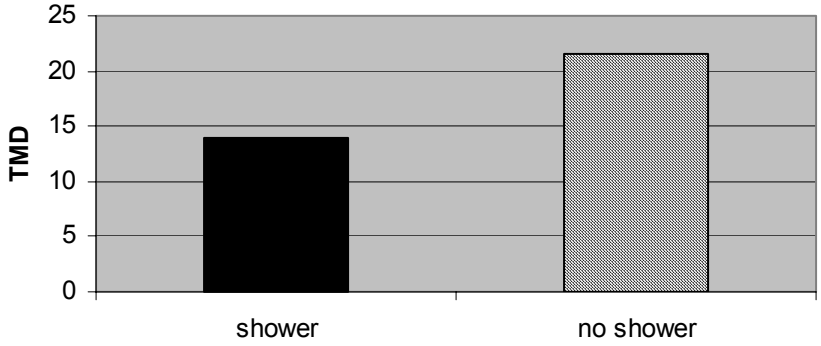


Figure 2. TMD means in the shower and no shower conditions

The significant ($p < .000$) time effect resulted in pre-post differences in TMD across shower and mode (M = 22.31, SD = 2.42 vs. M = 13.19, SD = 1.99; ES = .21).

For the present study, testing the hypotheses requires shower and mode to significantly interact with time (i.e., pre-post). Two interactions with time resulted in significant effect: shower by time ($p = .004$), and shower by mode by time ($p < .000$). Because the shower by time effect is embedded within the shower by mode by time effect, only the 3-way interaction is presented in Figure 3.

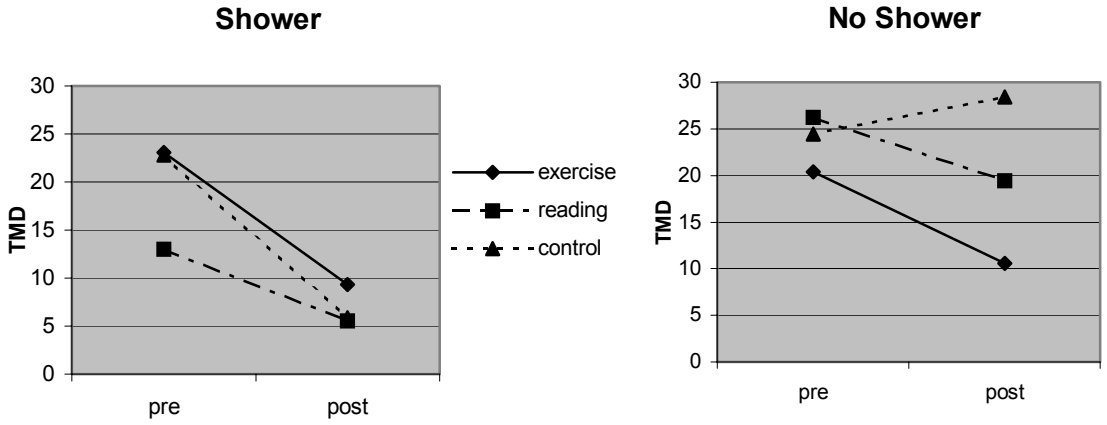


Figure 3. Means for TMD by shower, mode, and time

The pre-post means of TMD depicted in Figure 3, reflecting the shower by mode by time interaction, illustrate the following (a) people who took showers after exercising or just reading,

and those who just took showers improved substantially their TMD (M = 23.07, SD = 5.64, M = 16.97, SD = 3.57, M = 22.77, SD = 4.12 vs. M = 9.32, SD = 3.51, M = 5.52, SD = 2.62, M = 5.90, SD = 2.42, respectively for exercise, reading, and only showering), (b) when people are not allowed to shower, exercise and reading resulted in mood improvement (M = 20.39, SD = 4.61, M = 26.19, SD = 3.51 vs. M = 10.55, SD = 3.86, M = 19.54, SD = 3.45 for exercise and reading respectively), (c) when people have no shower and no activity, overall mood increased in negativity (M = 24.45, SD = 3.25 vs. M = 28.42, SD = 3.88), (d) when exercise, reading, and control were incorporated with showers, improvements in TMD were greater than when exercising, reading, or sitting quietly without showering (Δs = -13.75, -11.45, -16.80 vs. –9.84, -6.65, 3.97, respectively).

To further test the study's hypotheses RM MANOVA was employed including the 6 mood subscales in the analysis. The results are presented in Table 5.

Table 4
MANOVA results for POMS subscales by shower by mode by time by scale

Effect	Wilks' Λ	F	*p*	1-β
Shower	.815	6.814	.014	.714
Mode	.900	1.618	.216	.314
Time	.476	32.986	.000	1.000
Scale	.195	21.476	.000	1.000
Shower * Mode	.921	1.245	.303	.249
Shower * Time	.782	8.348	.007	.798
Mode * Time	.857	2.422	.106	.449
Shower * Mode * Time	.659	7.509	.002	.919
Shower * Scale	.789	1.390	.261	.410
Mode * Scale	.327	4.324	.002	.979
Shower * Mode * Scale	.248	6.360	.000	.999
Time * Scale	.376	8.642	.000	.999
Shower * Time * Scale	.751	1.723	.165	.502
Mode * Time * Scale	.266	5.807	.000	.997
Shower * Mode * Time * Scale	.389	3.302	.010	.925

One should note that the significant shower ($p = .01$) and time ($p < .000$) effects were reported in the previous analysis. The significant ($p = .000$) scale effect stemmed from the obvious differences in scales scoring range. Thus, to test the hypotheses only interactions with time (pre-post) are of interest. Because all 2-way and 3-way interactions with time are

embedded within the shower by mode by time by scale significant (p = .01) interaction, this finding is sufficient for testing our hypotheses. This 4-way interaction is presented in Figure 4.

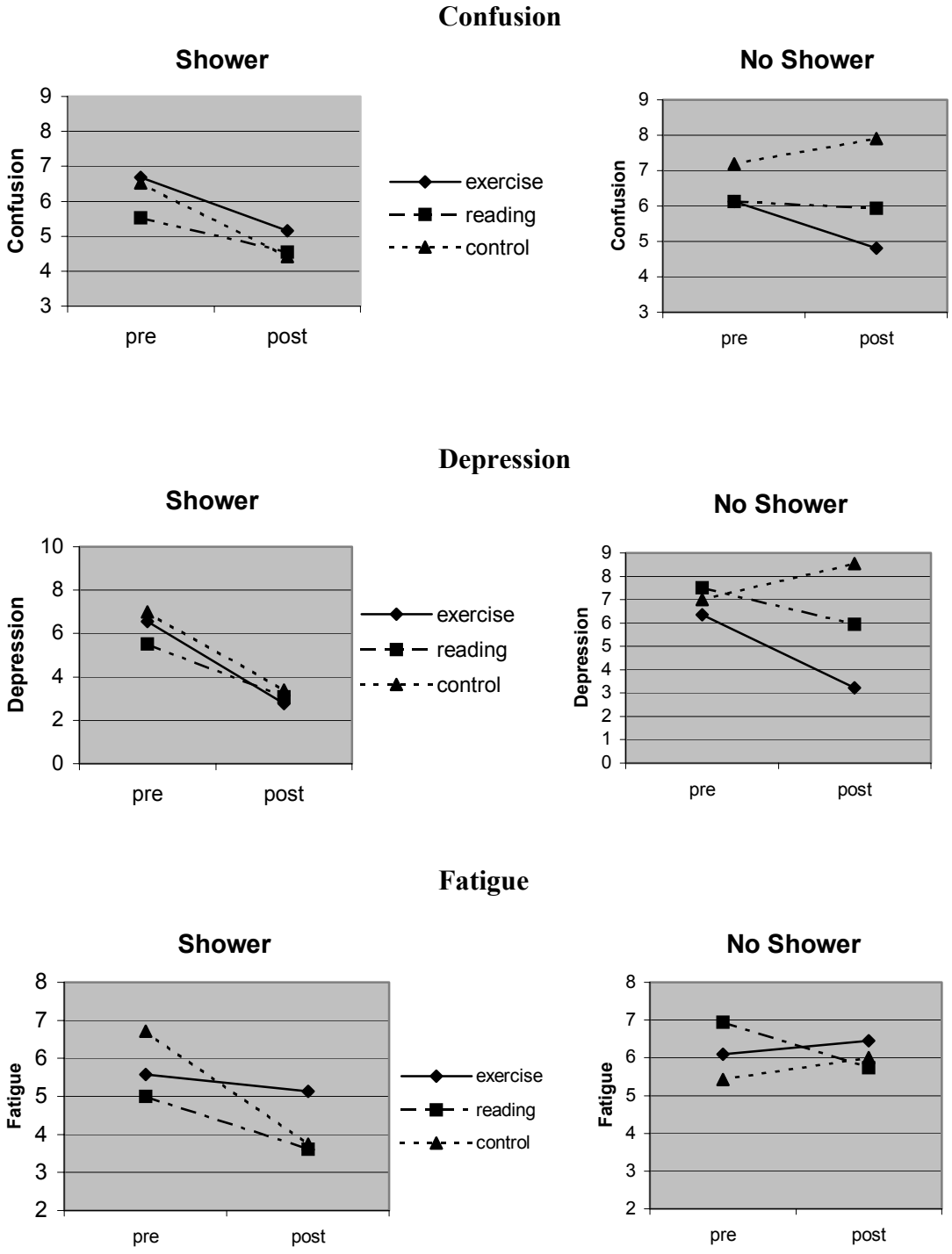
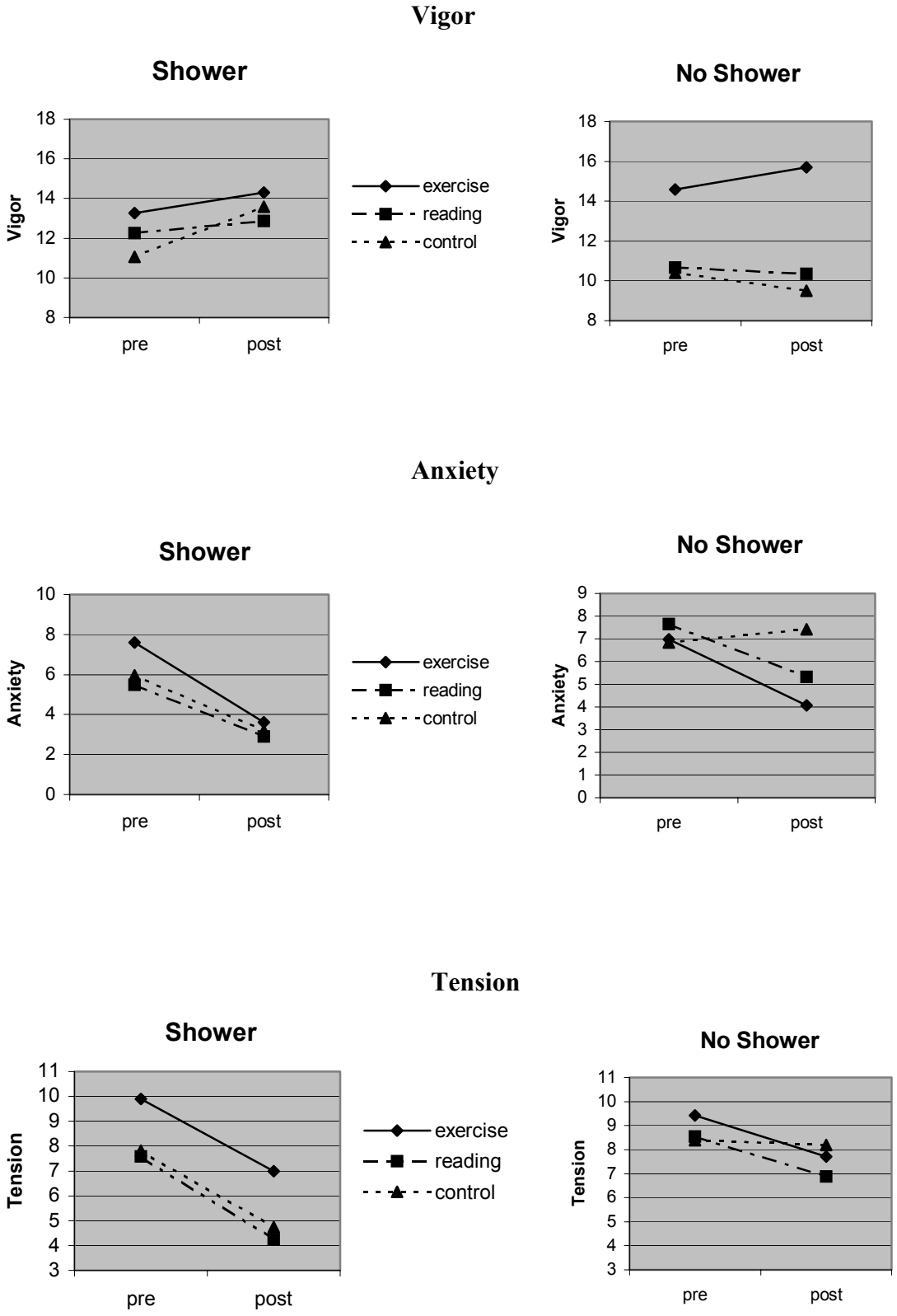


Figure 4. Means for the 6 POMS subscales by shower, mode, and time.

Figure 4 Continued



The results indicate somewhat different changes in the six components of mood state in relation to showering and activity mode. Showering decreases confusion, depression, anxiety, and tension similarly for exercising, reading, and "just showering." For the fatigue subscale, showering drastically decreased in the control, or "just showering", condition, while decreasing slightly due to reading and even less due to exercise. Vigor increased for all three activity modes with a shower, but increased the most when the shower was by itself, with no reading or exercise involved.

However, exercise also decreased confusion, depression, anxiety, and tension when no shower was involved. In the exercise and no shower condition, vigor increased drastically, while fatigue levels also increased, but only a small amount. The no shower control activity of sitting quietly for 5 minutes without distraction increased confusion, depression, fatigue, and anxiety, while it created little to no change in vigor and tension. Reading without a shower decreased depression, fatigue, anxiety, and tension. However, confusion and vigor stayed relatively stable over time due to reading without taking a shower.

Overall, the first hypothesis, which stated that across all mode of activity a shower would result in greater positive mood chances than the same modes without a shower, was verified.

The second hypothesis stated that a shower following exercise would result in the greatest positive mood changes overall. Exercise was shown to result in positive mood changes, as was a shower, and the combined condition also resulted in positive mood changes. However, the shower alone created the greatest decrease in TMD and also created a greater decrease in fatigue and confusion and a greater increase in vigor than exercising combined with showering. Thus, while a shower following an exercise did result in positive mood changes, they were not the greatest positive mood changes, and the second hypothesis was partially verified.

CHAPTER IV

Discussion

Summary

The purpose of this study was to examine the interaction between exercise and showering upon post-exercise affect. In order to examine this, exercise along with reading were used as diversionary activities, and each was combined with a shower treatment and a non-shower treatment. Also, control treatments of shower only and sitting quietly for the length of time of a shower, were included in the research design.

A diversion model of affect improvement was proposed in this study (Figure 1). This model highlights the possibility that exercise, in whatever form it is used, may serve as a distraction from other daily activities and concerns. Thus, reading may be distracting and account for a decrease in negative mood and an increase in positive mood. This model represents an extension of previous research, which illustrates that exercise reduces stress and improves mood (Barabasz, 1991; Berger & Owen, 1988; Ewing, Scott, Mendez, & McBride, 1984; Kerr & Kuk, 2001; & Rejeski, Thompson, Brubaker, & Miller, 1992). The model also emphasizes the distraction potential of exercise relative to daily stress (Morgan, 1985; & Berger & Owen, 1988). Iwasaki and Mannell (2000) showed leisure to be a buffer from daily stress, with a potential positive effect on mood, and suggested physical activity, games, and reading as examples. Therefore, exercise may very well be a diversionary activity with the ability to positively influence affect. Other forms of leisure activities might have similar effects.

Another important aspect of the diversion model is the so-called shower effect, first suggested by Raglin and Morgan (1987). Their research showed that a shower might have a positive mediating effect on post-exercise anxiety. If this is true, then the traditional post-exercise shower might mediate all aspects of affect. If exercise contributes to positive affect partially due to its ability to distract exercisers from their daily tasks or stressors, then a shower combined with other diversionary activities, such as reading, might have similar effects. All of these variables were examined in this study.

The first hypothesis addressed in this study stated that a positive change in affect would be found due to a shower, irrespective of activity mode, as suggested by Raglin and Morgan

(1987). The shower was in fact found to have a significant effect on affect – subjects experienced more positive overall affect (or smaller TMD scores) in the treatments in which they took showers than in the treatments when they did not take a shower. The TMD scores were also found to significantly decrease more from pre- to post- treatment when a shower was included than when it was not included. One of the most interesting findings in this study relates to differences between control situations. One control situation was simply showering as usual for five minutes, followed grooming and dressing. The other control condition, used to account for the approximately 5 minutes between pre- and post- survey in the control shower condition was no shower – where subjects simply sat quietly for five minutes without distraction. In the control without shower condition, subjects were found to show an increase in TMD scores, or an increase in negative affect, while the control shower condition showed a decrease in TMD scores, or an increase in positive affect. Thus, simply sitting for five minutes quietly negatively affected subjects' mood while showering for five minutes positively affected subjects' mood, thus helping to prove the existence of a shower effect.

Of the six subscales, confusion and tension were found to decrease a moderate amount from pre- to post- control shower. Depression and anxiety both decreased from pre-to post-control shower, while a small decrease in fatigue was found from pre-to post- control shower. Vigor, the only positive affect subscale measured by the POMS, was found to show a moderate increase from pre-to post- control shower. Overall, a shower was shown to produce a decrease in each measure of negative affect and an increase in positive affect, and thus, a positive change in overall affect.

While not addressed directly in the hypotheses tested in this study, exercise was assumed to provide a positive increase in affect. In previous studies, exercise has been shown to increase positive affect and reduce stress (Barabasz, 1991; Ewing, Scott, Mendez, & McBride, 1984; McGowan, Pierce, & Jordan, 1991; & Rejeski, Thompson, Brubaker, & Miller, 1992). No significant difference, however, was found in this study in TMD scores or subscale scores due to mode of activity or mode of activity by time, and thus, exercise was not found to significantly effect mood more than other modes of activity. Berger (1984) suggests that for physical activity to provide the greatest mood benefits, it needs to be aerobic, noncompetitive, predictable, and rhythmical. While all subjects in the current study participated in noncompetitive activity, not all participated in aerobic activity. Also, due to the fact that some subjects participated in guided

activities (martial arts, kick-boxing, and aerobics), the activities may not have always been predictable, as they were not in the direct control of the participant. The rhythmic quality of the activities was also difficult to gauge and quantify. These might provide some explanation as to why exercise did not produce identifiable and significant improvements in affect. Subjects did, however, select their own activities, which has been found to be important in providing mood benefits to exercisers (Barabasz, 1991).

Craft and Landers (1998) observed that exercise was not significantly different from other interventions in alleviating depression, as is the case here, where reading and exercise were not found to be significantly different in alleviating negative mood.However, just because exercise was not significantly different from other modes of distraction provided in this study in improving affect does mean that exercise does not provide a form of distraction from daily stress that could be similar to that provided by reading or sitting quietly. In fact, it might be important to note that exercise was not significantly different than reading in improving affect, as this lends to the idea that leisure activity in and of itself might be enough to enhance positive mood (Iwasaki & Mannell, 2000), which further supports the diversion model of affect improvement.

The second hypothesis investigated in this study was that a shower following exercise would produce greater positive changes in affect compared to reading and showering or just showering. Interactions between shower and exercise were found to be significant. Exercise and a shower produced a smaller Total Mood Disturbance than exercise and no shower. Interestingly, reading and a shower also produced a decrease in Total Mood Disturbance, but not as great a decrease as exercise and shower. However, the control shower produced a greater decrease in TMD than any other condition.

This seems to all suggest that while a shower and exercise may not produce the same significant positive affect changes, a shower tacked on to the end of the exercise experience might create a more positive affect change than simply exercising. This change in affect seems to be greater than the change in affect seen by simply taking the same amount of time out of one's day for leisure activity (in this case in the form of reading) and then showering. Thus, a shower produces a positive change in mood, but exercise followed by a shower creates a greater positive change in mood.

There is a possibility that there are different mechanisms involved in creating positive affect changes due to a shower or due to exercise; this might help explain the fact that a shower

and exercise do not provide the same affect improvements. One mechanism suggested as a cause of the positive effect of exercise on mood is physiological change with endorphins being indicated as the causal agent. Also, the distraction that exercise provides could itself be a mechanism. The mechanism involved in the shower effect, however, is as yet unknown and should be examined, but could involve simply cleansing oneself.

The interaction between shower and exercise can be seen in the subscales of the POMS as well. Confusion scales experienced a small decrease from pre-to post-activity when exercise and shower were combined, while fatigue and tension showed a moderate decrease. A small increase in the vigor subscale was observed from pre-exercise to post-shower, while a large decrease was seen in both anxiety and depression.

The original study by Raglin and Morgan (1987) inadvertently found a shower effect while examining the effect of exercise on anxiety and blood pressure. Upon further examination, a shower was not found to improve anxiety levels on hypertensive patients. This study took the idea of a shower effect and examined it more thoroughly, separating it out in healthy, regular exercisers to see if it truly exists.

Overall, it appears that a shower effect does in fact exist. A shower alone has the power to improve mood, but it also has the power to mediate post-exercise affect. Also important, a shower also positively affects affect, although to a lesser degree, post-reading. This all lends support to the diversion model of affect improvement, which states that diversion can have an effect on affect, which can be mediated by a shower.

Limitations

One limitation of this study is the use of undergraduate and graduate students. While it is convenient to use college-age subjects when conducting exercise psychology studies, such sampling would not permit generalization of findings to large numbers of exercisers not enrolled in college. Also, the college students that will be used in this study have chosen to participate in the study and also to participate in regular physical activity. This implies that they enjoy physical activity, which may in and of itself affect measurements of affect.

Another potential limitation of this study is the use of students at two separate universities, using two different gym and shower facilities. While each gym had an on-sight shower facility, there are no doubt minor differences in each which could have had an effect on the mood states of those exercising. Also, each gym-going subject could have had different

reactions to such things as the crowdedness of the facility, and the overall condition of the equipment they were conducting their physical activity on, which would vary by gym. Also, some subjects participated in group activities, while others exercised alone. This might have created a confounding effect as well.

Significance

The significance of this relates to findings reported elsewhere in the exercise psychology literature. Many other studies examining pre-to post-exercise affect changes have not included mention of the surveys being completed prior to or after a post-exercise shower. Future research in the field should control for time of survey in relationship to post-physical activity shower.

Also, findings from the present study are important in that they imply that exercisers should be told to take a shower after their physical activity in order to acquire the greatest mood benefits from exercising. Coaches of teams, and other sport and exercise professionals, should take this into consideration and suggest to their athletes that they shower post-practice in order to positively affect their mood as well.

Future Research

Future research should study the mechanism that may account for positive mood benefits associated with a shower. Future research should look into the effect of grooming oneself again for the day after exercise, the possibility of a shower being a "completing" aspect to exercise, and also simply the cleansing effect of the shower. Also, some sort of aromatherapy effect of soaps and shampoos might be involved, water in and of itself could have some effect, or something else might be involved that the researcher has not even considered.

Swimmers were deliberately left out of this study due to the potentially confusing effect that working out in water might have. Future studies should examine if swimmers experience the same results found in this study and should also look into the potential of a "water effect".

Also of interest to future researchers might be the idea of whether taking a shower post-activity and pre-treatment in the training room might affect how athletes perceive their physical treatments with their trainers.

Another item that might be of interest in future research would be the further investigation of the diversion model of affect improvement, and whether or not other forms of diversion than reading and exercise has similar effects on affect.

APPENDIX A

Profile of Mood States

Indicate how well each word or phrase below describes how you are feeling RIGHT NOW.
You are to pick one of the five possible descriptions for each word or phrase by checking underneath the appropriate choice.

	Not At All	A Little	Moderately	Quite A Bit	Extremely
1. Friendly	__	__	__	__	__
2. Tense	__	__	__	__	__
3. Angry	__	__	__	__	__
4. Worn out	__	__	__	__	__
5. Unhappy	__	__	__	__	__
6. Clear headed	__	__	__	__	__
7. Lively	__	__	__	__	__
8. Confused	__	__	__	__	__
9. Sorry for things done	__	__	__	__	__
10. Shaky	__	__	__	__	__
11. Listless	__	__	__	__	__
12. Peeved	__	__	__	__	__
13. Considerate	__	__	__	__	__
14. Sad	__	__	__	__	__
15. Active	__	__	__	__	__
16. On edge	__	__	__	__	__
17. Grouchy	__	__	__	__	__
18. Blue	__	__	__	__	__
19. Energetic	__	__	__	__	__
20. Panicky	__	__	__	__	__
21. Hopeless	__	__	__	__	__
22. Relaxed	__	__	__	__	__
23. Unworthy	__	__	__	__	__
24. Spiteful	__	__	__	__	__
25. Sympathetic	__	__	__	__	__
26. Uneasy	__	__	__	__	__
27. Restless	__	__	__	__	__
28. Unable to concentrate	__	__	__	__	__
29. Fatigued	__	__	__	__	__
30. Helpful	__	__	__	__	__
31. Annoyed	__	__	__	__	__
32. Discouraged	__	__	__	__	__
33. Resentful	__	__	__	__	__
34. Nervous	__	__	__	__	__
35. Lonely	__	__	__	__	__
36. Miserable	__	__	__	__	__
37. Muddled	__	__	__	__	__
38. Cheerful	__	__	__	__	__
39. Bitter	__	__	__	__	__
40. Exhausted	__	__	__	__	__
41. Anxious	__	__	__	__	__
42. Ready to fight	__	__	__	__	__
43. Good natured	__	__	__	__	__
44. Gloomy	__	__	__	__	__
45. Desperate	__	__	__	__	__
46. Sluggish	__	__	__	__	__
47. Rebellious	__	__	__	__	__
48. Helpless	__	__	__	__	__
49. Weary	__	__	__	__	__
50. Bewildered	__	__	__	__	__
51. Alert	__	__	__	__	__
52. Deceived	__	__	__	__	__
53. Furious	__	__	__	__	__
54. Efficient	__	__	__	__	__
55. Trusting	__	__	__	__	__
56. Full of pep	__	__	__	__	__
57. Bad-tempered	__	__	__	__	__
58. Worthless	__	__	__	__	__
59. Forgetful	__	__	__	__	__
60. Carefree	__	__	__	__	__
61. Terrified	__	__	__	__	__
62. Guilty	__	__	__	__	__
63. Vigorous	__	__	__	__	__
64. Uncertain about things	__	__	__	__	__
65. Bushed	__	__	__	__	__

APPENDIX B

Informed Consent Form

I freely and voluntarily and without element of force or coercion, consent to be a participant in the research project entitled "The after-exercise shower: Its effect upon mood."

This research is being conducted by Jennifer L. McGinnis, who is a graduate student of sport psychology at Florida State University. I understand the purpose of the research is to better understand moods as they relate to exercise and showers. I understand that if I participate in the project I will be asked to complete paper and pencil questionnaires. I also understand that I will be asked to participate in my regular physical activity course and a shower, quiet reading and a shower, or simply a shower during the course of my regular exercise period. I understand that I will in no way be observed during my shower. I understand that data collection will only include the survey, and that the shower itself is not a part of data collection. I understand that there is a possibility of minimal level of risk if I agree to participate in this study.

I understand that my participation is totally voluntary and I may stop participation at anytime. All my answers to the questions will be kept confidential to the extent allowed by law and identified by a subject code number. My name will not appear on any of the results. No individual responses will be reported. Only group findings will be reported. I understand that all information, surveys, data and results collected from this study will be kept in the private library of the researcher and will all be destroyed by 2006.

I understand that this consent may be withdrawn at any time without prejudice, penalty or loss of benefits to which I am otherwise entitled. I have been given the right to ask and have answered any inquiry concerning the study. Questions, if any, have been answered to my satisfaction.

I understand that I may contact Jennifer L. McGinnis, Florida State University, (336) 215 – 6441 or Dr. David Pargman, (850) 644 – 8793 for answers to questions about this research or my rights. Group results will be sent to me upon my request. If I have any questions about my rights as a subject/participant in this research, I can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633.

I have read and understand this consent form.

_____ _____

(Subject) (Date)

APPENDIX C

Demographics Sheet

Please fill out the following for demographic purposes only:

Last 4 digits of your Social Security Number: _____

Gender: _____ Male
_____ Female

Age: _____

Current standing in college: _____ Freshman
_____ Sophomore
_____ Junior
_____ Senior
_____ Graduate Student

APPENDIX D

	Minimal Effort				Maximal Effort
Please indicate the degree of effort that you expended during this exercise session	1	2	3	4	5
	___	___	___	___	___

APPENDIX E

Researcher Script
First Day of Data Collection

Good (morning/afternoon). As we have discussed previously, my name is Jennifer McGinnis and I am a graduate student in Sport Psychology working on my masters thesis. You have agreed to participate in my research.

I previously gave you a copy of the informed consent form for you to look over. I will now give you another copy of the informed consent form. Do you have any questions or concerns?

<pause and answer questions>

If there are no more questions and you are still interested in participating, please sign and date the bottom. If you have chosen not to participate, please pass back the blank informed consent form, and thank you for your time.

I will now hand out the first survey and a simple demographics sheet. Please respond to this survey how you feel right at this moment. Please also remember to write at the top right-hand corner the last four digits of your social security number. This will be used only for matching up your first and second survey and not for personal identification of any kind.

<pause for completion of demographics form and first survey>

Your order of treatments has been previously determined using a random numbers form. We will now begin your first session and then follow with another survey.

APPENDIX F

Researcher Script
Second through Sixth Days of Data Collection

Thank you once again for participating in my research study. I will now hand you your first copy of the survey for today. Please respond to this survey how you feel right at this moment. Please also remember to write at the top right-hand corner the last four digits of your social security number. This will be used only for matching up your first and second survey and not for personal identification of any kind.

As mentioned previously, your order of treatments has been previously determined using a random numbers form. We will now begin your <Xnth> session and then follow with another survey.

APPENDIX G

Debriefing Script

Thank you for participating in the study entitled “The after-exercise shower: Its effect upon mood”. Your assistance is greatly appreciated. The surveys you filled out will now be matched up and compared to determine any change in mood from across the different treatments. Results will be reported as a group and no individual results will be reported. No one will see the surveys but me. If you would like a copy of the group results you may contact me at the number on the informed consent form you were given originally. Do you have any questions or concerns?

Thank you again for your time and assistance.

APPENDIX H

Florida State
UNIVERSITY

Office of the Vice President
For Research
Tallahassee, Florida 32306-2763
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Human Subjects Committee

Date: 12/8/2003

Jennifer McGinnis
4518 Starmount Dr.
Greensboro, NC 27410

Dept.: **Sport Psychology**

From: **David Quadagno, Chair**

Re: **Use of Human Subjects in Research**
The after-exercise shower: Its effect upon mood

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be exempt per 45 CFR § 46.101(b) 2 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If the project has not been completed by **12/7/2004** you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

Cc: Dr. David Pargman
HSC No. 2003.626

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BIOGRAPHICAL SKETCH

Jennifer L. McGinnis was born April 21st, 1979 in Shreveport, LA, but grew up in Greensboro, NC. Ms. McGinnis graduated from the North Carolina School of Science and Mathematics in 1997 with her high school diploma. In 2001, she graduated summa cum laude with departmental honors from Clemson University with a B.S. in Parks, Recreation, and Tourism Management and a major area of Sport Management. During her time at Clemson, Ms. McGinnis completed an internship with the National Basketball Association, or NBA, in New York City, focusing on non-apparel licensing. In 2004, she graduated with an M.S. in Sport Psychology from Florida State University, having completed athletic department internships in operations at Wake Forest University and equipment at Duke University. Ms. McGinnis is also a published and acclaimed poet.