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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)

Yin-Kai Chen

Master's Project

Submitted to the School of Human Movement, Sport, and Leisure Studies
Bowling Green State University

In partial fulfillment of the requirements for the degree of

MASTER OF EDUCATION

In
Kinesiology

April, 2017

Project Advisor

Dr. Bonnie G. Berger

Second Reader

Dr. Lynn A. Darby

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	1
ABSTRACT	2
INTRODUCTION	3
Procedures for Submitting a Manuscript for Publication	3
Determination of Authorship	5
Selection of a Professional Journal	5
MANUSCRIPT FOR SUBMISSION	7
Blind Cover Page	8
Abstract	9
Introduction	10
Methods	14
Results	19
Discussion	24
References	31
Tables	36
Figures	37
Submitting the Manuscript	41
References for the Directed Research Project	42
Appendix A: <i>Journal of Sport Behavior</i> “Directions for Authors”	43

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throughout my graduate life. Second, I would like to thank my second reader, Dr. Lynn Darby

who provided me support and knowledge of exercise physiology. Finally, yet importantly, I

would like to thank my family for being my strongest back in my entire life.

Yin-Kai Chen

April, 2017

Bowling Green, Ohio

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 become 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 $2 \times 2 \times 2$ (Strategy \times Time \times 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 Jones’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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Running Head: ATTENTIONAL FOCUS, ENJOYMENT, AND MOOD

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

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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 $2 \times 2 \times 2$ (Type of Strategy \times Time \times 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.

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

24 Regular physical activity is associated with multiple physiological and psychological
25 benefits (American College of Sports Medicine, 2014; Deslandes et al., 2009). Despite the
26 benefits, 25.4% of adults in the United States do not include any exercise in their leisure time
27 (Centers for Disease Control and Prevention, 2014). It seems that the knowledge about health
28 benefits of exercise may not be a strong factor for individuals to maintain their exercise behavior.
29 Based on the Hedonic Theory (Kahneman, 1999), individuals prefer to repeat positive
30 experiences, because they provide immediate rewards. Exercise has been suggested as a positive
31 experience that brings immediate rewards such as enjoyment and mood alteration, motivating
32 individuals to exercise regularly (Berger, Darby, Owen, & Carels, 2010; Berger, Darby, Zhang,
33 Owen & Tobar, 2016; Kilpatrick, Greeley, & Collins, 2015). These immediate rewards have
34 been used for predicting long-term exercise behavior (Hagberg, Lindahl, Nyberg, & Hellénus,
35 2009). Therefore, it is important to investigate further factors that might enhance immediate
36 rewards that are derived from participating in exercise to increase exercise adherence (Williams,
37 2008).

38 Association and disassociation are two strategies that might influence psychological
39 changes associated with exercise. For example, they have been used in a variety of exercise and
40 sport contexts including distance running and strength training programs (Morgan, 1978;
41 Stevinson & Biddle, 1998). When using association, exercisers focus their attention on the task
42 at hand that includes the physical sensations emanating from physical activity (Goode & Roth,
43 1993; Lind, Welch, & Ekkekakis, 2009; Masters and Ogles, 1998). For example, exercisers using
44 association as a cognitive strategy monitor physical factors such as heart rate, breathing and how

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

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

61 **Benefits of Using Association or Dissociation Strategy while Exercising**

62 Cognitive strategies employed while exercising can yield different physiological and
63 performance benefits (Salmon et al., 2010). When using dissociation as a strategy, participants
64 reported lower physical exertion (RPE), heart rates, and respiratory exchange ratios while
65 exercising at the same intensities (Hatfield, Spalding, & Mahon, 1992; Neumann & Piercy, 2013;
66 Razon, Basevitch, Land, Thompson, & Tenenbaum, 2009; Stanley, Pargman, & Tenenbaum,
67 2007). In contrast, using an association strategy allowed exercisers to control and modify their

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

79 Although the effects of association and dissociation strategies on physiological and
80 performance results have been studied, there are few studies on the psychological results
81 (Salmon et al., 2010). Recently, Jones, Karageorghis, and Ekkekakis (2014) found that exercisers
82 using the dissociation strategy reported more positive scores in affect and enjoyed their exercise
83 more than those did not use the dissociation strategy. These results agree with Goode and Roth
84 (1993) who reported improvement of participants' Tension and Vigor scores on the Profile of
85 Mood States (POMS) when using dissociation strategies. In addition, LaCaille, Master and
86 Heath (2004) reported the psychological benefit of a greater increase in tranquility in a
87 dissociation group than an association group. In contrast to the benefits of dissociation, using
88 association while exercising has had negative effects or no effect on psychological factors
89 (Fillingim & Fine, 1986; Neumann & Brown, 2013; Pennebaker & Lightner, 1980; Welch,
90 Hulley, Ferguson, & Beauchamp, 2007). However, other studies revealed that there was no

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

95 **The Effect of Exercise Intensity on Psychological Factors**

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

107 **The Current Study**

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

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

122 **Method**

123 **Participants**

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

131 **Measures**

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

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

139 **Reynolds Short Form of the Marlowe-Crowne Social Desirability Scale.** The Reynolds
140 Short Form of the Marlowe-Crowne Social Desirability Scale (RSF) included 11 true/false items
141 to assess the tendency to report socially desirable responses while completing self-report
142 measures (Reynolds, 1982). The short form was derived from the original 33-item scale by a
143 factor analysis, retaining items loading 0.40 or greater (Reynolds, 1982). Participants answered
144 the statements such as “no matter who I’m talking to, I’m always willing to admit it when I make
145 a mistake.” Concurrent validity of this short form is high ($r = 0.91$; Reynolds, 1982).

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

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

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

164 **Attentional Focus Questionnaire.** The 30-item Attentional Focus Questionnaire (AFQ)
165 includes three subscales with 10 items in each: (1) Association (e.g., how often the runner thinks
166 about bodily sensations and performance variables); (2) Dissociation (e.g., how often an
167 exerciser lets his mind wander and thinks about problem solving), and (3) Distress (e.g., how
168 often the runner thinks about quitting and the pain being experienced; Brewer, Van Raalte, &
169 Linder, 1996). Participants rate each test item on a scale ranging 1 to 7 (“I did not do this at all,”
170 to “I did this all the time,” respectively). Sample items for the association subscale include
171 “monitoring specific body sensations, such as tension, breathing rate;” for dissociation, “singing
172 a song in your head;” and for distress, “wishing the run would end.” The AFQ subscales have
173 been reported to be reliable measures with $\alpha = .66 - .79$ and for Association, $\alpha = .66 - .77$ for the
174 Dissociation, and $\alpha = .85 - .88$ for the Distress (Brewer et al., 1996). The AFQ is reported to
175 have a moderate to high level of internal consistency ($\alpha = 0.66 - 0.82$; Brewer et al., 1996). The
176 AFQ allowed exercisers to score high or low on any of the three scales of Association,
177 Dissociation, Distress (Masters & Ogles, 1998).

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

182 correlation between HR and RPE has been reported to be moderate to high ($r = .65$; $r = .74$) in
183 Caucasian populations (Chen, Fan, & Moe, 2002; Scherr et al., 2013).

184 **Procedures**

185 After the Institutional Review Board at a Midwestern university granted approval,
186 participants were recruited for the study through classroom visits and campus flyers.
187 Respondents contacted the first author and arranged a meeting. There the participant was invited
188 to a sitting area with a table beside a 111-meter indoor track. They completed the consent form,
189 and the screening inventories that included the Medical History Questionnaire, Exercise History
190 Questionnaire, Demographic Questionnaire, and RSF. Then two subsequent jogging sessions
191 were scheduled two days apart within a week. Each participant was asked to maintain his current
192 exercise behavior and to avoid drinking caffeinated beverages, smoking, and eating for two to
193 three hours prior to subsequent testing sessions. Next, participants were instructed on using the
194 RPE Scale and a HR monitor (Polar Model S120^[TM]). The participants subsequently jogged at a
195 leisurely pace for four laps around an indoor track and practiced reporting RPE and heart rate
196 (HR) at the end of each lap. The entire first meeting familiarized the participant with the setting,
197 use of the HR monitor, and the reporting of RPE.

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

205 exerciser was instructed to walk an additional two laps to cool down. Exercisers completed post-
206 exercise measures of AFQ, POMS, and state version of the PACES immediately after the cool
207 down. The same testing procedure was employed in the final jogging session in which all
208 participants completed 1.5-mile run under the opposite cognitive strategy used in the first
209 running session.

210 In the current study, the instructions for using association and dissociation strategy were
211 developed by Brick, MacIntyre, and Campbell (2014) and Stevinson and Biddle (1998).
212 Assignment of the initial cognitive strategy was randomized. In the associative condition,
213 participants were instructed to monitor their heart and respiration rates, and to focus on
214 monitoring their muscle exertion and feet pushing off the ground. Throughout the dissociation
215 cognitive strategy, exercisers were instructed to remain focused on anything unrelated to
216 exercising such as reflective thoughts, daydreams, scheduling events, and favorite music. In both
217 conditions, participants quickly reported the RPE and HR, and then immediately transitioned
218 back into the previous thoughts or started new thoughts according to the strategy assigned for
219 that running session.

220 **Statistical Analysis**

221 The Statistical Package for the Social Sciences version 20 was used (IBM SPSS
222 Statistics, Chicago, IL, USA). The three independent variables included: type of Attentional
223 Focus Strategy (Association or Dissociation); Order of Strategy (First Association and then
224 Dissociation, or First Dissociation and then Association); and Time (Pre-exercise and Post-
225 exercise). All analyses were performed with $\alpha \leq .05$. The first MANOVA was a 2×2 design
226 (Strategy \times Order) with repeated measures on both factors on the vector of AFQ scores. This
227 analysis assessed whether participants followed the instructions and engaged in the assigned

228 attentional strategy. An additional $2 \times 2 \times 2$ MANOVA (Strategy \times Order \times Time) with repeated
229 measures on the vector of the POMS scores examined mood. In addition, three 2×2 (Strategy \times
230 Order) ANOVAs with repeated measures were used to assess differences in exercise enjoyment,
231 RPE, and time to complete the jogging session.

232 **Results**

233 **Demographic Characteristics**

234 Participants' mean Body Mass Index (BMI) was 25.5 kg/m^2 ($SD = 3.5$), and their
235 ethnicity included identification as Caucasian ($n = 16$), Asian ($n = 2$), African American ($n = 1$),
236 and Hispanic ($n = 2$). Their exercise background included exercising 5.1 times/week, a mean of
237 duration of 76.2 minutes per session (See *Table 1*). Participants' initially reported preferences
238 for a cognitive strategy were: association ($n = 5$), disassociation ($n = 8$), or both strategies
239 combined ($n = 8$).

240 _____

241 Inset *Table 1* about here

242 _____

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

244 A 2×2 (Cognitive Strategy \times Order) MANOVA on the three subscales of the Attentional
245 Focus Questionnaire (AFQ) was used to determine whether participants actually employed the
246 attentional focus strategies of association and disassociation as instructed. There was a
247 significant main effect, as hypothesized, for Cognitive Strategy on the AFQ subscales ($F_{2,18} =$
248 61.414 ; $p < .001$; $\eta^2 = .872$). A follow-up ANOVA of the significant difference between the
249 strategies revealed that participants in the association condition had significantly more
250 association thoughts than dissociation thoughts (50.85 ± 1.88 vs 21.8 ± 1.60 , respectively; p

251 < .001) and that participants in the dissociation condition had significantly more dissociation
252 thoughts than association thoughts (45.11 ± 1.98 vs 25.10 ± 2.23 , respectively; $p < .001$).
253 Further follow-up pairwise comparisons of the significant difference between Order of the
254 conditions revealed that there was no overall significant difference in association thoughts
255 whether participants completed the association condition or the dissociation condition first
256 (35.45 ± 2.15 vs 40.50 ± 2.05 , respectively; $p = .105$) and no overall significant difference of
257 dissociation thoughts whether participants completed the dissociation condition first or the
258 association condition first (31.91 ± 2.01 vs 35.00 ± 2.11 , respectively; $p = .301$). The MANOVA
259 results also showed that the Cognitive Strategy \times Order interaction was not significant. Between
260 subjects tests revealed a significant difference between Order of the strategies ($F_{2,18} = 4.498$; p
261 $= .026$; $\eta^2 = .33$).

262 The third AFQ scale, Distressful Thoughts, was examined in a follow-up 2 \times 2 (Cognitive
263 Strategy \times Order) ANOVA with repeated measures on the second factor. Although the
264 interaction effect was not significant ($F_{1,19} = .112$; $p = .741$; $\eta^2 = .006$), there was a significant
265 difference in Distress scores between the two cognitive strategies ($F_{1,19} = 6.171$; $p = .022$; η^2
266 $= .245$), but not for Order. The joggers reported more distressful thoughts when using association
267 rather than disassociation as a cognitive strategy ($M = 11.92 \pm 1.03$; $M = 9.19 \pm .62$ respectively).

268 **Exercise Enjoyment (State)**

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

274 5.0) than in the association treatment ($M = 96.18 \pm 4.72$). When participants employed the
275 association strategy first, their exercise enjoyment was higher in the association ($M = 91.5 \pm$
276 4.95) than in dissociation treatment ($M = 81.4 \pm 5.25$). Simple effect analyses revealed no
277 differences in the means of the state exercise enjoyment while completing either association
278 strategy first, or dissociation strategy first ($ps > .05$). Thus, there was no evidence that state
279 enjoyment scores differed between the two conditions. See *Figure 1* for a comparison of exercise
280 enjoyment when using the cognitive strategies in different orders.

281

Insert *Figure 1* about here

282

283

284 **Cognitive Strategy and Mood Alteration**

285 The POMS subscales were converted to *T*-scores based on normative college student
286 sample means and standard deviations (McNair et al., 2003). Results of a $2 \times 2 \times 2$ (Cognitive
287 Strategy \times Order \times Time) MANOVA on the vector of the six POMS subscales with repeated
288 measures on the first and third factors showed a significant three-way interaction ($F_{6,14} = .2.878$;
289 $p = .048$; $\eta^2 = .552$). Therefore, follow-up MANOVAs were conducted to assess the interaction.

290 **Order Effect: Using the Association Strategy First**

291 In a follow-up 2×2 (Cognitive Strategy \times Time) MANOVA examining the order in
292 which participants performed the association strategy first and dissociation second, there was no
293 interaction ($p = .318$) or main effect for Cognitive Strategy on mood states ($p = .707$). However,
294 there was a trend for a main effect of Time when mood was measured pre- and post-exercise (p
295 $= .064$). This indicated that something was happening at the univariate level. Thus, 2×2
296 (Cognitive Strategy \times Time) univariate analyses were used to investigate pre- and post-exercise

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

300

301 Insert *Figure 2* about here

302

303 In addition, when examining the POMS subscale for Tension, the 2×2 (Cognitive
304 Strategy \times Time) univariate analyses revealed a significant interaction ($F_{1,9} = 8.288$; $p = .018$; η^2
305 $= .479$). However, there was no significant main effect of Time on Tension when using either of
306 the cognitive strategies of association and dissociation, respectively. Since each Cognitive
307 Strategy had no pre- and post- difference in Tension scores, the overall effects of Cognitive
308 Strategy were most likely a result of the non-significant increase in Tension in the dissociation
309 strategy when completed second. See *Figure 2*.

310 When analyzing the Confusion subscale, the results of the 2×2 (Cognitive Strategy \times
311 Time) univariate analysis revealed a significant main effect of time on Confusion when
312 participants used the association strategy first ($F_{1,9} = 17.347$; $p = .002$; $\eta^2 = .658$). Results of
313 pairwise comparisons indicated that scores on Confusion significantly decreased from pre- to
314 post-exercise when employing the association strategy first (42.30 ± 2.51 to 38.86 ± 2.50 ; p
315 $= .002$). Simple, simple, effects revealed that Confusion scores significantly decreased when
316 employing the association strategy ($p = .004$), but there was no significant main effect when
317 using dissociation second ($p = .157$). See *Figure 2* for the POMS scores before and after jogging
318 when using association first, and disassociation second.

319

320 Order Effect: Using the Dissociation Strategy First

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

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

334 _____
335 Insert *Figure 3* about here
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337 When examining the mood effects of using the dissociation strategy first, simple, simple
338 effects analyses showed significant main effects of time on Depression ($F_{1,10} = 9.199$; $p = .013$;
339 $\eta^2 = .479$) and Confusion ($F_{1,10} = 12.124$; $p = .006$; $\eta^2 = .548$). Results of pairwise comparisons
340 revealed that when using the dissociation strategy first, there were significant decreases in
341 Depression and Confusion pre- ($40.03 \pm .78$; 40.17 ± 1.65) to post-exercise ($38.61 \pm .79$; $35.06 \pm$
342 1.17 ; $p = .013$; $p = .006$). Simple, simple effects revealed that exercisers reported significant

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

346 **Ratings of Perceived Exertion**

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

353 _____
354 Insert *Figure 4* about here
355 _____

356 **Performance: Time to complete the 1.5-mile run**

357 Joggers using dissociative strategies were hypothesized to take longer to complete the
358 1.5-mile run than when using association strategies. Results from the 2×2 (Cognitive Strategy \times
359 Order) analyses revealed no interaction ($p \geq .13$). Without Order being a significant factor, there
360 were no differences in time to completion between using association and dissociation strategies
361 ($p \geq .13$). Therefore, there was no evidence that exercisers' performance differed when using
362 either one of the two attentional focus strategies.

363 **Discussion**

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

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

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

382 **Attentional Focus**

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

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

401 **Exercise Enjoyment**

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

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

415 **Mood Alteration and Exercise**

416 We hypothesized that exercisers would improve their mood states more while using the
417 dissociation strategy than while using an association strategy. Since there was an interaction
418 among Attentional Focus Strategy, Time, and Order, separate analyses were conducted on the
419 individual POMS subscales while examining the order of the attentional strategies. These results
420 should be cautiously interpreted because of the multiple tests and comparisons performed.

421 In the first exercise session, participants reported mood benefits on more numerous
422 subscales when using dissociation as evidenced by decreases in Tension, Depression, and
423 Confusion, than when using association as evidenced by a decrease only in Confusion. See
424 *Figures 2 and 3*. In the second exercise session, participants reported few significant mood
425 changes after using either association or dissociation strategies. Thus, it seems that joggers who
426 employ a preponderance of dissociative thoughts from the start of an exercise session will have
427 more mood benefits than those employing associative thoughts. However, it should be noted that
428 regardless of the cognitive strategies employed, the joggers' mood states changed in the
429 hypothesized directions.

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

435 after the exercise sessions. Similar mood benefits have been reported after a 15-minute exercise
436 session of high intensity in college-age joggers who reported decreases in Depression, Anger,
437 and Confusion (Berger et al., 2016). These results also agreed with an early study by Goode and
438 Roth (1993) who examined the effects of attentional focus strategy on mood states. After using
439 dissociation strategy, participants felt better as indicated by increases in Vigor, and decreases in
440 Fatigue and Tension. After using the cognitive strategy of association, Fatigue increased. In
441 conclusion, these mood benefits seem to be related to experiencing less distressful thoughts
442 while using the dissociation strategy. When recreational joggers use dissociation rather than the
443 association strategy, they are less aware of the discomfort of exercise and their paces, allowing
444 them to report more mood benefits.

445 **Perceived Exertion**

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

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

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

464 In addition, the results also showed that RPE in both exercise sessions increased as the
465 duration increased, which agrees with previous findings (Borg, 1998; Drylund & Wininger,
466 2008; Schomer, 1986; Tenenbaum & Connolly; 2008). Even though RPE increased over time,
467 the thoughts of participants did not shift from dissociative to associative thoughts, which may
468 occur under higher exercise intensities (Tenenbaum, 2001). This is mainly because the mean
469 highest reported RPE was 11 which is classified as a “light” exertion (Borg, 1982) and was not
470 high enough for thoughts during exercise to be forced to become associative thoughts. As
471 suggested in the guidelines of the current study and confirmed with the results, the intent of
472 having participants exercise at a moderate intensity and moderate perceived exertion in order for
473 thoughts to be manipulated was successful.

474 **Performance**

475 The hypothesis suggesting that participants using a dissociation strategy will require
476 more time to complete the 1.5 miles than when using association strategy was not supported.
477 These results did not agree with the previous studies that indicated using association strategy
478 allowed exercisers to monitor and modulate their pace to increase the speed of performance
479 (Connolly & Janelle, 2003; LaCaille et al., 2004; Wulf, 2013). The result, however, can be

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

482 **Limitations**

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

492 **Conclusion**

493 Participants enjoyed the exercise sessions even though the cognitive strategies were
494 assigned. In addition, their mood states changed in hypothesized directions with their post-
495 exercise mood profiles reflecting the Iceberg Profile. These findings agree with previous studies
496 and suggest that exercisers can reap the mood benefits after a short bout of exercise (Berger &
497 Motl, 2000; Berger et al., 2016; Butryn, & Furst, 2003; Goode & Roth, 1993). When using
498 dissociation strategy first, exercisers reaped the greatest mood benefits by decreasing Tension,
499 Depression and Confusion. There were no apparent differences in RPE and performance quality
500 as reflected by the time required to run 1.5 miles at a moderate intensity between the two
501 attentional focus strategies. It seems that exercisers can experience more numerous mood
502 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.

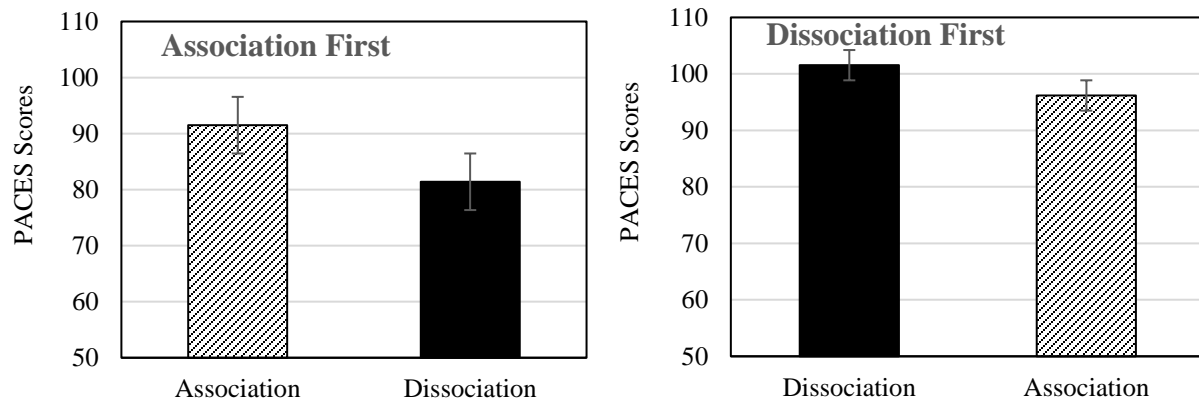


Figure 1. Comparison of State exercise enjoyment in the sequence of association first, dissociation second ($N=10$), and the sequence of dissociation first, association second ($N=11$). There was no effect of attentional focus strategy on State exercise enjoyment. Standard error bars are included.

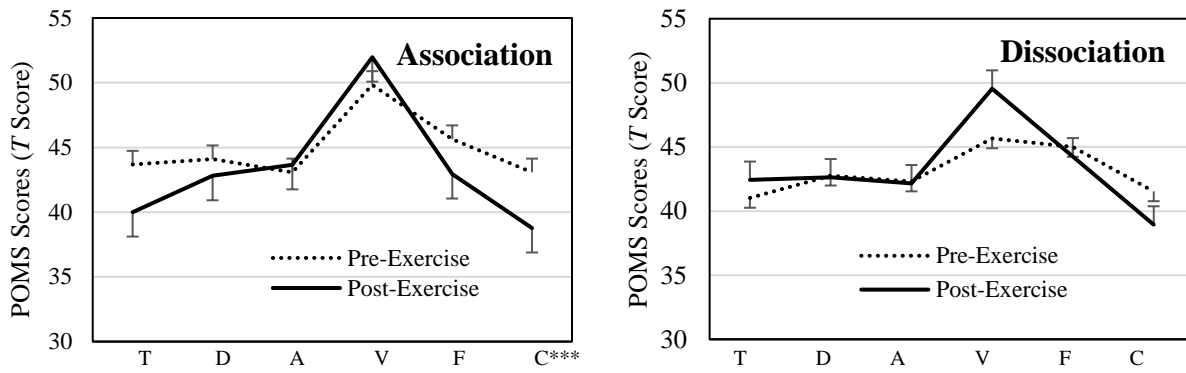


Figure 2. Pre- and post-exercise mood alteration using Association first and Dissociation second (***) $p \leq .005$). Standard error bars are included.

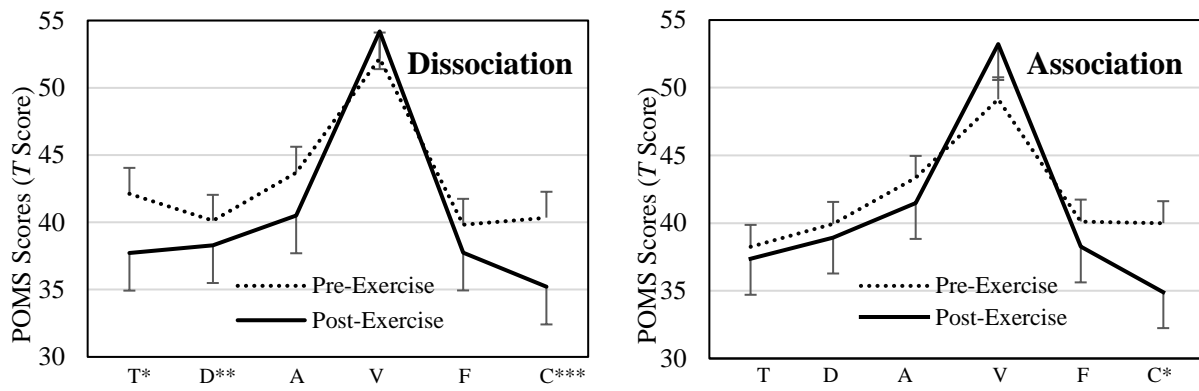


Figure 3. Pre- and post-exercise mood alteration using Dissociation first and Association second (* $p \leq .05$; ** $p \leq .01$; *** $p \leq .005$). Standard error bars are included.

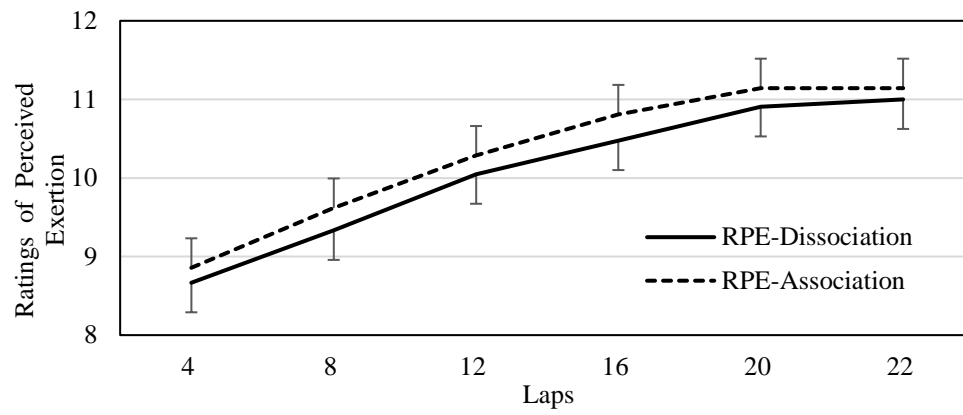


Figure 4. Changes in Ratings of Perceived Exertion based on Laps. Standard error bars are included.

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

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Appendix A

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Journal of Sport Behavior



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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.

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Contact Information

Manuscripts and all matters pertaining to subscription should be directed to:

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