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Preparing a Manuscript for Publication: Effects of Attentional Focus Strategies on Exercise Enjoyment, Mood Alteration, and Ratings of Perceived Exertion (Jones, 2015)

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PREPARING A MANUSCRIPT FOR PUBLICATION: EFFECTS OF ATTENTIONAL FOCUS STRATEGIES ON EXERCISE ENJOYMENT, MOOD ALTERATION, AND RATINGS OF PERCEIVED EXERTION (JONES, 2015)

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Abstract

The purpose of this directed project was to strengthen my research skills through my work in preparing a manuscript for publication. This procedure included the following activities. In 2014, Matt Jones completed a master's thesis, *Cognitive Strategies Used during Moderate Intensity Running*. In 2016, the thesis committee and Matt Jones gave me permission to prepare the thesis as a manuscript for publication. I reviewed the content of the thesis, reorganized the important information, and condensed the thesis into a manuscript. In addition, I added up-to-date research citations. Lastly, I reviewed all the data and checked the accuracy of figures in the manuscript to insure these reflected the results of the thesis. Throughout this process, my directed research project committee members reviewed numerous drafts of the manuscript, and provided their comments and multiple suggestions for manuscript refinement. The final version of manuscript was based on these comments, and members of my committee will continue to develop the manuscript and prepare a final version for publication in a professional journal.

Introduction

The purpose of this directed research project was to prepare a previously completed master's thesis (Jones, 2015) for a submission to a professional journal. Earlier, I (Chen, Y.-K.) wrote a research proposal for a study on a related topic that was titled, *The Influence of Exercise Intensity and Individual Preference for Intensity on Affect, Mood, and Enjoyment* (Chen, 2016). This proposal for a research study was approved by the Institutional Review Board (IRB) at Bowling Green State University. However, the IRB approval process was lengthy and time consuming, and it was too late to complete the research process in order to graduate as planned. Given the design of my research project (Chen, 2016), it was determined in discussions with my graduate academic advisor (Dr. Bonnie Berger) and a member of my thesis committee (Dr. Lynn Darby) that I could prepare the master's thesis of Matt Jones (2015) for publication. By completing the manuscript preparation process on work that was very similar to my proposed thesis research project, I would fulfill the requirements for the culminating experience (i.e., directed research project) of my graduate studies in the School of Human Movement, Sport, and Leisure Studies (HMSLS).

Procedures for Submitting a Manuscript for Publication

I completed the following steps in order to prepare the manuscript for publication. First, I read the thesis and decided which information needed to be included in the manuscript. Although there were some similarities in my previous proposal and Matt Jones' thesis, I needed to review and became familiar with the concept of attentional strategies employed when exercising. By reviewing the content of the study, I realized that each of the two attentional strategies of association or dissociation may influence exercisers' enjoyment, mood states, Rating of

Perceived Exertion (RPE), self-efficacy, heart rate, and performance. To condense the length of the thesis, my advisor and I decided to narrow the study by eliminating the portion that focused on self-efficacy. We also decided to strengthen the portion that focused on the relationship between attentional focus strategies and psychological benefits. Therefore, the topic of the current manuscript was mainly on the effects of attentional focus strategy on psychological benefits of exercise enjoyment, mood alteration, and ratings of perceived exertion (RPE).

A second step in preparing the manuscript was to update the references. Since we narrowed the focus of the manuscript, some references from the original thesis were eliminated. In addition, some new references were added to strengthen the topic. I added references related to how exercise can increase individuals' exercise enjoyment and change their mood states in a desirable direction. Some of these new references included those by Berger, Darby, Zhang, Owen & Tobar (2016), and Kilpatrick, Greeley & Collins (2015). In addition, I added an article related to the relationship between attentional focus strategies and psychological benefits (Jones, Karageorghis & Ekkekakis, 2014). Therefore, the reference list in the manuscript was more comprehensive and thorough on the topic of the attentional focus strategies.

As a third step in preparing the manuscript, I checked the accuracy of the references and the results of the analyses. I printed paper copies of references used in the study. By doing so, I could make sure that the cited articles supported the topic in the manuscript. I also conducted some statistical analyses that were used in the original study, and made certain that results of the analyses were reported accurately. In addition, in order to find extra findings for the study, a 2 × 2 × 2 (Strategy × Time × Order) ANOVA with repeated measured on Total Mood Disturbance (TMD) scores was conducted. These TMD results were not reported in the final version of the manuscript, because the findings were not significant and did not enhance the scope of the study.

Determination of the Authorships

A next step in preparing the manuscript was to determine the authorship. The author sequence of the manuscript was based on the authors' contributions. The first author was Matt Jones who worked with Dr. Berger to develop the idea of the study, collected the data, and completed his master's thesis. Dr. Bonnie Berger, who was the advisor of Matt Jones and Yin-Kai Chen, was the second author. Dr. Lynn Darby was the third author as well as the second reader of the current directed research project. The fourth author, Dr. David Owen, was the statistical consultant that provided insights into the statistical analyses in the current directed research project. The last author was Yin-Kai Chen, who aggregated the comments from other authors, updated all references, added references, and revised the content into a manuscript.

Selection of a Professional Journal

In the academic world, the results and conclusions of a study are typically shared with other researchers by publication in professional journals. Once data in any study is collected and analyzed, the results and conclusions of the study can be written. To begin the process of disseminating the results of this research study (Jones, 2015), three scholarly professional journals in the field of exercise and sport psychology were reviewed as possible outlets for publication of the manuscript based on the Jones (2015) thesis. The journals for consideration were as follows: 1) *Journal of Behavioral Health*, 2) *American Journal of Health Education*, and 3) *Journal of Sport Behavior.* The criteria used to differentiate potential journals for manuscript submission were based on these aspects of each journal: 1) aim and scope, 2) theoretical versus application focus, and 3) readership. Not only were these characteristics of the journals considered, but the purpose and outcomes of the study were matched to the scope and readership of the journals to select the most appropriate journal for publication.

After discussions with Dr. Berger and Dr. Darby, the *Journal of Sport Behavior* was selected for manuscript submission, because the manuscript best matched one of the aims of this journal, to publish "*empirical studies or innovation which have practical application for the coach or athlete*." (*Journal of Sport Behavior*, 2017) See Appendix A. The purpose of the Jones (2015) study was to examine the psychological and performance effects of two types of attentional focus strategies, namely association and dissociation, when jogging. The investigation included the relationships of attentional focus strategies, exercise enjoyment, mood alteration, and ratings of perceived exertion in recreational joggers. The Jone's (2015) study included an additional dependent variable than those selected for the manuscript: Self-efficacy was excluded. Therefore, the thesis of Jones (2015) was edited, cut, and focused into the manuscript that is presented within this directed research project.

Effects of Attentional Focus Strategies on Exercise Enjoyment, Mood Alteration, and Ratings of Perceived Exertion

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Effects of Attentional Focus Strategies on Exercise Enjoyment, Mood Alteration, and Ratings of Perceived Exertion

Abstract

The attentional focus strategies of association and dissociation can yield differential physiological, performance, and psychological benefits when exercising. The major purpose of this study was to examine the relationship of attentional focus strategies after jogging 1.5-miles at a moderate intensity to exercise enjoyment, mood alteration, Ratings of Perceived Exertion (RPE), and jogging speed. College males (N = 21) who habitually exercised were randomly assigned to use either an association or dissociation strategy first, while in the subsequent exercise sessions, participants employed the second strategy. Exercisers completed the Profile of Mood States (POMS) before and after each exercise session. They also completed the Physical Activity Enjoyment Scales (PACES) after each exercise session. Heart Rate (HR) and Rate of Perceived Exertion (RPE) were recorded every four laps. Results of 2 × 2 × 2 (Type of Strategy × Time × Order) MANOVAs showed no evidence of a difference in enjoyment, RPE, and exercisers' performance when employing the two attentional strategies. However, participants enjoyed the first exercise session more than the second one, no matter which strategy was used. Exercisers using the dissociation strategy first reported that they experienced a decrease in Tension, Depression, and Confusion after jogging. Only a significant mood change in Confusion was reported when participants employed the association strategy first. In conclusion, exercisers enjoyed the first exercise session regardless of which assigned attentional focus strategy had been employed. Greater mood benefits were reported when using the dissociation strategy first, and RPE increased as the number of laps increased in all exercise sessions.

Effects of Attentional Focus Strategies on Exercise Enjoyment, Mood Alteration, and Ratings of Perceived Exertion

Regular physical activity is associated with multiple physiological and psychological benefits (American College of Sports Medicine, 2014; Deslandes et al., 2009). Despite the benefits, 25.4% of adults in the United States do not include any exercise in their leisure time (Centers for Disease Control and Prevention, 2014). It seems that the knowledge about health benefits of exercise may not be a strong factor for individuals to maintain their exercise behavior. Based on the Hedonic Theory (Kahneman, 1999), individuals prefer to repeat positive experiences, because they provide immediate rewards. Exercise has been suggested as a positive experience that brings immediate rewards such as enjoyment and mood alteration, motivating individuals to exercise regularly (Berger, Darby, Owen, & Carels, 2010; Berger, Darby, Zhang, Owen & Tobar, 2016; Kilpatrick, Greeley, & Collins, 2015). These immediate rewards have been used for predicting long-term exercise behavior (Hagberg, Lindahl, Nyberg, & Hellénius, 2009). Therefore, it is important to investigate further factors that might enhance immediate rewards that are derived from participating in exercise to increase exercise adherence (Williams, 2008).

Association and disassociation are two strategies that might influence psychological changes associated with exercise. For example, they have been used in a variety of exercise and sport contexts including distance running and strength training programs (Morgan, 1978; Stevinson & Biddle, 1998). When using association, exercisers focus their attention on the task at hand that includes the physical sensations emanating from physical activity (Goode & Roth, 1993; Lind, Welch, & Ekkekakis, 2009; Masters and Ogles, 1998). For example, exercisers using association as a cognitive strategy monitor physical factors such as heart rate, breathing and how

they feel during the task (Lind et al., 2009; Morgan, 1978). In contrast when using disassociation as a cognitive strategy, the exerciser purposely engages in thoughts that are unrelated to the exercise itself (Goode & Roth, 1993; Lind et al., 2009; Masters and Ogles, 1998). Exercisers use dissociation strategies to be distracted, for example, by listening to music, thinking about old relationships, or completing mathematical operations (Morgan, 1978).

Little is known, however, about the influence on hedonic tone of using cognitive strategies while exercising. The cognitive strategies of association and dissociation employed by exercisers and athletes have been studied (Morgan, 1978). The results of a recent review, however, revealed that using specific cognitive strategies can influence psychological changes (Salmon, Hanneman, & Harwood, 2010). Salmon and colleagues (2010) reviewed 50 studies that were related to the effects of the two attentional focus strategies, and identified only six study that focused on the differences in participants' psychological behavior (Goode & Roth, 1993). Investigating the relationships of exercise enjoyment and mood alteration with the two attentional focus strategies of association and disassociation is important for practitioners. Identifying these relationships may allow exercisers and practitioners to design programs that provide enjoyment, mood elevation and increased adherence.

Benefits of Using Association or Dissociation Strategy while Exercising

Cognitive strategies employed while exercising can yield different physiological and performance benefits (Salmon et al., 2010). When using dissociation as a strategy, participants reported lower physical exertion (RPE), heart rates, and respiratory exchange ratios while exercising at the same intensities (Hatfield, Spalding, & Mahon, 1992; Neumann & Piercy, 2013; Razon, Basevitch, Land, Thompson, & Tenenbaum, 2009; Stanley, Pargman, & Tenenbaum, 2007). In contrast, using an association strategy allowed exercisers to control and modify their

pace while running and to maintain stride consistency, which resulted in better performance (Schomer, 1986). More recently, Aitchison et al. (2013) investigated the exercisers' attentional thoughts when exercising at different intensities. They found that their attentional focus changed from dissociation to association as the exercise intensity increased. It seems that at higher exercise intensities, exercisers tended to use association strategy. However, the effects of these two attentional focus strategies and how these are related to performance outcomes still are questionable because of previous inconsistent findings. Some researchers have suggested that using an association strategy can facilitate performance results (Masters & Ogles, 1998; Mauger & Sculthorpe, 2012). However, using the dissociation strategy can increase participants' performance on agility tests (Porter, Nolan, Ostrowski & Wulf, 2010). These findings suggest that cognitive strategies have differential benefits.

Although the effects of association and dissociation strategies on physiological and performance results have been studied, there are few studies on the psychological results (Salmon et al., 2010). Recently, Jones, Karageorghis, and Ekkekakis (2014) found that exercisers using the dissociation strategy reported more positive scores in affect and enjoyed their exercise more than those did not use the dissociation strategy. These results agree with Goode and Roth (1993) who reported improvement of participants' Tension and Vigor scores on the Profile of Mood States (POMS) when using dissociation strategies. In addition, LaCaille, Master and Heath (2004) reported the psychological benefit of a greater increase in tranquility in a dissociation group than an association group. In contrast to the benefits of dissociation, using association while exercising has had negative effects or no effect on psychological factors (Fillingim & Fine, 1986; Neumann & Brown, 2013; Pennebaker & Lightner, 1980; Welch, Hulley, Ferguson, & Beauchamp, 2007). However, other studies revealed that there was no

difference for psychological results between using these two attentional focus strategies (Drylund & Wininger, 2008). Additional research is needed to reduce the inconsistency of psychological results and to understand the potential psychological benefits of using attentional strategies.

The Effect of Exercise Intensity on Psychological Factors

Exercise intensity has been reported to be related to psychological benefits of exercise. To maximize the positive experiences related to exercise, researchers have investigated differences in mood and enjoyment after exercising at different exercise intensities (Berger, Darby, Owen, & Carels, 2010; Ekkekakis, Parfitt, & Petruzzello, 2011; Kilpatrick, Greeley, & Collins, 2015). Participants exercising at low and moderate intensity have reported the mood alteration in desirable directions (Ekkekakis et al., 2011; Stych & Parfitt, 2011). In contrast, exercising at a high intensity has been associated with no mood change or mood changes in undesired directions (Berger & Motl, 2000). In addition, when exercising at high intensities, participants tended to report lower exercise enjoyment (Kilpatrick, Greeley, & Collins, 2015). It seems that exercising at a low or moderate intensity can maximize the positive experience by facilitating mood alteration and exercise enjoyment.

The Current Study

Although mood states and enjoyment have been studied extensively in relation to exercise, few investigators have examined the influences of association and dissociation strategies during exercise on these psychological factors in recreationally active college students. The selected participants were college students, because exercise dropout rates and the obesity rates increase after the age of 24 years (Centers for Disease Control, 2014; Soliah, Walter, & Antosh, 2008). Therefore, the primary purpose of this study was to investigate the impact that

association and dissociation may have on exercise enjoyment and mood states in recreationally active, college students. A secondary purpose was to investigate the relationships between cognitive strategies, RPE, and running speed. Specific hypotheses were as follows: 1) participants will report higher exercise enjoyment, will report more desirable changes in mood states, and fewer distressful thoughts when using a dissociation strategy than when using an association strategy, 2) participants will report a lower RPE and will require more time to complete the 1.5 miles jogging when using a dissociation strategy when compared to using an association strategy.

Method

Participants

Participants (N = 22) were full-time male undergraduate and graduate male students from a Midwestern university who had a mean age of 23.7 years (SD = 3.1) and who met the following requirements: (1) an absence of medical health issues that might preclude exercise, (2) regular exercise participation of at least 150 minutes per week, (3) reported ability to run 1.5 miles continuously, and (4) acceptable scores on a social desirability measure. One participant was excluded from the study because of a high social desirability (see Measures). Thus, the final number of participants was 21.

Measures

Medical history, exercise history, and demographic questionnaires. A Medical History Questionnaire was used to screen each participants' health status and determine their eligibility to run continuously for 1.5 miles (ACSM, 2014). An Exercise History Questionnaire included questions about each participant's exercise habits such as exercise mode, duration, and frequency, specific questions about average running distance per session, and preferred cognitive

strategies employed when exercising. A Demographic Questionnaire was administered to measure each participant's age, weight, height, ethnicity, and education level.

Reynolds Short Form of the Marlowe-Crowne Social Desirability Scale. The Reynolds Short Form of the Marlowe-Crowne Social Desirability Scale (RSF) 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 by a factor analysis, retaining items loading 0.40 or greater (Reynolds, 1982). Participants answered the statements such as "no matter who I'm talking to, I'm always willing to admit it when I make a mistake." Concurrent validity of this short form is high (r = 0.91; Reynolds, 1982).

Profile of Mood States. The Profile of Mood States (POMS) is a 65-item self-report scale that measures transient feelings (McNair, Lorr, & Droppleman, 2003). The POMS includes the six subscales of Tension, Depression, Anger, Vigor, Fatigue, and Confusion. Each item in the POMS is measured on a 5-point Likert-type scale, ranging from 0 (not at all) to 4 (extremely) with the state measure reflecting "how a person feels at that exact moment." The POMS has been used in exercise, clinical, and medical research to assess changes in mood pre- and post-treatment (Berger & Motl, 2000). Internal consistency for the POMS is high with subscales ranging from r = 0.79 for Confusion to r = 0.93 for the Depression subscales (Bourgeois, LeUnes, & Meyers, 2010).

Physical Activity Enjoyment Scale. The Physical Activity Enjoyment Scale (PACES) contains 18 items measuring enjoyment-related feelings an individual may experience while participating in an activity (Kendzierski & DeCarlo, 1991). Sample bipolar items include "I find it pleasurable" or "I find it unpleasant." Participants rate items on a 7-point scale. A higher score represents more enjoyment for the specific activity. The PACES can be administered either as a

state or a trait measure based on the given instruction (i.e., "rate how you feel at this moment about the physical activity you have just completed" or "rate how you feel about most types of physical activity in general, most of the time"), and has been shown to have acceptable validity (Crocker, Bouffard, & Gessaroli, 1995; Kendzierski & DeCarlo, 1991; Motl et al. 2001).

Attentional Focus Questionnaire. The 30-item Attentional Focus Questionnaire (AFQ) includes three subscales with 10 items in each: (1) Association (e.g., how often the runner thinks about bodily sensations and performance variables); (2) Dissociation (e.g., how often an exerciser lets his mind wander and thinks about problem solving), and (3) Distress (e.g., how often the runner thinks about quitting and the pain being experienced; Brewer, Van Raalte, & Linder, 1996). Participants rate 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 include "monitoring specific body sensations, such as tension, breathing rate;" for dissociation, "singing a song in your head;" and for distress, "wishing the run would end." The AFQ subscales have been reported to be reliable measures with $\alpha = .66 – .79$ and for Association, $\alpha = .66 –.77$ for the Dissociation, and $\alpha = .85 – .88$ for the Distress (Brewer et al., 1996). The AFQ is reported to have a moderate to high level of internal consistency ($\alpha = 0.66 – 0.82$; Brewer et al., 1996). The AFQ allowed exercisers to score high or low on any of the three scales of Association, Dissociation, Distress (Masters & Ogles, 1998).

Rating of Perceived Exertion. The Rating of Perceived Exertion Scale (RPE) was used to measure individuals' perceived effort of physical strain (Borg, 1998). Participants rate their physical effort from a low of 6 to indicate "no exertion at all" to a high of 20 to indicate "maximal exertion." Borg (1998) developed the RPE Scale to be associated with heart rate. 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).

Procedures

After the Institutional Review Board at a Midwestern university granted approval, participants were recruited for the study through classroom visits and campus flyers. Respondents contacted the first author and arranged a meeting. There the participant was invited to a sitting area with a table beside a 111-meter indoor track. They completed the consent form, and the screening inventories that included the Medical History Questionnaire, Exercise History Questionnaire, Demographic Questionnaire, and RSF. Then two subsequent jogging sessions were scheduled two days apart within a 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. Next, participants were instructed on using the RPE Scale and a HR monitor (Polar Model S120[TM]). The participants subsequently jogged at a leisurely pace for four laps around an indoor track and practiced reporting RPE and heart rate (HR) at the end of each lap. The entire first meeting familiarized the participant with the setting, use of the HR monitor, and the reporting of RPE.

At the beginning of each of the two subsequent jogging sessions, participants completed the state measure of the POMS and trait version of the PACES. Participants then were fitted with a heart rate monitor and reviewed instructions for reporting RPE. Both HR and RPE were reported every four laps to ensure that exercisers maintained a moderate intensity exercise (40% to 60% participant's Heart Rate Reserve; HRR; ACSM, 2014) throughout the exercise sessions. Exercising at a moderate intensity has been shown to be conducive to positive experiences (Berger & Motl, 2000). After recording time to complete the 1.5-mile jogging session, the

exerciser was instructed to walk an additional two laps to cool down. Exercisers completed post-exercise measures of AFQ, POMS, and state version of 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 opposite cognitive strategy used in the first running session.

In the current study, the instructions for using association and dissociation strategy were developed by Brick, MacIntyre, and Campbell (2014) and Stevinson and Biddle (1998). Assignment of the initial cognitive strategy was randomized. 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 cognitive strategy, exercisers were instructed to remain focused on anything unrelated to exercising such as reflective thoughts, daydreams, scheduling events, and favorite music. In both conditions, participants quickly reported the RPE and HR, 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 SPSS Statistics, Chicago, IL, USA). The 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 and Post-exercise). All analyses were performed with $\alpha \leq .05$. The first MANOVA was a 2×2 design (Strategy × Order) with repeated measures on both factors on the vector of AFQ scores. This analysis assessed whether participants followed the instructions and engaged in the assigned

attentional strategy. An additional 2 × 2 × 2 MANOVA (Strategy × Order × Time) with repeated measures on the vector of the POMS scores examined mood. In addition, three 2 × 2 (Strategy × Order) ANOVAs with repeated measures 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). Their exercise background included exercising 5.1 times/week, a mean of duration of 76.2 minutes per session (See *Table 1.*). Participants' initially reported preferences for a cognitive strategy were: association (*n* = 5), disassociation (*n* = 8), or both strategies combined (*n* = 8).

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Inset *Table 1* about here

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Manipulation of Attentional Thoughts and the Attentional Focus Questionnaire (AFQ)

A 2 × 2 (Cognitive Strategy × Order) MANOVA on the three subscales of the Attentional Focus Questionnaire (AFQ) was used to determine whether participants actually employed the attentional focus strategies of association and disassociation as instructed. There was a significant main effect, as hypothesized, for Cognitive Strategy on the AFQ subscales ($F_{2,18}$ = 61.414; $p < .001$; $\eta^2 = .872$). A follow-up ANOVA of the significant difference between the strategies revealed that participants in the association condition had significantly more association thoughts than dissociation thoughts (50.85 ± 1.88 vs 21.8 ± 1.60, respectively; *p*

< .001) and that participants in the dissociation condition had significantly more dissociation thoughts than association thoughts (45.11 ± 1.98 vs 25.10 ± 2.23, respectively; $p < .001$). Further follow-up pairwise comparisons of the significant difference between Order of the conditions revealed that there was no overall significant difference in association thoughts whether participants completed the association condition or the dissociation condition first (35.45 ± 2.15 vs 40.50 ± 2.05, respectively; $p = .105$) and no overall significant difference of dissociation thoughts whether participants completed the dissociation condition first or the association condition first (31.91 ± 2.01 vs 35.00 ± 2.11, respectively; $p = .301$). The MANOVA results also showed that the Cognitive Strategy × Order interaction was not significant. Between subjects tests revealed a significant difference between Order of the strategies ($F_{2,18} = 4.498$; $p = .026$; $\eta^2 = .33$).

The third AFQ scale, Distressful Thoughts, was examined in a follow-up 2 x 2 (Cognitive Strategy × Order) ANOVA with repeated measures on the second factor. Although the interaction effect was not significant ($F_{1,19} = .112$; $p = .741$; $\eta^2 = .006$), there was a significant difference in Distress scores between the two cognitive strategies ($F_{1,19} = 6.171$; $p = .022$; $\eta^2 = .245$), but not for Order. The joggers reported more distressful thoughts when using association rather than disassociation as a cognitive strategy ($M = 11.92 \pm 1.03$; $M = 9.19 \pm .62$ respectively).

Exercise Enjoyment (State)

Results of a 2 × 2 (Cognitive Strategy × Order) repeated measures ANOVA on exercise enjoyment (state) indicated that there was a significant Cognitive Strategy × Order interaction ($F_{1,19} = 4.849$; $p = .040$; $\eta^2 = .203$). This indicated that exercise enjoyment was higher after the strategy that was used first, regardless of the actual strategy. When participants completed the dissociation strategy first, their exercise enjoyment was higher in the dissociation ($M = 101.54 \pm$

5.0) than in the association treatment (M = 96.18 ± 4.72). When participants employed the association strategy first, their exercise enjoyment was higher in the association (M = 91.5 ± 4.95) than in dissociation treatment (M = 81.4 ± 5.25). Simple effect analyses revealed no differences in the means of the state exercise enjoyment while completing either association strategy first, or dissociation strategy first (ps > .05). Thus, there was no evidence that state enjoyment scores differed between the two conditions. See *Figure 1* for a comparison of exercise enjoyment when using the cognitive strategies in different orders.

Insert *Figure* 1 about here

Cognitive Strategy and Mood Alteration

The POMS subscales were converted to *T*-scores based on normative college student sample means and standard deviations (McNair et al., 2003). Results of a 2 × 2 × 2 (Cognitive 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 ($F_{6,14}$ = .2.878; p = .048; η^2 = .552). Therefore, follow-up MANOVAs were conducted to assess the interaction.

Order Effect: Using the Association Strategy First

In a follow-up 2 × 2 (Cognitive Strategy × Time) MANOVA examining the order in which participants performed the association strategy first and dissociation second, there was no interaction (p = .318) or main effect for Cognitive Strategy on mood states (p = .707). However, there was a trend for a main effect of Time when mood was measured pre- and post-exercise (p = .064). This indicated that something was happening at the univariate level. Thus, 2 × 2 (Cognitive Strategy × Time) univariate analyses were used to investigate pre- and post-exercise

scores on each of the six POMS subscales. Because of the likelihood of Type 1 errors due to multiple analyses, the following results should be interpreted cautiously. See *Figure 2* for the POMS scores when using the association strategy first, and the disassociation strategy second.

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Insert *Figure 2* about here

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In addition, when examining the POMS subscale for Tension, the 2 × 2 (Cognitive Strategy × Time) univariate analyses revealed a significant interaction ($F_{1,9}$ = 8.288; p = .018; η^2 = .479). However, there was no significant main effect of Time on Tension when using either of the cognitive strategies of association and dissociation, respectively. Since each Cognitive Strategy had no pre- and post- difference in Tension scores, the overall effects of Cognitive Strategy were most likely a result of the non-significant increase in Tension in the dissociation strategy when completed second. See *Figure 2*.

When analyzing the Confusion subscale, the results of the 2 × 2 (Cognitive Strategy × Time) univariate analysis revealed a significant main effect of time on Confusion when participants used the association strategy first ($F_{1,9}$ = 17.347; p = .002; η^2 = .658). Results of pairwise comparisons indicated that scores on Confusion significantly decreased from pre- to post-exercise when employing the association strategy first (42.30 ± 2.51 to 38.86 ± 2.50; p = .002). Simple, simple, effects revealed that Confusion scores significantly decreased when employing the association strategy (p = .004), but there was no significant main effect when using dissociation second (p = .157). See *Figure 2* for the POMS scores before and after jogging when using association first, and disassociation second.

Order Effect: Using the Dissociation Strategy First

In a follow-up 2 × 2 (Cognitive Strategy × Time: Pre- and post-exercise) MANOVA on POMS subscales, results revealed that when using a disassociation strategy first and association second, there were no interaction or main effects for Cognitive Strategy or for Time (*p*s > .10). Although there was no significant finding from the multivariate analyses, the same justification of analysis was used to analyze the data at univariate level. The result should be interpreted cautiously.

Results of 2 × 2 (Time × Cognitive Strategy) univariate analyses for specific POMS subscales showed a significant interaction on Tension ($F_{1,10}$ = 7.327; p = .022; η^2 = .423). In addition, simple, simple, effects showed that when using the dissociation strategy first, there was significant main effect of Time on Tension ($F_{1,10}$ = 5.347; p = .043; η^2 = .348). Pairwise comparisons revealed that there was a significant decrease in pre- to post-exercise Tension when using the dissociation strategy first (42.13 ± 1.54 vs 37.73 ± 1.73; p = .043). However, there was no main effect for Tension when using the association strategy second (p = .624). See *Figure 3.*

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Insert *Figure 3* about here

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When examining the mood effects of using the dissociation strategy first, simple, simple effects analyses showed significant main effects of time on Depression ($F_{1,10}$ = 9.199; p = .013; η^2 =.479) and Confusion ($F_{1,10}$ = 12.124; p = .006; η^2 = .548). Results of pairwise comparisons revealed that when using the dissociation strategy first, there were significant decreases in Depression and Confusion pre- (40.03 ± .78; 40.17 ± 1.65) to post-exercise (38.61 ± .79; 35.06 ± 1.17; p = .013; p = .006). Simple, simple effects revealed that exercisers reported significant

decreases in Depression when employing the dissociation strategy (p = .014), and a strong trend when employing association strategy (p = .053). In contrast, participants significantly decreased their Confusion when using both association (p = .016) and dissociation strategies (p = .008).

Ratings of Perceived Exertion

A 2 × 6 × 2 (Cognitive Strategy × Laps × Order) repeated measures ANOVA on Perceived Exertion revealed there was no three-way interaction (p = .39). In addition, there was no significant two-way interaction (p = .96; p = .82; p = .50). There was a significant main effect of Laps on RPE scores ($F_{1.56,29.644}$ = .30.834; p < .001; η^2 = .62), but no significant main effects of Cognitive Strategy or Order (see *Figure 4*). Thus, jogging at the same moderate intensity, the participants experienced more physical exertion in both conditions as the duration increased.

Insert *Figure 4* about here

Performance: Time to complete the 1.5-mile run

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 (Cognitive Strategy × Order) analyses revealed no interaction ($p \geq .13$). Without Order being a significant factor, there were no differences in time to completion between using association and dissociation strategies ($p \geq .13$). Therefore, there was no evidence that exercisers' performance differed when using either one of the two attentional focus strategies.

Discussion

In this study, we examined the relationship between the attentional focus strategies of association and dissociation and college students' psychological, physiological, and performance

outcomes while jogging 1.5-miles at a moderate intensity. It was hypothesized that participants would report higher scores on exercise enjoyment and improved mood states after using dissociation strategy, compared with using the association strategy. It also was hypothesized that when using dissociation strategy, the exercisers would report lower RPE scores and require more time to complete the jogging.

The findings suggested that participants followed the instructions and successfully employed the association and dissociation strategies while jogging in each exercise session. Although participants reported high enjoyment scores after each exercise session, there was no difference in exercise enjoyment between the two attentional focus strategies. Participants improved their mood states by decreasing negative mood states of Tension, Depression, and Confusion after the exercise session. The findings also suggested that when using dissociation strategy first, participants reaped greater mood benefits than when using association strategy. There were no significant differences in RPE or performance between the two strategies. Overall, the results suggested that participants enjoyed exercising using attentional strategies and improved their mood states. In summary, there were no differences in exercise enjoyment, RPE, and performance results between the two strategies.

Attentional Focus

The results showed that participants had more association than dissociation thoughts while exercising using association strategy. Participants reported mainly dissociated thoughts when using the dissociation strategy. The results also suggested that the attentional manipulations assigned in each exercise session were not affected by the sequence of the strategies. That is, participants successfully employed the assigned strategy, and the results of the study could be attributed to the attentional focus strategies employed in the exercise session.

Participants reported more distressful thoughts as measured by the Attentional Focus Questionnaire while using association strategy rather than dissociation strategy. The results can be explained by study of Morgan and Pollock (1977) who reported that using the association strategy enabled the exercisers to monitor their physical sensations and feel more pain or discomfort during the exercise. In a more recent study by Drylund and Wininger (2008), participants reported employment of association strategy, and also distressful thoughts when exercising at a high intensity, rather than at moderate and light intensities. When exercising at a moderate intensity in the present study, participants also reported more distress when using association strategy. This finding suggests that using association results in exercise distress when exercising at a moderate intensity. Therefore, we recommend that exercisers who exercise for psychological benefits should use predominately dissociation strategy. With dissociation, they can avoid monitoring the physical sensations and the discomfort of exercise.

Exercise Enjoyment

The relationship between cognitive strategy and exercise enjoyment is not clear. Although the hypothesis that participants will report higher exercise enjoyment when using a dissociation than when using an association strategy was based on the previous studies (e. g., Drylund & Wininger, 2008; Salmon et al., 2010), the results showed that exercisers reported similar enjoyment scores regardless of the attentional focus strategy that they employed. In addition, when examining the order of the strategies used in the exercise sessions, there was a trend for exercise enjoyment to be higher in the first exercise session no matter which strategy was employed. Although the results did not support our hypothesis, the results were similar to several other studies that indicated similar state exercise enjoyment reported by exercisers regardless of the attentional strategy employed (LaCaille et al., 2004; Mestre, Maiano,

Dagonneau, & Mercier, 2011; Neumann & Piercy, 2013;). Because of the inconsistent findings on exercise enjoyment while employing the attentional focus strategies, further research is needed to determine the relationship between attentional focus strategies and exercise enjoyment.

Mood Alteration and Exercise

We hypothesized that exercisers would improve their mood states more while using the dissociation strategy than while using an association strategy. Since there was an interaction among Attentional Focus 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, participants reported mood benefits on more numerous subscales when using dissociation as evidenced by decreases in Tension, Depression, and Confusion, than when using association as evidenced by a decrease only in Confusion. See *Figures 2* and *3*. In the second exercise session, participants reported few significant mood changes after using either association or dissociation strategies. Thus, it seems that joggers who employ a preponderance of dissociative thoughts from the start of an exercise session will have more mood benefits than those employing associative thoughts. However, it should be noted that regardless of the cognitive strategies employed, the joggers' mood states changed in the hypothesized directions.

In each of the exercise sessions that required appropriately 18.5 minutes in duration to complete the 1.5 mile run, participants reported mood changes that represented the Iceberg Profile as described by Morgan (1980). This profile is characterized by relatively high scores on Vigor and lower scores on the less desirable subscales of Anxiety, Depression, Anger, Fatigue, and Confusion. See *Figures 2* and *3* for the after-exercise Iceberg Profiles that were apparent

after the exercise sessions. 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). These results also agreed with an early study by Goode and Roth (1993) who examined the effects of attentional focus strategy on mood states. After using dissociation strategy, participants felt better as indicated by increases in Vigor, and decreases in Fatigue and Tension. After using the cognitive strategy of association, Fatigue increased. In conclusion, these mood benefits seem to be related to experiencing less distressful thoughts while using the dissociation strategy. When recreational joggers use dissociation rather than the association strategy, they are less aware of the discomfort of exercise and their paces, allowing them to report more mood benefits.

Perceived Exertion

In contrast to expectations, exercisers did not report any difference in RPE when using association or dissociation strategy. These results could be related to the positive relation between RPE and heart rate (Borg, 1998). Since exercise intensity in both exercise sessions was carefully maintained in a moderate intensity zone, the RPE reported by participants did not differ in the two attentional strategies. However, findings of LaCaille et al. (2004) when studying exercise setting support the current findings of no differences in RPE between attentional strategies. The literature surrounding cognitive strategies and ratings of perceived exertion still remains unclear, but this was an opportunity to assess RPE as heart rate or intensity was controlled.

Wherein previous studies participants ran at a self-selected pace (LaCaille et al., 2004) and reported RPE, participants were given the opportunity to run at an intensity of their choice. As the intensity of the exercise was not controlled in the LaCaille et al. (2004) study, the

increases in RPE may have reflected the positive linear relationship with HR (Borg, 1982). In the current study, however, intensity (heart rate) was controlled and RPE still increased. Therefore, any change in RPE in the current study should have been a direct effect of the strategy and not the exercise intensity, mode, or duration. Because the current study found no differences in RPE, it can be concluded that there was little or no influence of the association and dissociation interventions on perceived exertion.

In addition, the results also showed that RPE in both exercise sessions increased as the duration increased, which agrees with previous findings (Borg, 1998; Drylund & Wininger, 2008; Schomer, 1986; Tenenbaum & Connolly; 2008). Even though RPE increased over time, the thoughts of participants did not shift from dissociative to associative thoughts, which may occur under higher exercise intensities (Tenenbaum, 2001). This is mainly because the mean highest reported RPE was 11 which is classified as a "light" exertion (Borg, 1982) and was not high enough for thoughts during exercise to be forced to become associative thoughts. As suggested in the guidelines of the current study and confirmed with the results, the intent of having participants exercise at a moderate intensity and moderate perceived exertion in order for thoughts to be manipulated was successful.

Performance

The hypothesis suggesting that participants using a dissociation strategy will require more time to complete the 1.5 miles than when using 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 (Connolly & Janelle, 2003; LaCaille et al., 2004; Wulf, 2013). The result, however, can be

attributed to the assigned moderate intensity of exercise that participants employed to maintain their heart rate in a specific range and which quite likely restricted their jogging speed.

Limitations

This study had several limitations. It is important to consider participants' preferences for exercise mode and training factors. According to Berger's taxonomy designed to enhance the psychological benefits of exercise, factors such as mode, exercise intensity, and duration need to be enjoyable (Berger & Tobar, 2011; Berger, Weinberg & Eklund, 2015). Berger and her colleagues (2016) reported that the average preferred intensity for college students is 78.1% HRR, which is higher than the exercise intensity (40% to 60% HHR) in the current study. Future studies should include self-selected intensities to control for participants' preferred intensities (Rose, & Parfitt, 2012). Another limitation of the present investigation was the small sample size which reduced the power within the analyses.

Conclusion

Participants enjoyed the exercise sessions even though the cognitive strategies were assigned. In addition, their mood states changed in hypothesized directions with their post-exercise mood profiles reflecting the Iceberg Profile. These findings agree with previous studies and suggest that exercisers can reap the mood benefits after a short bout of exercise (Berger & Motl, 2000; Berger et al., 2016; Butryn, & Furst, 2003; Goode & Roth, 1993). When using dissociation strategy first, exercisers reaped the greatest mood benefits by decreasing Tension, Depression and Confusion. There were no apparent differences in RPE and performance quality as reflected by the time required to run 1.5 miles at a moderate intensity between the two attentional focus strategies. It seems that exercisers can experience more numerous mood benefits and less distress by using a dissociation strategy.

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Table 1.

Participant Characteristics

Variables	**Mean**	**S.D.**
Age (years)	23.7	3.1
Height (in.)	69.9	2.2
Body Weight (lb)	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 participant participated in more than 150 minutes per week of exercise.

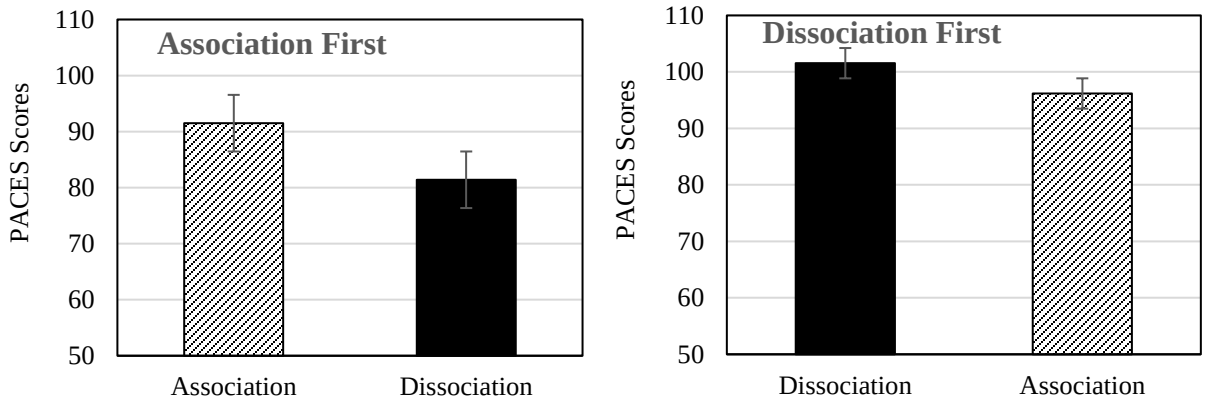

Figure 1. Comparison of State exercise enjoyment in the sequence of association first, dissociation second (*N*=10), and the sequence of dissociation first, association second (*N*=11). There was no effect of attentional focus strategy on State exercise enjoyment. Standard error bars are included.

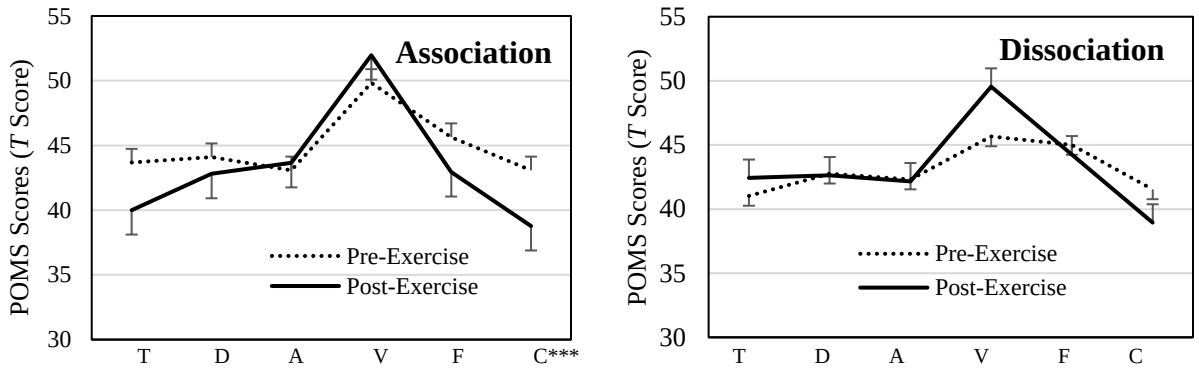

Figure 2. Pre- and post-exercise mood alteration using Association first and Dissociation second (*** $p \leq .005$). Standard error bars are included.

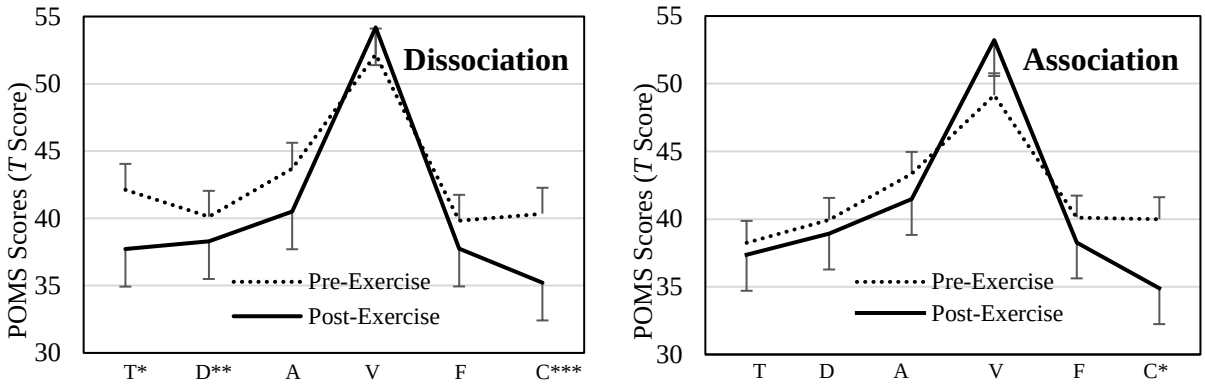

Figure 3. Pre- and post-exercise mood alteration using Dissociation first and Association second (* $p \leq .05$; ** $p \leq .01$; *** $p \leq .005$). Standard error bars are included.

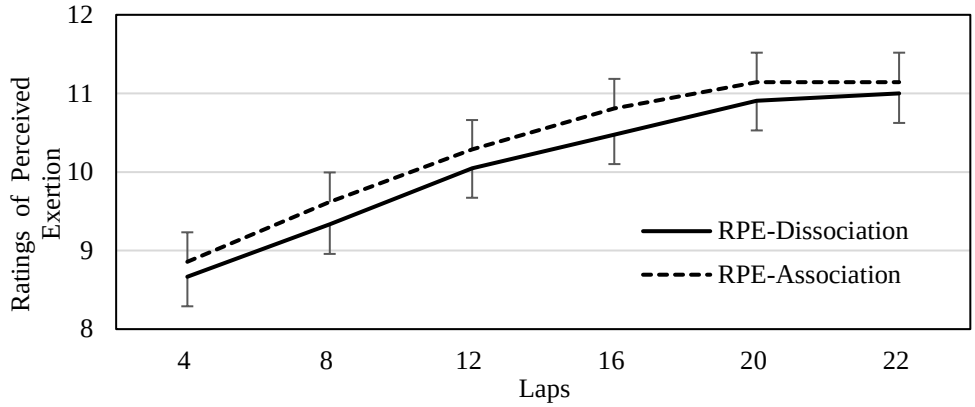

Figure 4. Changes in Ratings of Perceived Exertion based on Laps. Standard error bars are included.

Submitting the Manuscript

The manuscript was prepared in American Psychological Association (APA) format according to the "Directions for Authors" (*Journal of Sport Behavior*, 2017) with three copies of the manuscript including a title page, a blind title page, an abstract of 200-250 words with content explaining: 1) Purpose; 2) Methods; 3) Results; 4) Discussion.

Summary

The purpose of preparing a manuscript for this directed research project was tedious and challenging. However, the results of using attentional focus strategies during jogging should be disseminated to other researchers interested in this topic.

References: Directed Research Project

Berger, B. G., Darby, L. A., Zhang, Y., Owen, D. R., & Tobar, D. A. (2016). Mood alteration after 15 minutes of preferred intensity exercise: Examining heart rate, perceived exertion, and enjoyment. *Journal of Sport Behavior, 39,* 3-21.

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Appendix A

Journal of Sport Behavior

Overview

The Journal of Sport Behavior publishes original, empirical, investigative, and theoretical papers dealing with the studies of behavior in the areas of game and sport. Unsolicited reviews of books will also be accepted for publication. Empirical studies or innovation which have practical application for the coach or athlete are also accepted. Essentially, the Journal of Sport Behavior is interested in sociological, psychological, anthropological, and related applications to the science of sport.

This journal is published quarterly (March, June, September, & December), and is listed in the Physical Education on Index, the Psychological Abstracts, PsychINFO, the SPORT database, and SPORT Discus. Subscriptions rates: In the USA and its possessions - $38.00 library rates; Foreign - $58.00 per year (airmail only) beginning Volume 25 2002.

Directions for Authors

Manuscripts should be submitted in triplicate and must conform to the style and procedure described in the publication manual for the American Psychological Association, Fifth Edition (2001). Manuscripts must be accompanied by an abstract in English of 200-250 words typed on a separate sheet of paper. Where appropriate to the nature of the article, the abstract should contain statements of (a) the problem, (b) the method, (c) the results, and (d) discussion. Authors must provide three copies of a second title page for blind review, omitting author names, affiliation and other identifying information. Manuscripts submitted that do not adhere to the approved submission process will not be reviewed or returned.

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