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Influence of attentional focus strategies on exercise enjoyment, mood alteration, and ratings of perceived exertion

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This study examined relationships among attentional strategies and recreational joggers' exercise enjoyment, mood alteration, and perceived exertion. College male recreational joggers (N = 21) were randomly assigned to employ either an association strategy followed by dissociation, or to the reverse treatment order in separate, moderate intensity exercise sessions. Analyses of the Attentional Focusing Questionnaire responses indicated that participants successfully employed the assigned attentional focus strategy and reported fewer Distressful thoughts when using dissociation, rather than association. Joggers enjoyed the first exercise session more than the second, but there was no difference for enjoyment between the strategies. When using the dissociation strategy first, joggers reported decreased Tension, Depression, and Confusion. When using the association strategy first, joggers reported decreased Confusion. In conclusion, male recreational joggers reported fewer Distressful thoughts when using dissociation, enjoyed the first exercise session more than the second, had greater mood benefits when using the dissociation strategy first, and reported increased RPE as the distance jogged increased.

KEY WORDS: Association, Cognitive strategies, Dissociation, Distressful thoughts, recreational exercisers.

Regular physical activity is associated with multiple physiological and psychological benefits (American College of Sports Medicine, 2018). Despite the benefits, 26.6% of adults in 2017 did not include any exercise in their

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leisure time (Centers for Disease Control and Prevention, 2019). In 2017, only 50.3% of adults in the U.S. met the suggested guidelines for aerobic physical activity; namely, 150 minutes of moderate intensity exercise per week (Centers for Disease Control and Prevention, 2019). It seems that knowledge about health benefits of exercise may not be a strong factor for individuals to maintain their exercise behavior.

Based on hedonic theory (Kahneman, 1999), individuals prefer to repeat positive experiences because they provide immediate rewards and thus enhance implicit biases to approach a specific activity. Exercise can be a positive experience that brings immediate rewards such as enjoyment and mood enhancement (Berger, Darby, Owen, & Carels, 2010; Berger, Darby, Zhang, Owen, & Tobar, 2016; Kilpatrick, Greeley, & Collins, 2015). These rewards may motivate individuals to exercise regularly and have been used for predicting long-term exercise behavior (Dunton, Leventhal, Rothman, & Intille, 2018; Hagberg, Lindahl, Nyberg, & Hellénius, 2009). Therefore, it is important to investigate factors that might enhance immediate psychological rewards derived from participating in exercise to increase exercise adherence (Berger, Weinberg, & Eklund, 2015; Williams, 2008).

Association and dissociation are attentional focus strategies that might influence exercise enjoyment and other psychological changes associated with exercise. As postulated by Morgan and Pollock (1977) when using association, elite distance runners focus their attention on the task at hand that primarily includes monitoring their bodies to assess the physical sensations emanating from physical activity. Exercisers, as well as elite athletes, using association can monitor internal physical factors such as heart rate, breathing pattern, muscular exertion, and how they generally feel during the task. In contrast when using dissociation, exercisers purposely engage in thoughts that are unrelated to the exercise itself (Brewer, Van Raalte, & Linder, 1996; Goode & Roth, 1993; Hutchinson, Karageorghis, & Jones, 2015; Masters & Ogles, 1998, Morgan & Pollock, 1977). Exercisers may use dissociation strategies to distract themselves from the painful sensory input and sensations of exercise and/or the exercise-related boredom of endurance exercise by diverse mental activities such as thinking and personal reflection (any topic of choice), listening to music, watching television, and playing video games (Chow & Etnier, 2017; Hutchinson et al., 2015; Jones, Karageorghis, & Ekkekakis, 2014; Monedero, Lyons, & O'Gorman, 2015; Morgan & Pollock, 1977). The attentional focus strategies of both association and dissociation have been used in a variety of physical activity contexts including distance-running and strength-training programs (Brick, MacIntyre, & Campbell, 2014; Morgan & Pollock, 1977; Stevinson & Biddle, 1998).

Relatively little is known about the influence of using attentional focus

strategies while exercising on hedonic tone. In comprehensive reviews of the use of association and dissociation strategies when participating in physical activity, Brick et al. (2014), Lind, Welch, and Ekkekakis (2009), and Salmon, Hanneman, and Harwood (2010) reported that using a specific attentional strategy can influence performance-related measures such as running time, RPE, fatigue tolerance, and endurance in diverse physical activities. However, they identified only a few studies that focused specifically on the differences in participants' affective states. Investigating the effects of the attentional focus strategies of association and dissociation on exercise enjoyment and mood alteration is particularly important for exercise practitioners and exercisers themselves who wish to use exercise to enhance hedonic tone. Providing opportunities for enjoyment and mood elevation also may assist participants in maintaining their exercise adherence throughout their lives.

Potential Benefits of Using Association or Dissociation Strategy while Exercising

Attentional focus strategies employed while exercising can yield different physiological and performance benefits (Brick et al., 2014; Salmon et al., 2010). For example when using dissociation as a strategy, participants have reported lower ratings of perceived exertion (RPE), heart rates, and respiratory exchange ratios than when using association strategies and exercising at the same intensities (Chow & Etnier, 2017; Lind et al., 2009; Neumann & Piercy, 2013). However, when Schomer (1986) allowed exercisers to control and modify their pace and maintain stride consistency while running, exercisers performed better when using an association strategy. More recently, Aitchison et al. (2013) investigated participants' attention when exercising at different intensities. As exercise intensity increased, exercisers' attentional foci automatically changed from dissociation to association. At higher exercise intensities, exercisers have tended to use an association strategy (Aitchison et al., 2013; Lind et al., 2009). However, the effects of these two attentional focus strategies and how they are related to performance outcomes still are questionable. Some researchers have suggested that using an association strategy can facilitate performance results (Masters & Ogles, 1998b; Mauger & Sculthorpe, 2012). In contrast, using a dissociation strategy has increased participants' performances on agility tests (Porter, Nolan, Ostrowski, & Wulf, 2010). These findings suggest that attentional focus strategies have differential performance benefits depending on the physical activity.

Although the effects of association and dissociation strategies on physiological and performance outcomes have been studied, there have been rela-

tively few studies on the possible psychological outcomes (Salmon et al., 2010). Recently when investigating high intensity exercise, Jones et al. (2014) reported that exercisers using the dissociation strategies of listening to music and simultaneously watching videos, and also a music-only condition reported more positive affect and enjoyed their exercise more than those who did not use either of the dissociation strategies, or the video-alone dissociation strategy. These results agree with Goode and Roth (1993) who reported improvement on Tension and Vigor scores when using dissociation strategies and with LaCaille, Masters, and Heath (2004) who reported a greater increase in tranquility in the dissociation than in the association group. In contrast to the psychological benefits of dissociation, using association while exercising has had either no effect or a negative effect on psychological factors (Fillingim & Fine, 1986; Neumann & Brown, 2013; Welch, Hulley, Ferguson, & Beauchamp, 2007). Additional research is needed to investigate the psychological results when employing the two attentional strategies.

The Influence of Exercise Intensity on Psychological Factors

To enhance the positive psychological experiences related to exercise, researchers have examined the influence of exercising at different exercise intensities on mood alteration and enjoyment (Berger et al., 2010; Ekkekakis, Parfitt, & Petruzzello, 2011; Kilpatrick et al., 2015). Participants exercising at low and moderate intensity have reported mood benefits (Berger & Owen, 1998; Ekkekakis et al., 2011; Stych & Parfitt, 2011). In contrast, exercising at a high intensity has been associated with either no change, or mood changes in undesired directions (e.g., Berger & Motl, 2000; Ekkekakis et al., 2011). Similar results have been reported for exercise enjoyment. When exercising at high intensities, participants have tended to report lower enjoyment (Kilpatrick et al., 2015). Thus, it seems that low or moderate, rather than high, intensity exercise can facilitate desirable changes in mood states, exercise enjoyment, and the overall hedonic benefits of exercise.

The Current Study

Although mood alteration and enjoyment have been studied extensively in relation to exercise, few investigators have examined the influences of association and dissociation attentional strategies during exercise on psychological factors in recreational participants. This study was based on a social-cognitive perspective as described by Brick and colleagues (2014) and on the

parallel processing model of pain (Brewer & Buman, 2006). A primary purpose of the present study was to investigate the impact of attentional strategies on exercise enjoyment and mood in male recreational exercisers who jogged at a moderate intensity. A secondary purpose was to investigate the relationships between attentional focus strategies and the performance-related measures of RPE and jogging speed when exercising at a moderate intensity. Based on the social-cognitive model, we controlled for a variety of experimental factors. These included the following: task familiarity, demographic characteristics by specifying participant eligibility, performance conditions specified by careful attention to experimental design, individual testing, and use of the assigned cognitive strategy interventions.

Some researchers have suggested expanding the categorical terminology of association and dissociation to capture more completely the complex thought processes of exercisers and athletes (e.g., Brick et al., 2014; Schomer, 1986). However in this study, the original dichotomous attentional focus strategies of association and dissociation were employed as treatment strategies to provide basic information about the psychological and performance benefits of a typical exerciser's jogging session. Specific hypotheses were that (a) male recreational joggers will report higher exercise enjoyment, more desirable changes in mood states, and fewer Distressful thoughts when using a dissociation strategy than when using an association strategy, and (b) participants will report a lower RPE but will require more time to complete the 1.5 miles jogging when using a dissociation strategy, rather than an association strategy.

Method

Participants

Participants were healthy, full-time male undergraduate and graduate students from a Midwestern university who had a mean age of 23.7 years (*SD* = 3.1). Participation was restricted to males since there may be a sex difference in the hedonic response to exercise and in strategy use (Emad, Neumann, & Abel, 2017). Participants met the following requirements: (a) an absence of medical health issues that might preclude exercise, (b) regular exercise participation of at least 150 minutes per week for the past month for ease of participation in moderate intensity exercise, (c) reported ability to run 1.5 miles continuously for task familiarity, and (d) acceptable scores on a social desirability measure. One participant was excluded from the study because of a high social desirability score (see Measures). Thus, the final number was $N = 21$.

Measures

Medical history, exercise history, and demographic questionnaires. A Medical History Questionnaire was used to screen each participant's health status and determine his eligibility to run continuously for 1.5 miles (ACSM, 2018). In addition, an Exercise History Questionnaire included questions about each participant's exercise habits such as exercise mode, duration, and frequency, average running distance per session, and preferred attentional focus strategies employed when exercising. A Demographic Questionnaire was administered to measure each participant's age, weight, height, ethnicity, and education level.

Reynolds Short Form (RSF) of the Marlowe-Crowne Social Desirability Scale. The RSF of the Marlowe-Crowne Social Desirability Scale (MCSDS) included 11 true/false items to assess the tendency to report socially desirable responses while completing self-report measures (Reynolds, 1982). The short form was derived from the original 33-item scale based on a factor analysis and retaining items loading 0.40 or greater. Participants answered the statements such as "no matter who I'm talking to, I'm always a good listener" and also "I'm always willing to admit it when I make a mistake." Concurrent validity of this short form is high ($r = 0.91$) and the 11-item scale has more than adequate reliability for assessing social-desirability (Reynolds, 1982). Participants with elevated social desirability (score ≥ 9) were excluded from the study. The cut off of 9 is at the 75^{th} percentile of social desirability.

Attentional Focusing Questionnaire. The 30-item Attentional Focusing Questionnaire (AFQ) included three subscales (Brewer et al., 1996). The Association subscale (11-items) reflected how often the runner thought about bodily sensations and performance variables. The Dissociation subscale (12-items) measured how often an exerciser let his mind wander and thought about problem solving. The Distress subscale (7-items) reflected how often the runner thought about quitting and the pain being experienced. Participants rated each test item on a scale ranging 1 to 7 ("I did not do this at all," to "I did this all the time," respectively). Sample items for the Association subscale included "monitoring specific body sensations" and "focusing on staying loose and relaxed"; for the Dissociation subscale, "singing a song in your head;" and for Distress, "wishing the run would end" (Brewer et al., 1996). The AFQ allowed exercisers to score high or low on any of the three subscales (Masters & Ogles, 1998b). The subscales have been reported to be reliable measures with Cronbach's $\alpha = .66 - .79$ for Association, $\alpha = .66 - .77$ for Dissociation, and $\alpha = .85 - .88$ for Distress (Brewer et al., 1996).

Physical Activity Enjoyment Scale. The Physical Activity Enjoyment Scale (PACES) contained 18 statements measuring enjoyment-related feelings an individual reports experiencing while participating in a physical activity (Kendzierski & DeCarlo, 1991). Sample bipolar items included "I find it pleasurable" or "I find it unpleasant." Participants rated statements on a 7-point response scale. A higher composite score represented more enjoyment for the specific activity. The PACES was administered as a state measure based on the instructions, "rate how you feel at this moment about the physical activity you have just completed" and has been shown to have acceptable reliability as evidenced by an internal consistency reliability that has been reported as $\alpha = .96$, with test-retest reliability coefficients ranging from .60 – .93 (Kendzierski & DeCarlo, 1991; Motl et al., 2001).

Profile of Mood States (POMS). The POMS was a 65-item self-report inventory that measured transient feelings (McNair, Lorr, & Droppleman, 2003). The POMS included the six subscales of Tension, Depression, Anger, Vigor, Fatigue, and Confusion. Each item in the POMS was measured on a 5-point Likert-type scale, ranging from 0 (not at all) to 4 (extremely) with the state measure reflecting "how do you feel right now." The POMS has been employed extensively in exercise, clinical, and medical research to assess changes in mood pre- and post-treatment (e.g., Berger & Motl, 2000; Bourgeois, LeUnes, & Meyers, 2010; Morgan, 1980). Internal consistency for the POMS was high with subscales ranging from $\alpha = 0.79$ for the Confusion to $\alpha = 0.93$ for the Depression subscales (Bourgeois et al., 2010).

Rating of Perceived Exertion. The Rating of Perceived Exertion Scale (RPE), a category-interval rating scale, was used to measure individuals' perceived efforts of physical strain (Borg, 1998). Participants rated their physical effort from a low of 6 to indicate "no exertion at all" to a high of 20 which indicated "maximal exertion." Borg (1998) developed the RPE Scale to be associated with heart rate by multiplying the RPE score by 10. Thus, an RPE score of 9 (very light intensity) corresponded with a heart rate of 90 beats per minute. The correlation between HR and RPE has been reported to be moderate to high ($r = .65$; $r = .74$) in Caucasian populations (Chen, Fan, & Moe, 2002; Scherr et al., 2013).

Procedure

After the study was approved by the Institutional Review Board at a Midwestern university, volunteers were recruited for the study. Joggers were a convenience sample and were recruited for the study through classroom visits in exercise science and physical education classes and the posting of

campus flyers in an exercise science building. Participant requirements as listed in the participant section were emphasized both in the classroom and poster recruiting venues. Respondents contacted the first author who arranged an introductory meeting. There, beside a 111-meter indoor track, the participant was invited to a sitting area with a table where the volunteer completed the consent form, Medical History Questionnaire, Exercise History Questionnaire, Demographic Questionnaire, and RSF. Volunteers were carefully screened during this introductory meeting for satisfying study inclusion criteria.

To experimentally control for possible influences of methodological issues on the effects of cognitive strategy as suggested by Brick et al. (2014), joggers were instructed on using the RPE Scale and a HR monitor (Polar Model S120[TM]). During this introductory meeting, participants subsequently jogged at a leisurely pace for four laps around an indoor track and practiced verbally reporting RPE as they passed an assistant holding a large RPE sign at the end of each lap. They also practiced verbally reporting HR as indicated on their HR monitor as they passed the assistant. The purpose of the entire first meeting was to familiarize joggers with the setting, use of the HR monitor to facilitate maintaining a moderate exercise intensity, and the reporting of RPE. Subsequently, two jogging sessions were scheduled on different days within the next week. Each participant was asked to maintain his current exercise behavior and to avoid drinking caffeinated beverages, smoking, and eating for two to three hours prior to subsequent testing sessions in order that these activities did not influence their heart rates and jogging comfort.

At the beginning of each of two jogging sessions, participants first completed the state measure of the POMS. Participants then were fitted with the HR monitor and reviewed instructions for reporting RPE. Joggers verbally reported both HR and RPE every four laps. They received advice (when needed) from the first author to reduce or raise HR to ensure that they maintained a moderate intensity while exercising, i.e., 40% to 60% participant's Heart Rate Reserve (HRR; ACSM, 2018) throughout the exercise sessions. Thus, HR served as a control variable in the present study. It is important to control exercise intensity, because exercising at a moderate intensity has been shown to be conducive to positive experiences (e.g., Berger & Motl, 2000; Berger et al., 2015; Ekkekakis et al., 2011; Kilpatrick et al., 2015). After the time needed to complete the 1.5-mile jogging session was recorded, the exerciser walked two additional cool down laps. Exercisers completed post-exercise measures of AFQ, POMS, and the PACES immediately after the cool down. The same testing procedure was employed in the final jogging session in which all participants completed 1.5-mile run under the attentional focus strategy opposite to that used in the first jogging session.

After random assignment to an attentional focus strategy sequence for the initial exercise session, the jogger listened to instructions for using either association or dissociation strategies which were based on those employed in previous studies (Brewer & Buman, 2006; Brick et al., 2014; Stevinson & Biddle, 1998). In the associative condition, participants were instructed to monitor their heart and respiration rates, and to focus on monitoring their muscle exertion and feet pushing off the ground. Throughout the dissociation attentional focus strategy, exercisers were instructed to remain focused on anything of their choice that was unrelated to exercising such as past relationships, recalling memories, thoughts of friends and family, imagining music, and solving problems. In both conditions, participants reported RPE and HR every fourth lap, and then immediately transitioned back into the previous thoughts or started new thoughts according to the strategy assigned for that running session.

Statistical Analysis

The Statistical Package for the Social Sciences version 20 was used (IBM Corp., Armonk, NY, USA). Three independent variables included type of Attentional Focus Strategy (Association, or Dissociation), Order of Strategy (First Association and then Dissociation, or First Dissociation and then Association), and Time (Pre-exercise, or Post-exercise). All decisions were made with $\alpha = .05$. To assess whether the participants followed the instructions and engaged in the assigned attentional strategy, a MANOVA with a 2 × 2 design (Strategy × Order) with repeated measures for the first factor on the vector of AFQ subscale scores was calculated as a manipulation check. An additional 2 × 2 × 2 MANOVA (Strategy × Order × Time) with repeated measures for the first and third factors on the vector of the POMS scores examined mood. Subsequently, three 2 × 2 (Strategy × Order) ANOVAs with repeated measures on Strategy were used to assess differences in exercise enjoyment, RPE, and time to complete the jogging session.

Results

Demographic Characteristics

Participants' mean Body Mass Index (BMI) was 25.5 kg/m^2 (*SD* = 3.5), and their ethnicity included identification as Caucasian (*n* = 16), Asian (*n* = 2), African American (*n* = 1), and Hispanic (*n* = 2) males. Their exercise background included exercising a mean of 5.1 times/week which included jogging 2.2 times/week (see Table I) Participants' mean resting HR was 64 ±

TABLE I
Participant Characteristics (N=21)

Variables	*Mean*	*SD*
Age (years)	23.7	3.1
Height (in.)	69.9	2.2
Body Weight (lbs.)	177.5	33.9
Body Mass Index (kg/m^2)	25.5	3.5
Exercise Days/Week	5.1	1.2
Exercise duration (minutes/sessions)	76.2	25.4
Running sessions/Week	2.2	1.5
Miles/Session	2.3	2.0

Note. Each jogger reported exercising for more than 150 minutes per week for the past month.

9 b/min and predicted maximal HR was 196 ± 3 b/min (ACSM, 2018). While exercising in the association and dissociation strategy sessions, their mean exercise intensity HRs were 139 ± 7 b/min and 139 ± 11 b/min, respectively and were well within the required moderate intensity range. Thus, exercise HR successfully served as a control variable. Participants' initially-reported preferences for an attentional focus strategy were somewhat evenly distributed among association ($n = 5$), dissociation ($n = 8$), or both strategies combined ($n = 8$) as measured by the Exercise History Questionnaire.

Verification of the Attentional Strategy Manipulation

To determine whether participants employed the attentional focus strategies of association and dissociation as instructed, a 2 × 2 (Strategy × Order) MANOVA (with repeated-measures on the first factor) on the association and dissociation subscales of the Attentional Focusing Questionnaire (AFQ) was calculated. The Order × Attentional Strategy interaction was not significant, however, there was a significant difference for Order of the strategies ($\Lambda = .67$, $F_{2, 18} = 4.50$, $p = .026$, $\eta^2 = .33$). These differences in average scores under each order are not of interest in this study, because they represent the Association plus Dissociation total score. There was a significant main effect for Strategy on the AFQ subscales ($\Lambda = .13$, $F_{2, 18} = 61.41$, $p < .001$, $\eta^2 = .87$). Follow-up ANOVAs on the Strategy factor revealed that participants in the Association treatment had significantly more association thoughts than dissociation thoughts ($M \pm SEM$; $M = 50.85 \pm 1.88$ vs $M = 21.80 \pm 1.60$, respectively; $F_{1, 19} = 151.95$, $p < .001$, $\eta^2 = .89$). Participants in the Dissociation treatment had significantly more dissociation thoughts than association thoughts ($M = 45.11 \pm 1.98$ vs $M = 25.10 \pm 2.23$, respectively; $F_{1, 19} = 50.13$, $p < .001$, $\eta^2 = .73$). Based

on the AFQ responses, participants maintained an association or dissociation strategy during the assigned sessions.

Responses to the third AFQ scale of Distress were analyzed in a separate 2 × 2 (Strategy × Order) ANOVA with repeated measures on the first factor. The interaction and Order effects were not significant. As hypothesized, there was a significant difference in Distress scores between the two attentional strategies ($F_{1, 19} = 6.17$, $p = .022$, $\eta^2 = .25$). The male recreational joggers reported more Distressful thoughts when using association rather than dissociation as an attentional strategy ($M = 11.92 \pm 1.03$ vs $M = 9.19 \pm .62$, respectively) even when exercising at a moderate intensity.

Attentional Focus Strategy and Exercise Enjoyment (State)

Results of a 2 × 2 (Strategy × Order) repeated measures ANOVA on the state measure of the PACES revealed a significant interaction ($F_{1, 19} = 4.85$, $p = .040$, $\eta^2 = .20$). Enjoyment of the first jogging session completed was greater, regardless of the strategy employed. When participants used the dissociation strategy first, their exercise enjoyment was greater for the dissociation ($M = 101.55 \pm 5.00$) than in the subsequent association treatment ($M = 96.18 \pm 4.72$). When participants used the association strategy first, their exercise enjoyment was greater ($M = 91.50 \pm 4.95$) for the association than in the subsequent dissociation strategy ($M = 81.40 \pm 5.25$). However, simple effect analyses revealed no differences between the strategies. Thus, joggers enjoyed the first exercise session more than the second, regardless of strategy employed. See Figure 1.

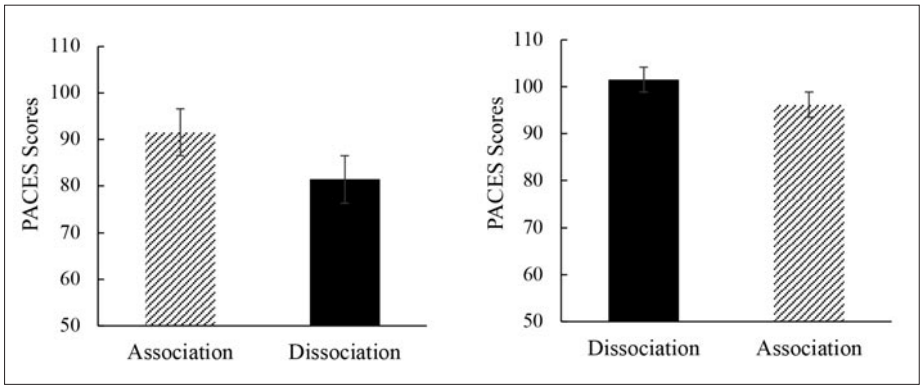

Fig. 1. - Comparison of exercise enjoyment in the sequence of Association first, Dissociation second ($n = 10$), and Dissociation first, Association second ($n = 11$).

Attentional Focus Strategy and Mood Alteration

After converting scores on the POMS subscales to *T* scores based on normative college student sample means and standard deviations (McNair et al., 2003), analyses were conducted to examine the relationship between attentional focus strategies and mood alteration. Results of a 2 × 2 × 2 (Strategy × Order × Time) MANOVA on the vector of the six POMS subscales with repeated measures on the first and third factors showed a significant three-way interaction ($F_{6,14} = 2.88$, $p = .048$, $\eta^2 = .55$). Therefore, follow-up simple-effect MANOVAs were conducted to assess the interaction.

Effects of completing the Association Strategy first. Results of a simple effect 2 × 2 (Strategy × Time) MANOVA on POMS subscales examining only data from when participants performed the association strategy first and dissociation second (i.e., holding Order constant) indicated no interaction or main effect for Strategy on mood states. There was a strong trend for a main effect of Time ($p = .064$) when mood was measured pre- and post-exercise. Follow-up univariate ANOVAs for each POMS subscale indicated that Tension and Confusion subscales showed pre- to post-exercise decreases.

When examining the POMS subscale for Tension, the simple 2 × 2 (Strategy × Time) univariate analyses revealed a significant interaction ($F_{1,9} = 8.29$, $p = .018$, $\eta^2 = .48$). However, the simple, simple analyses showed no pre- to post-exercise differences in Tension scores under either attentional focus strategy. See Figure 2.

When analyzing the Confusion subscale, the results of the simple 2 × 2 (Strategy × Time) univariate analysis revealed only a significant effect of Time when using the association strategy first ($F_{1,9} = 17.35$, $p = .002$, $\eta^2 = .66$). Confusion significantly decreased from pre- to post-exercise when

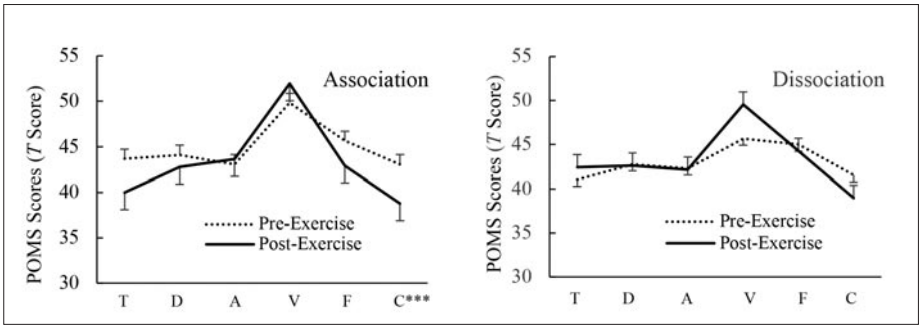

Fig. 2. - Pre- and post-exercise mood scores using Association first and Dissociation second (*** $p \leq .005$). Standard error bars are included.

employing the association strategy first (M = 42.31 ± 2.50 to M = 38.86 ± 2.50). Simple, simple effects revealed that Confusion scores significantly decreased when employing the association strategy first (p = .004), but there was no significant Time effect when using the dissociation strategy second. See Figure 2 for the POMS scores before and after jogging when using association first and dissociation second.

Effects of completing the Dissociation Strategy first. In the simple 2 × 2 (Strategy × Time) MANOVA on POMS subscales examining only the data from the order in which participants performed the dissociation strategy first and association second (i.e., holding Order constant), results revealed neither interaction nor main effects for Strategy, or for Time. Although there was no significant finding from the multivariate analyses, data were analyzed at the univariate level similar to the Association First analyses presented previously. These results should be interpreted cautiously.

Results of the simple effect 2 × 2 (Strategy × Time) univariate analysis for Tension showed a significant interaction ($F_{1, 10}$ = 7.33, p = .022, η^2 = .42). Simple, simple analyses revealed a significant Time effect for Tension when using the Dissociation strategy first ($F_{1, 10}$ = 5.35, p = .043, η^2 = .35). When using the Association strategy, there was no significant Time effect for Tension ($F_{1, 10}$ = 0.26, p = .624, η^2 = .03). See Figure 3.

In the simple 2 × 2 analysis for Depression, there was a Time effect ($F_{1, 10}$ = 9.20, p = .013, η^2 =.48). The simple, simple follow-up for the Dissociation strategy showed a significant decrease pre- to post-exercise during the Dissociation first Strategy (M = 40.03 ± .78 to M = 38.61 ± .79; $F_{1, 10}$ = 8.81, p = .014, η^2 = .47) and the Association strategy showed a trend (M = 39.95 ± 1.14 to M = 38.93 ± 1.18; $F_{1, 10}$ = 4.79, p = .053, η^2 = .32).

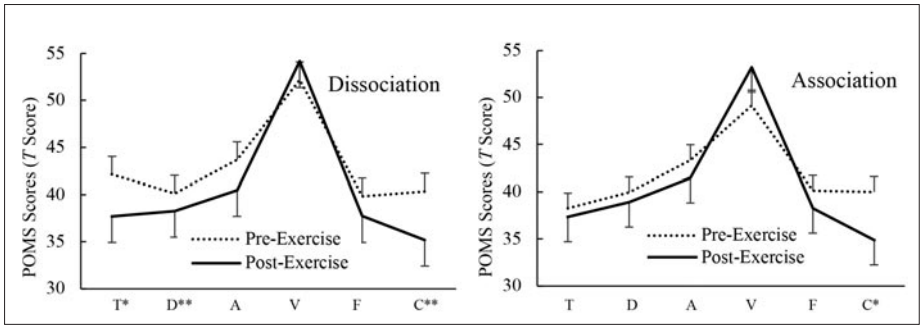

Fig. 3. - Pre- and post-exercise mood scores using Dissociation first and Association second (* $p \leq .05$; ** $p \leq .01$). Standard error bars are included.

The simple 2 × 2 analysis for Confusion also produced a significant Time effect ($M = 40.17 \pm 1.65$ to $M = 35.06 \pm 1.17$; $F_{1, 10} = 12.12$, $p = .006$, $\eta^2 = .55$). Simple, simple effects revealed that exercisers reported significant decreases in Confusion when using both Dissociation ($F_{1, 10} = 10.91$, $p = .008$, $\eta^2 = .52$) and Association strategies ($F_{1, 10} = 8.42$, $p = .016$, $\eta^2 = .46$). (See Figure 3.)

Ratings of Perceived Exertion

A 2 × 6 × 2 (Strategy × Laps × Order) repeated measures ANOVA for the first and third factors on Perceived Exertion revealed no three-way or two-way interactions. There was a significant main effect of Laps on RPE scores ($F_{1.56, 29.644} = 30.84$; $p < .001$; $\eta^2 = .62$), but the effects of Strategy and Order were not significant (see Figure 4). Thus when jogging at the same moderate intensity, the participants experienced increased physical exertion under both Strategies as the duration, or number of laps increased regardless of the type of strategy employed.

Regarding the nonsignificant Strategy effect for RPE, it was nonetheless intriguing that on every one of the six measurement laps, the Dissociation group reported the lower scores for RPE. The non-parametric *a priori* expectation for this direction on a single measurement would be 0.5. The expectation of observing this same difference all six times would be only $0.5^6 = .016$, which hints at a significant Strategy effect. However, the overlap of the dissociation and association strategy distributions on RPE was great, and the effect size tiny, resulting in

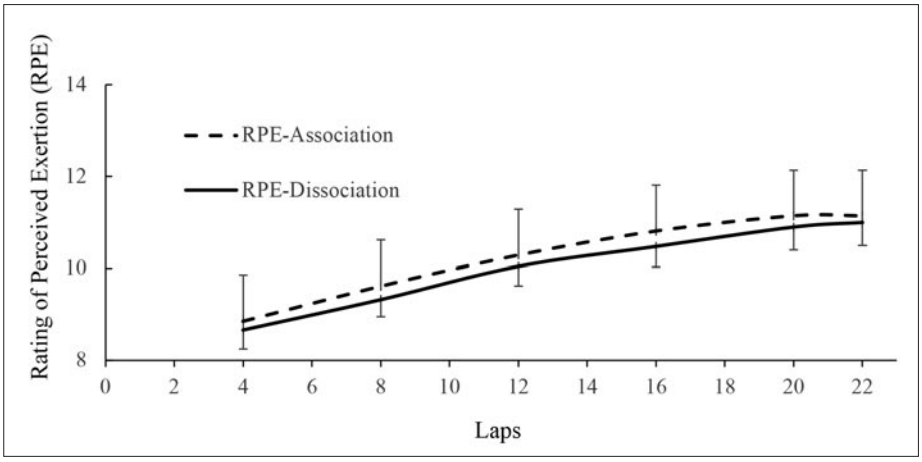

Fig. 4. - Changes in Ratings of Perceived Exertion (RPE) based on Laps. Standard error bars are included.

the nonsignificant Strategy parametric test. Thus, we would not recommend selecting a Strategy with the goal of influencing RPE.

Performance: Time to complete the 1.5-mile Jog

Joggers using dissociative strategies were hypothesized to take longer to complete the 1.5-mile run than when using association strategies. Results from the 2 × 2 (Strategy × Order) analyses revealed no interaction and no effect of Order. There was no difference in mean times to completion between using association and dissociation strategies. The participants' mean times to complete the 1.5-mile jog for the association and dissociation strategies were 18.54 ± 2.85 min and 18.64 ± 2.91 min, respectively. Clearly, all participants jogged at the assigned moderate intensity, and because of this control variable, their mean times to completion did not differ.

Discussion

In this study, the effects of the attentional focus strategies of association and dissociation on college males' psychological, physiological, and performance outcomes while jogging 1.5-miles at a moderate intensity were investigated. The male recreational joggers were hypothesized to report higher scores on exercise enjoyment and improved mood states after using the dissociation strategy, rather than the association strategy. It also was hypothesized that exercisers using the dissociation strategy would report lower RPE scores and possibly require more time to complete the 1.5-mile jogging task.

Overall, the results suggested that participants enjoyed jogging and improved their mood states when using each of the attentional focus strategies. When participants used the dissociation strategy first, they improved their mood states by decreasing the negative mood states of Tension, Depression, and Confusion after the jogging session. When using the association strategy first, there were improvements in Confusion. However, there were no apparent differences between the two attentional focus strategies in exercise enjoyment, RPE, and performance results. These findings may reflect that exercise intensity was moderate when using each of the cognitive strategies.

Attentional Focus and Distressful Thoughts

The experimental manipulation was successful. While exercising using an association strategy, joggers had more associative than dissociative

thoughts. Conversely, joggers reported primarily dissociation thoughts when instructed to use the dissociation strategy. The attentional manipulations assigned in each exercise session were not affected by the sequence of the strategies. Thus, participants successfully employed the assigned strategy, and the results can be attributed to the attentional focus strategies employed in the exercise session.

As hypothesized, joggers reported more Distress as measured by the Attentional Focusing Questionnaire while using an association, rather than dissociation strategy. A possible explanation for this finding can be found in a study by Morgan and Pollock (1977) who reported that elite distance runners use an association strategy to monitor their physical sensations during exercise sessions. More recently, participants who employed an association strategy reported Distressful thoughts when exercising at a high intensity, rather than at moderate and light intensities (Drylund & Wininger, 2008). In the present study, where all participants exercised at a moderate intensity, they also reported more Distress when using an association, rather than a dissociation strategy. This finding suggests that using an association strategy may result in exercise Distress even when exercising at a moderate intensity, and it extends the literature on the parallel processing model of pain as described by Brewer and Buman (2006). Thus, on an applied note, we recommend that habitual exercisers as well as inexperienced exercisers, who seek the psychological benefits should use predominately a dissociation strategy. With a dissociative focus, participants can avoid monitoring the physical sensations and the possible discomfort of exercise.

Exercise Enjoyment

Male recreational exercisers reported similar enjoyment scores in each of the attentional focus strategies that they employed. In addition, when examining the order of the strategies used in the exercise sessions, exercise enjoyment was higher in the first jogging session no matter which strategy was employed. The results of the present study were similar to several other studies that indicated similar state exercise enjoyment as reported by exercisers regardless of the attentional strategy employed (Fillingim & Fine, 1986; Neumann & Piercy, 2013).

Factors influencing exercise enjoyment appear to be complex and may differ among the individual participants (Berger et al., 2015, 2016; Butryn & Furst, 2003; Emad et al., 2017). Highlighting the complexity of factors influencing exercise enjoyment, several joggers in the study stated that they did not enjoy the experimental control/constraint of moderate intensity exercise

and would have preferred to jog faster at an intensity of their choice. Perhaps if participants exercised at their preferred intensities, rather than a controlled intensity, enjoyment may be higher in exercisers who select high intensities and employ dissociation, rather than association. Some evidence for this possibility has been produced by Chow and Etnier (2017) who reported that cyclists who used a dissociative focus that included simultaneous use of music and a video reported lower RPE during high intensity exercise than when using either music or the video alone. Although it remains to be tested, lower RPE may be related to increased exercise enjoyment. Other researchers have found that novice exercisers who employed a dissociation strategy reported increased pleasure and exercise enjoyment in comparison to those who employed an association strategy (e.g., Lind et al., 2009). These inconsistent findings on exercise enjoyment suggest that further research is needed to elucidate factors affecting the complex relationship between attentional focus strategies and enjoyment when exercising at various intensities and for exercisers representing various fitness levels.

Mood Alteration and Exercise

It was hypothesized that male recreational joggers would report greater mood changes after exercising when using a dissociation strategy than while using an association strategy. Since there was a three-way interaction among Attentional Strategy, Time, and Order, separate analyses were conducted on the individual POMS subscales while examining the order of the attentional strategies. These results should be cautiously interpreted because of the multiple tests and comparisons performed.

In the first exercise session, joggers using the dissociation strategy first reported improved mood states on more numerous subscales as evidenced by decreases in the negative mood states of Tension, Depression, and Confusion, than when using association. In contrast, joggers using the association strategy first reported mood benefits only on Confusion. During the second exercise session, participants reported few significant mood changes. The order in which participants engage in the attentional strategies is important and an order effect should be included in future studies of attentional strategies. It can be noted, however, that regardless of the attentional focus strategies employed, the joggers' mood states tended to change in desirable directions after the exercise sessions.

The 1.5 mile moderate intensity jogging session required approximately 18.5 minutes to complete, and participants reported desirable mood changes that resulted in the Iceberg Profile on the POMS subscales as initially described by Morgan (1980). This profile exhibited by the male recreational

joggers was characterized by relatively high scores on Vigor and considerably lower scores on the less desirable subscales of Anxiety, Depression, Anger, Fatigue, and Confusion as evidenced by *T* scores of 40 or below. Similar mood benefits have been reported after a 15-minute exercise session of high intensity in college-age joggers who reported decreases in Depression, Anger, and Confusion (Berger et al., 2016). The mood benefits in the present investigation also agreed with an early study by Goode and Roth (1993) who examined the effects of attentional focus strategy on mood states. After using a variety of dissociation strategies, exercisers in the Goode and Roth (1993) study "felt better" as indicated by increases in Vigor, and decreases in Tension and Fatigue. In support of both the parallel processing and the social cognitive models, recreational joggers who use a dissociation rather than an association strategy may be less aware of the physical discomfort of exercise. They also may experience fewer Distressful thoughts which allows them to report more post-exercise mood benefits and the Iceberg Profile.

RPE and Jogging Speed

In contrast to expectations, there was no evidence that exercisers reported differences in RPE when using association or dissociation strategies with or without the order factor. These results could be related to the positive relationship between RPE and heart rate (Borg, 1998). Since joggers successfully maintained their exercise HR in a moderate intensity zone, the RPE reported by participants did not differ for the two attentional strategies. This study was an opportunity to assess RPE when heart rate or exercise intensity was controlled. Our findings were consistent with those of LaCaille et al. (2004) who also found no differences in RPE between attentional strategies, and the findings of Lind et al. (2009) who reported inconsistent findings.

In the current study, exercise intensity as indicated by joggers' heart rates was controlled and maintained in a moderate intensity zone. Therefore, the slight, non-significant differences in the current study in RPE reported by joggers employing associative or dissociative strategies should have been a direct effect of the strategy, and not the exercise intensity, mode, or duration. Because there were no significant differences in RPE, it can be concluded that there was relatively little or no influence of the association and dissociation interventions on perceived exertion when exercising at a controlled, moderate intensity.

The joggers did report increases in RPE in both the disassociation and association focus exercise sessions as the duration increased, which is a consistent finding in the literature (Borg, 1998; Drylund & Wininger, 2008; Schomer, 1986; Tenenbaum & Connolly, 2008). Our results confirm that the

instructions to jog at a moderate HR intensity were followed successfully as reflected by both HR (range 136-140 b/min) and the "light" Rating of Perceived Exertion (range 9-11) by our fit male recreational participants.

The hypothesis suggesting that participants using a dissociation strategy will require more time to complete the 1.5 miles than when using an association strategy was not supported. These results did not agree with the previous studies that indicated using association strategy allowed exercisers to monitor and modulate their pace to increase the speed of performance (LaCaille et al., 2004; Wulf, 2013). The result, however, can be attributed to joggers' maintenance of the assigned moderate intensity. Maintenance of moderate exercise intensity quite likely restricted their jogging speed. Because exercise intensity was controlled, there was no difference in jogging speed when employing the two strategies. Controlling for exercise intensity was both a strength and limitation in the present study. It was a strength because exercise intensity has been related to both the direction of mood change (Berger & Owen, 1998; Ekkekakis et al., 2011) and to pain perception as described in the parallel processing model (Brewer & Buman, 2006). By controlling for the exercise intensity/mood change relationship, it was hypothesized that mood change would reflect the attentional strategy that was employed. However, personal preferences for exercise intensity also may influence exercise enjoyment and mood alteration (Berger et al., 2016). Thus if the effect of attentional strategy on performance time or jogging speed is of interest, future studies may need to permit participants to self-select a preferred jogging intensity.

Limitations and Strengths

The present investigation had several additional limitations as well as strengths. One limitation was the small sample size which reduced the power within the analyses. Another factor that was a limitation as well as a strength was the requirement that male recreational joggers exercise at a moderate intensity. According to Berger's taxonomy which was designed to enhance the psychological benefits of exercise, factors such as exercise mode, intensity, and duration need to be enjoyable for the participants (Berger & Tobar, 2011; Berger et al., 2015). Thus, it is important to consider participants' preferences for exercise mode and training factors in studies of attentional focus strategies, mood alteration, and enjoyment. For example, the average preferred intensity for college students has been reported to be 78.1% HRR (Berger et al., 2016), and this intensity is higher than the exercise intensity (40% to 60% HRR) in the current study. Future studies examining psychological responses of recreational exercisers when employing differing attentional focus strategies should allow partic-

ipants to self-select exercise intensities in order for enjoyment and mood to not be affected by imposed demands (Rose & Parfitt, 2012). Finally, the results of this investigation can be generalized only to participation in moderate intensity jogging and to males. These results may differ for females and for other exercise modes and intensities.

Despite these limitations, the study has notable strengths. Although it is important to examine attentional focus strategies and self-selected exercise intensity, the assignment and control of moderate exercise intensity in the present study was a strength, since moderate intensity has been reported to be conducive to mood alteration and can be tolerated and enjoyed by diverse exercise participants (e.g., Berger & Owen, 1998; Berger et al., 2010; Ekkekakis et al., 2011; Kilpatrick et al., 2015). Additional strengths include the random assignment of participants to an initial cognitive strategy, the testing of male recreational joggers rather than athletes, and the minimal duration of 15 to 20 minutes as necessary to jog for the specified 1.5 mile distance that can be maintained by most recreational exercisers. These strengths serve to enhance the external validity of this study.

Conclusions

Participants enjoyed the exercise sessions even though the attentional focus strategies were assigned. Male recreational joggers reported fewer Distressful thoughts and greater mood benefits when using a dissociation strategy first. This was evidenced by their decreases in Tension, Depression and Confusion. In addition, most of the mood states for the joggers changed in hypothesized directions, and their post-exercise mood profiles represented the Iceberg Profile. These findings agreed with previous studies and suggest that exercisers can reap the mood benefits after a short bout of exercise as reflected by 15 to 20 minutes of physical activity (Berger et al., 2015, 2016; Berger & Motl, 2000; Butryn & Furst, 2003; Goode & Roth, 1993). Reflecting the controlled exercise HR within the moderate intensity zone, there were no apparent differences between the two attentional focus strategies in RPE or time for completing a 1.5-mile jogging session. In conclusion it seems that for male recreational joggers, when exercising at a moderate intensity, cognitive strategy has relatively little discernable influence on exercise enjoyment, but exercisers can experience more numerous mood benefits and fewer Distressful thoughts by using a dissociation strategy.

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