

Exercise, Motivation, and Attentional Style 1

1 Running Head: Exercise, Motivation, and Attentional Style

2

3 Jones, L., Karageorghis, C. I., Lane, A. M., & Bishop, D. T. (2015). The influence of
4 motivation and attentional style on affective, cognitive, and behavioral outcomes of
5 an exercise class. *Scandinavian Journal of Medicine & Science in Sports*. Advance
6 online publication. doi:10.1111/sms.12577

7

8

9 The Influence of Motivation and Attentional Style on Affective, Cognitive, and Behavioral
10 Outcomes of an Exercise Class

11

12

13

14

15

16

17

18

19

20

21

22

23

Abstract

1
2 Exercise classes are a popular form of physical activity. A greater understanding of the
3 individual difference factors that might influence the outcomes of such classes could help to
4 minimize the high dropout rates associated with exercise. The study explored the effects of
5 dominant attentional style and degree of self-determination on affective, cognitive, and
6 behavioral outcomes following structured exercise classes. Data from 417 female participants
7 revealed that those with a dominant attentional style for association (*Associators*) reported
8 significantly ($P < 0.05$) more positive affective, cognitive, and behavioral outcomes than did
9 *Dissociators*, and were more self-determined. Highly self-determined individuals reported the
10 most positive outcomes. Almost 29% of the variance in participants' affective valence could
11 be explained by Dissociators' behavioral regulations. Results lend support to the notion that
12 attentional style is associated with motivation. The combination of attentional style and
13 degree of self-determination appear to be noteworthy individual difference factors that
14 influence responses to exercise classes and could thus have a bearing on long-term exercise
15 adherence.

16

17 **Keywords:** Adherence; attentional focus; group exercise; SDT; structural equation modeling

1 The benefits of exercise are manifold and include improvements in cardiovascular and
2 respiratory function, reduced risk of coronary artery disease, decreased morbidity and
3 mortality, decreased anxiety and depression, and enhanced feelings of wellbeing (American
4 College of Sports Medicine, 2013). Physical inactivity levels are rising in the Western world
5 (e.g., Trost et al., 2014), and so exercise and health researchers must address the
6 multitudinous reasons for why this is the case. The cost of physical inactivity cannot be
7 assessed purely in financial terms; however, the financial cost is substantial given that
8 physical inactivity is estimated to cost in excess of €80 billion per annum across Europe (Lee
9 et al., 2012). The human cost is arguably far greater (Hallal et al., 2012).

10 Evidence has shown a clear decline in the physical activity levels of females, which
11 has a tendency to begin in early adolescence (Biddle et al., 2014; Kohlstedt et al., 2013).
12 Moreover, women continue to be less active than men throughout adulthood (Hallal et al.,
13 2012). A physically active lifestyle entails much more than simply attending gymnasias;
14 nonetheless, this remains a popular way by which people attempt to achieve the
15 recommended levels of physical activity (e.g., at least 150 min each week; American College
16 of Sports Medicine, 2013). Gymnasias and fitness centers offer multiple ways for people to
17 engage in exercise and one of the most popular modalities, particularly among females, is
18 exercise classes (Hawley-Hague et al., 2013). The high proportion of female attendees at such
19 classes has been reflected in studies exploring the psychological outcomes of engagement in
20 exercise classes (e.g., Akpinar et al., 2011; Karageorghis et al., 2000).

21 **Individual Differences**

22 Individual difference factors have long been mooted as important determinants of
23 physical activity (Bauman et al., 2012). The idiosyncratic patterning of affect, cognition,
24 behavior, and goals over time serves to form our personality (Ortony et al., 2005). Personality
25 is pivotal in the appraisal of our responses to physical activity, and can determine whether we

1 enjoy the activity and choose to continue to be active. It is unsurprising then that there
2 is emerging evidence to support the contribution of individual differences to the maintenance
3 of regular physical activity (Rhodes & Smith, 2006; Wilson & Dishman, 2015). Specifically,
4 *extraversion*, *conscientiousness*, and *openness* are positively correlated with engagement in
5 physical activity, while neuroticism is negatively correlated. Motivation to exercise that is
6 driven by external factors (e.g., rewards) has been shown to positively correlate with
7 neuroticism whereas participating in exercise for intrinsic reasons appears to be negatively
8 correlated with this trait (Ingledeew et al., 2004). A greater understanding of the ways in
9 which personality traits contribute to physical activity behaviors may help us to predict an
10 individual's future physical activity levels and, in turn, to develop strategies to counter those
11 characteristics that do not foster positive physical activity behaviors.

12 The constructs of attentional style and self-determination are two individual
13 difference factors that have been extensively researched in the sport and exercise psychology
14 literature (see Hagger & Chatzisarantis, 2007; Moran, 2009). However, little is known about
15 how these factors interact in an exercise context or how they might influence important
16 consequences of exercise participation such as affective, behavioral, and cognitive outcomes.
17 These particular individual differences are likely to have a strong bearing on people's
18 attraction and adherence to exercise classes.

19 **Attention as an Individual Difference Factor**

20 Attentional focus has been conceptualized using two distinct styles: dissociation and
21 association (e.g., Brewer et al., 1996; Connolly & Janelle, 2003; Hutchinson & Karageorghis,
22 2013). Dissociation is characterized by a cognitive process of *blocking out* bodily sensations
23 related to physical effort (Lind et al., 2009) and association is a cognitive strategy by which
24 an individual attends to internal bodily cues such as respiration rate or muscle tension
25 (Hutchinson & Karageorghis, 2013). Individuals with a predisposition to dissociate are

1 identified as *Dissociators*, and those with a tendency to associate as *Associators* (Masters &
2 Ogles, 1998). However, there has been little investigation of people's tendency to adopt a
3 particular attentional style in exercise settings; this has been cited as an area that warrants
4 further investigation (Lind et al., 2009).

5 Of particular relevance to the present study is the influence that attentional style might
6 have on psychological outcomes (e.g., affect) rather than performance outcomes (e.g.,
7 amount of repetitions completed; cf. Brewer et al., 1996). Several studies have reported that a
8 dissociative attentional focus results in fewer reports of fatigue and boredom (e.g., Connolly
9 & Janelle, 2003; Schomer, 1987). However, Hutchinson and Karageorghis (2013) found that
10 *Associators* reported lower levels of perceived exertion compared to *Dissociators* during
11 high-intensity exercise. Research into the effects of attentional style on psychological
12 outcomes has primarily examined perceptions of fatigue (e.g., Koivula, & Hassmen, 1998),
13 whereas other important psychological outcomes (such as affect) have been largely neglected
14 (Lind et al., 2009). There is growing evidence to suggest that affective responses are a
15 significant contributing factor to longer term adherence to exercise (Williams et al., 2008;
16 Williams et al., 2012).

17 **Motivation as an Individual Difference Factor**

18 Self-determination theory (Deci & Ryan, 1985, 2000) posits that behavior is
19 determined by three psychological forces: amotivation, extrinsic motivation, and intrinsic
20 motivation. Amotivation represents a complete lack of self-determination and intention to
21 participate in an activity such as exercise (Deci & Ryan, 2000). Extrinsically motivated
22 behavior can be differentiated into four specific motives – external regulation, introjected
23 regulation, identified regulation, and integrated regulation – that represent a progression from
24 less self-determined to more self-determined forms of behavioral regulation (Deci & Ryan,
25 1985). Intrinsic motivation concerns behaviors that are performed for sheer interest and

1 enjoyment; moreover, three types of intrinsic motivation have been identified: intrinsic
2 motivation to know, intrinsic motivation to accomplish, and intrinsic motivation to
3 experience stimulation (Vallerand et al., 1997). Self-determination theory posits that
4 competence, autonomy, and relatedness are three basic human needs, and the extent to which
5 these three needs are satisfied, strongly determines an individual's intrinsic motivation. Using
6 the theory as a lodestar, researchers have developed a number of context-specific measures
7 that tap the *behavioral regulations*, or drivers of behavior, associated with each psychological
8 force (e.g., Li, 1999; Pelletier et al., 2013).

9 As suggested by Vallerand (1997), motivation is associated with three principal
10 consequences: affective, cognitive, and behavioral. Although the relationship between self-
11 determined motives and outcomes is complex (McDonough & Crocker, 2007), there is a
12 wealth of evidence to suggest that individuals who exhibit high levels of self-determination
13 report more positive cognitive, affective, and behavioral outcomes in an exercise context
14 (e.g., Kohlstedt et al., 2013; Wilson et al., 2004). In accordance with Vallerand's theoretical
15 propositions, the present study included assessments of affective (Affect Grid; Russell et al.,
16 1989), cognitive (concentration on the task at hand subscale of the Flow State Scale-2;
17 Jackson & Eklund, 2002), and behavioral (behavioral intent items; Vlachopoulos et al., 2000)
18 outcomes from participation in a structured exercise class.

19 **Interaction of Attention and Motivation**

20 Engelmann et al. (2009) presented findings that support an emerging body of
21 evidence, which they suggest indicates that attention and motivation are “intimately tied” (p.
22 1). Stimuli with motivational significance – in other words, those that fulfill a particular need
23 for the perceiver – appear to preferentially engage attention and this extends to stimuli with
24 positive emotional valence whereby attention is drawn toward seemingly more pleasing
25 stimuli, such as images of food presented to hungry participants (e.g., LaBar et al., 2001) or

1 images of female nudity presented to male participants (Most et al., 2007). Oliveira et al.
2 (2013) proposed that the degree to which distractors are processed is dependent upon the
3 primary task (Erthal et al., 2005), but that the capacity to process distractors can be
4 modulated by the relevance of the distractor and the motivation for the primary task.

5 **Behavioral regulations in exercise.** People are said to be extrinsically motivated
6 when they engage in a behavior (e.g., an exercise program) for contingent rewards.
7 Therefore, exercisers' attention may be drawn toward stimuli that fulfill the need for reward
8 (e.g., an image on the wall of the exercise studio that depicts a desired body shape).
9 Conversely, intrinsically motivated individuals engage in exercise because they enjoy doing
10 so. Accordingly, an individual who is intrinsically motivated may attend to cues that promote
11 the inherent pleasure of exercise (e.g., the pleasure associated with movement itself). It is
12 logical to suggest that Associators would be more self-determined toward exercise than
13 Dissociators, owing to the abundance of stimuli that fulfill the needs of intrinsically
14 motivated individuals (i.e., movement is a necessary element of exercise classes and therefore
15 it fulfills the needs of an Associator). Conversely, Dissociators would be less self-determined
16 toward exercise as their needs would be fulfilled by external stimuli, but such stimuli may not
17 be readily available within an indoor exercise class and consequently their needs are not met.

18 **Purpose and Hypotheses**

19 The purpose of the present study was to explore two psychological characteristics that
20 are potential predictors of people's responses to exercise classes: preferred attentional style
21 and contextual motivation. A fuller understanding of the influence of these factors in exercise
22 classes may afford us greater insight into how the experience of such classes may be
23 maximized for all participants.

24 It was hypothesized that those who reported a predominantly associative style during
25 the class (hereafter *Associators*) would experience more positive outcomes (H_1) than would

1 those who reported a dissociative one (*Dissociators*), owing to the fact that the class would
2 serve their needs (e.g., the inherent pleasure of exercise/movement) more fully. The
3 examination of the interaction of attentional style and behavioral regulations was expected to
4 reveal that Associators would be more self-determined than Dissociators (H_2). The
5 relationships between behavioral regulations and four outcome measures (affective valence
6 and arousal, concentration, and behavioral intent) were explored and it was expected that
7 correlations would be increasingly positive as the level of self-determination increased (H_3).
8 The predictive strength of behavioral regulations in relation to the four outcome measures
9 was explored using a multiple-group structural equation model (SEM) that examined
10 Associators and Dissociators. It was hypothesized that the relationships between the
11 behavioral regulations and the four outcome measures would differ according to attentional
12 style; specifically, that the intrinsic behavioral regulations of Associators would be more
13 positively related to the four outcome measures than extrinsic behavioral regulations, and that
14 extrinsic behavioral regulations of Dissociators would be more positively related to the
15 outcome measures than intrinsic behavioral regulations (H_4).

16 **Methodology**

17 The study was conducted in accordance with the Helsinki Declaration of 1975, as
18 revised in 2000, and by approval of the Brunel University London Research Ethics
19 Committee. All participants provided written informed consent and data were collected at six
20 health and leisure centers. Participants were required to complete a questionnaire before and
21 after attending their exercise class. The questionnaires were administered at classes wherein
22 the goal was to promote activity at a moderate-to-high intensity with a focus on large muscle
23 groups (e.g., Body Pump™ (Les Mills International Limited, Auckland, NZ) step aerobics,
24 spinning, and Zumba® (Zumba Fitness, Hallandale, FL, USA)). Classes without a significant
25 aerobic demand (e.g., yoga and Pilates) were not included in order to maintain some

1 homogeneity in terms of the cardiorespiratory demands of the exercise sessions. Moreover,
2 the exercise classes all employed music throughout the session and the type of music used in
3 moderate-to-high intensity exercise classes is stimulative, rather than sedative, in nature.

4 **Participants**

5 A total of 434 female participants ($M_{age} = 37.2$ years, $SD = 13.8$; 89.6% British
6 nationality) completed pre- and post-class questionnaires.

7 **Measures**

8 **Attentional Focus Questionnaire.** Participants' dominant attentional style was
9 assessed using a modified Attentional Focus Questionnaire (AFQ; Brewer et al., 1996). The
10 original AFQ required participants to respond as if they were completing a maximal-effort
11 run. However, participants in the present study were asked to respond to the items (e.g.,
12 "monitoring specific body sensations" and "reflecting on past experience") with reference to
13 an exercise class. The AFQ (Brewer et al., 1996) has been used in a number of studies as a
14 method by which to establish individual preference for attentional style (e.g., Connolly &
15 Janelle, 2003; Hutchinson & Karageorghis, 2013; Masters & Ogles, 1998). The AFQ has
16 three subscales (association, dissociation, and distress) with responses attached to a 7-point
17 Likert scale anchored by 1 (*would not do at all*) and 7 (*would do a lot*). Brewer et al. (1996)
18 provided evidence of the internal consistency for the subscales in the AFQ: association
19 (0.79), dissociation (0.77), and distress (0.85).

20 A Cognitive Index (CI; Masters & Ogles, 1998) was determined for each participant.
21 The CI was calculated from the AFQ (Brewer et al., 1996) responses by subtracting each
22 individual's association score from their dissociation score and adding 100. A score over 100
23 indicates a preference for dissociation whereas a score equal to or below 100 indicates a
24 preference for association. This calculation yielded scores that ranged from 55–130 ($M =$
25 87.5 , $SD = 13.4$) and there were 335 participants with a preference for association

1 (Associators) and 82 with a preference for dissociation (Dissociators).

2 **Exercise Motivation Scale.** Participants' motivation to exercise was assessed using
3 the Exercise Motivation Scale (EMS; Li, 1999). The EMS categorizes responses into one of
4 eight types of motivation (intrinsic motivation [IM] to know, IM to accomplish, IM to
5 experience stimulation, integrated regulation, identified regulation, introjected regulation,
6 external regulation, and amotivation). Participants are asked the question "Why are you
7 currently participating in this activity?" with responses provided on a 6-point Likert scale
8 anchored by 1 (*strongly disagree*) and 6 (*strongly agree*). The Amotivation subscale is
9 comprised of three items whereas the remaining seven subscales each comprise four items. Li
10 (1999) reported alpha coefficients for each subscale that averaged 0.77 ranging from 0.71
11 (IM to accomplish) to 0.85 (IM to learn).

12 **Outcome measures. Affect Grid.** The Affect Grid (Russell et al., 1989) is a self-
13 report measure in which respondents can indicate their perceived affective state according to
14 two orthogonal dimensions – affective valence and arousal – via a unitary response on a 9 x 9
15 grid. Participants were asked to mark an "X" in one cell of the grid.

16 **Flow State Scale-2.** The concentration on the task at hand subscale of the 36-item
17 Flow State Scale-2 (FSS-2; Jackson & Eklund, 2002) was used to assess participants'
18 cognitive responses to an exercise class. Participants responded to the four items of the scale
19 (e.g., "I was completely focused on the task at hand") on a 5-point Likert scale anchored by 1
20 (*Strongly disagree*) and 5 (*Strongly agree*).

21 **Behavioral intent.** Participants responded to three statements designed to represent
22 their future intentions toward attending exercise classes. The three items (e.g., "I am
23 determined to continue participating in exercise classes during this year") were initially used
24 by Vlachopoulos et al. (2000). Participants responded on a 7-point Likert scale anchored
25 from 1 (*extremely unlikely*) to 7 (*extremely likely*).

26

1 **Procedure**

2 Each participant completed the AFQ (Brewer et al., 1996) and the EMS (Li, 1999)
3 immediately prior to their exercise class. Participants were instructed to complete the
4 questionnaire individually and to attend the session as normal. The initial questionnaire took
5 approximately 5 min to complete. Immediately after the class, participants were asked to
6 complete the Affect Grid (Russell et al., 1989), behavioral intent items, and the FSS-2 items,
7 all of which took approximately 2 min to complete.

8 **Data Analysis**

9 Data were screened for univariate outliers using z scores ($> \pm 3.29$) and multivariate
10 outliers using the Mahalanobis distance method ($P < 0.001$). Following checks to ensure that
11 the data were suitable for parametric analysis, a series of MANOVAs and ANOVAs was
12 applied. A one-way independent-samples MANOVA was used to assess the effect of
13 attentional style on affective valence and arousal. One-way, independent-samples ANOVAs
14 (attentional style groups) were conducted for cognitive and behavioral outcome data. A one-
15 way independent-samples MANOVA was used to assess the effect of attentional style on
16 behavioral regulations. A correlational analysis was conducted to explore relationships
17 between behavioral regulations and the four outcome measures. A multiple group (Associator
18 or Dissociator) SEM was applied to examine the strength of relationships between behavioral
19 regulations and the four outcome measures. SEM analyses were conducted using EQS 6.1
20 (Bentler, 2004). Each structural model had eight latent predictor variables that represented the
21 behavioral regulations, as identified by the EMS (Li, 1999), and the maximum likelihood
22 estimation method was employed.

23 **Results**

24 Seventeen participants were removed following univariate and multivariate outlier
25 checks leaving 417 participants for the main analyses ($M_{\text{age}} = 37.5$ years, $SD = 13.7$ years).

1 Analysis of Variance

2 A one-way MANOVA of affective responses revealed a significant difference,
 3 associated with a small effect size, between Associators and Dissociators (Hotelling's $T =$
 4 0.02 , $F(2, 414) = 4.24$, $P = 0.015$, $\eta_p^2 = 0.02$). Associators reported significantly higher levels
 5 of pleasure than did Dissociators ($P = 0.005$, $\eta_p^2 = 0.02$). There were no significant
 6 differences for arousal.

7 ANOVA for the cognitive outcome was significant and revealed a small-to-moderate
 8 effect size, $F(13, 403) = 2.58$, $P < 0.01$, $\eta_p^2 = 0.07$, with Associators reporting higher levels
 9 of concentration. ANOVA for the behavioral outcome was significant, albeit that the effect
 10 size was small, $F(6, 410) = 2.39$, $P < 0.05$, $\eta_p^2 = 0.03$, with Associators reporting stronger
 11 behavioral intent.

12 A one-way MANOVA revealed a significant difference with a moderate effect size
 13 between Associators and Dissociators (Pillai's Trace = 0.11, $F(8, 408) = 6.04$, $P < 0.001$, η_p^2
 14 $= 0.11$) for behavioral regulations. Follow-up pairwise comparisons indicated that the
 15 Associators reported significantly higher EMS scores for identified regulation ($P < 0.001$),
 16 integrated regulation ($P < 0.001$), IM to learn ($P < 0.001$), intrinsic motivation to accomplish
 17 ($P < 0.001$), and intrinsic motivation to experience stimulation ($P < 0.001$) when compared to
 18 Dissociators. Conversely, Dissociators reported significantly higher EMS scores for
 19 amotivation ($P < 0.001$), and external regulation ($P < 0.001$) compared to Associators. There
 20 were no significant differences between Associators and Dissociators for introjected
 21 regulation (see Table 1 and Fig. 1).

22 Correlations

23 Analysis revealed 27 significant correlations between behavioral regulations and
 24 outcome measures regardless of attentional style (see Table 2). The relationships between
 25 integrated regulation, IM to learn, IM to accomplish, and IM to experience stimulation and all

1 of the outcome measures were positive in nature with Pearson's r ranging 0.13 to 0.37. The
2 relationships between identified regulation and the cognitive, behavioral, and arousal scores
3 were positive with Pearson's r ranging 0.15 to 0.26. The relationships between amotivation
4 and external motivation and all of the outcome measures were negative with Pearson's r
5 ranging -0.10 to -0.32 . Correlations between behavioral regulations and outcome measures
6 by attentional style identified some differences in the strength of the relationships between
7 Associators and Dissociators. Specifically, Associators exhibited stronger negative and
8 positive correlations than Dissociators for concentration and affective valence when moving
9 from nonself-determined to increasingly self-determined forms of behavioral regulation
10 (Table 2).

11 **Multiple-Groups Structural Equation Model**

12 SEM results for Associators (IFI = 0.98; RMSEA = 0.12; CFI = 0.98; NFI = 0.97;
13 SRMR = 0.03, $\chi^2(6) = 32.35$, $P = 0.001$) and Dissociators (IFI = 0.96; RMSEA = 0.17; CFI =
14 0.96; NFI = 0.95; SRMR = 0.04, $\chi^2(6) = 21.16$, $P = 0.002$) indicated good fit for IFI (>0.95),
15 marginal fit for RMSEA (>0.08), acceptable fit for the CFI (>0.95), good fit for NFI (>0.94),
16 good fit for SRMR (<0.08), and poor fit for χ^2 ($P < 0.05$). The two SEMs including the two
17 attentional styles (association and dissociation) are presented in Figs 2 and 3 respectively.

18 The structural model for Associators shows that 25% of the variance in behavioral
19 intent scores was accounted for by behavioral regulations (see Fig. 2). Path coefficients
20 showed that high scores for IM to experience stimulation were associated with stronger
21 behavioral intent ($P < 0.05$). High scores for amotivation and external regulation were
22 associated with the weakest behavioral intent ($P < 0.05$). Data indicated that 14% of variance
23 in the cognitive outcome was accounted for by the behavioral regulations. Path coefficients
24 showed that high scores for IM to learn were associated with the highest levels of
25 concentration during the exercise class ($P < 0.05$). Further, high scores for external regulation

1 continue attending exercise classes over the next year. Nonetheless, caution regarding the
2 behavioral outcome is warranted, as the responses indicate *intention* to continue attending,
3 rather than providing objective evidence showing that attendance *did* continue. Nonetheless,
4 when coupled with participants' affective responses, the results could suggest that this
5 intention will lead to exercise adherence; for example, Parschau et al. (2013) found that
6 intentions to continue with physical activity were more likely to be translated into action
7 when the physical activity was perceived to be a positive experience.

8 **The Link between Attention and Motivation**

9 The data support our hypothesis that Associators would have greater self-
10 determination than Dissociators (H_2): Dissociators recorded significantly higher scores for the
11 EMS subscales of amotivation and extrinsic regulation than did Associators (see Fig. 1).
12 Therefore, Dissociators may stand to benefit most from interventions that serve to enhance
13 autonomy, competence, and relatedness in an exercise context. Associators reported higher
14 levels of integrated regulation, identified regulation, and all aspects of intrinsic motivation,
15 which indicates that they are focusing on stimuli that fulfill their needs during exercise (e.g.,
16 the inherent joy of movement).

17 The present results lend support to the notion that attention is associated with
18 motivation (Engelmann et al., 2009). The notion that attention can also be *driven* by
19 motivation (LaBar et al., 2001; Most et al., 2007) provides a plausible explanation for the
20 observed links between attentional style and motivation reported herein. Specifically, the
21 results of the present study suggest that participants who were more externally regulated
22 tended to favor a dissociative attentional style (see Fig. 1). External regulation is
23 characterized by behavior driven by forms of external reinforcement, such as gaining rewards
24 or avoiding punishment (Deci & Ryan, 1985).

25

1 In light of the findings of LaBar et al. (2001) and Most et al. (2007), it is tenable that
2 individuals who are externally regulated with regard to exercise, may, for example, use the
3 music as a means by which to avoid punishment – the “punishment” in this context being the
4 negative affect and physical discomfort often experienced during exercise (Rhodes et al.,
5 2009). Individuals who describe themselves as externally regulated are not likely to
6 participate in exercise for inherent enjoyment, and the present data indicate that these
7 individuals may seek distraction as a means by which to enable themselves to tolerate the
8 exercise class. Hence, they may attend classes because the external stimuli (e.g., music, the
9 instructor, and fellow exercisers) are a salient distraction from the activity itself. Oliveira et
10 al. (2013) proposed that distractors are most effective when they are perceived as being
11 relevant, in particular *emotionally relevant*, to the individual. Music such as that used in
12 Spinning, Body Pump™, and other group-exercise formats can help to reduce the negative
13 emotional states associated with exercise (e.g., Elliott et al., 2005; Jones et al., 2014) and this
14 may offer some explanation as to why those with low self-determination seek such an
15 external stimulus: the music is used to avoid or minimize the negative emotional
16 consequences of exercise.

17 **Self-determination and Positive Outcomes**

18 An examination of the results that pertain to the relationships among behavioral
19 regulation and outcome measures led to the acceptance of H_3 . It was hypothesized that
20 correlations between behavioral regulations and outcome measures would become stronger
21 and more positive with higher levels of self-determined motivation. Table 2 shows a clear
22 pattern of small-to-medium negative correlations between amotivation and the outcome
23 measures, and small-to-medium positive correlations between intrinsic motivation and the
24 outcome measures. The expected trend emerged, with the strongest positive correlations
25 found between IM to experience stimulation and the outcome measures. These results support

1 previous work of a similar nature (e.g., Vlachopoulos et al., 2000; Wilson et al., 2004), and
2 can be added to the wealth of data regarding the self-determination of an individual and
3 positive outcomes in a wide range of contexts.

4 **Findings from the Structural Equation Models**

5 The hypothesis pertaining to the multiple-group SEMs (H_4) is only partially accepted.
6 Results indicate that both models (Associators and Dissociators) demonstrated acceptable fit
7 and that attentional style did not moderate the strength of relationships between behavioral
8 regulations and the outcome measures. However, almost 29% of the variance in affective
9 valence could be explained by behavioral regulations for Dissociators (Fig. 3), whereas this
10 figure was only 4% for Associators (Fig. 2); this indicates that attentional style may exert a
11 considerable influence on affective responses to exercise classes. There was significant
12 variation in the affective responses of Dissociators, which was largely due to their perceived
13 level of self-determination. We hypothesized that the extrinsic behavioral regulations would
14 relate more strongly than intrinsic behavioral regulations to positive outcomes for
15 Dissociators; however, the affective valence findings do not support H_4 , given that IM to
16 accomplish accounted for the greatest percentage of variance in affective valence – notably,
17 higher IM scores were associated with higher affect scores.

18 Enhancing the enjoyment that Dissociators experience during exercise appears crucial
19 in terms of enhancing levels of self-determination; the challenge is how we, as researchers
20 and practitioners, might go about increasing enjoyment for Dissociators. Exercisers with a
21 preference for dissociation are more likely to be amenable to in-task interventions. Thus if the
22 quality of such interventions can be improved for this group – particularly through offering a
23 pleasant stimulus that captures attention (addressing their greater need for extrinsic reward) –
24 a marked improvement in the outcomes of exercise classes will likely follow.

25 For Associators, 25% of the variance for behavioral intent could be explained by

1 behavioral regulations whereas this figure was 18% for Dissociators. Significant path
2 predictors for Associators between IM to experience stimulation and positive behavioral
3 intent, as well as between external regulation and negative behavioral intent, offer support for
4 H_4 . Further support for H_4 can be found in the significant path predictors for Dissociators
5 between integrated regulation and positive behavioral intent. This could indicate that exercise
6 classes are appropriate for those with an associative attentional style in terms of engendering
7 future exercise participation. Structured exercise classes may be of particular benefit to
8 Associators owing to the fact that the primary task (i.e., movement) appeals to their intrinsic
9 motives (e.g., pleasure derived from exercise) and no discernible extrinsic reward. The higher
10 behavioral intent score for Associators may be a result of the higher self-reported self-
11 determination for this group compared with Dissociators.

12 Williams et al. (2008) provided evidence of the link between acute affective responses
13 to bouts of exercise and adherence to exercise programs after 6 and 12 months. The present
14 results offer tentative support for the link between affective responses to exercise and
15 exercise adherence inasmuch as individuals who reported more positive affect also reported
16 stronger behavioral intentions (see Table 1). In line with the notion that acute affective
17 responses predict physical activity behavior, the present results suggest that Associators may
18 be more likely to continue attending exercise classes in the long term.

19 Behavioral regulations for Associators and Dissociators accounted for similar levels
20 of variance for the cognitive outcome (14% and 19% respectively). The path predictors
21 relating to the cognitive outcome measure revealed four significant relationships (see Fig. 2
22 and Fig. 3). Associators and Dissociators with intrinsic motivation to learn reported higher
23 levels of concentration in the exercise class ($P < 0.05$) suggesting that a desire to learn the
24 skills required to take part in exercise (e.g., the dance moves that are integral to a Zumba
25 class) is a strong driver to mentally engage with exercise. This finding represents the only

1 similarity across path predictors and might indicate that learning the skills to be able to
2 participate successfully in an exercise class is a central component of intrinsically-motivated
3 behavior, regardless of one's attentional style.

4 **Practical Implications**

5 The present results support previous research suggesting that high self-determination
6 is associated with the most positive consequences from engaging in exercise behavior (e.g.,
7 Vlachopoulos et al., 2000). Therefore, practitioners in a structured exercise context should
8 aim to bolster the level of self-determination that is perceived by participants in their charge.
9 With regards to the three building blocks of self-determination (autonomy, competence, and
10 relatedness), allowing participants to select the music that is played during an exercise class
11 (such as Spinning or Body Pump™) can enhance autonomy by giving them a sense of choice
12 about their exercise experience. The use of regular social events that engage class members
13 or exercise-related activities that are conducted in pairs or small groups (e.g., passive
14 stretching techniques) will contribute toward satisfaction of the need for relatedness (Deci &
15 Ryan, 2000). To satisfy the need for competence, instructors might use verbal
16 encouragement, assist exercisers in setting and monitoring challenging but attainable goals,
17 and employ token reward systems (e.g., exerciser of the week).

18 Practitioners should seek to explore a variety of external stimuli that Dissociators may
19 focus upon, which can lead to more positive outcomes. As an initial step, this might
20 necessitate that instructors talk to their class members to gain an insight into the stimuli that
21 may be of emotional significance to them (e.g., motivational quotes, pop videos, etc.).
22 Nonetheless, practitioners should be mindful of strategies that entail forms of social pressure
23 and an emphasis on physical attractiveness, as despite the fact that these are significant
24 factors for females to initiate exercise, they can have a deleterious effect when it comes to
25 maintaining exercise behaviors (Kohlstedt et al., 2013).

1 **Limitations of the Present Study**

2 Baseline measures for the affective, cognitive, and behavioral outcomes were not
3 recorded. Although the results indicate that Associators experience the most positive
4 psychological outcomes, it may be that Dissociators experience the greatest *change* in
5 outcomes between the pre and post phases of an exercise session. The practicalities of a study
6 of this nature would be extremely challenging, as it would demand additional time from the
7 participants prior to the session, something that proved a significant challenge even within the
8 current participant-friendly protocol. Further, the instructors of an exercise class, and the
9 music they play, are significant factors (Elliott et al., 2005). It was not possible to control for
10 the actions (verbal or nonverbal) of the instructors in this study or the music played.

11 The pool of participants comprised a considerably greater number of Associators ($n =$
12 335) than Dissociators ($n = 82$). While this disparity appears consistent with that observed in
13 other studies exploring the influence of attentional style (e.g., Connolly & Janelle, 2003;
14 Couture et al., 2003), it is a noteworthy limitation that has implications for future research. A
15 larger initial pool of participants would be necessary from which to extract equal numbers of
16 Associators and Dissociators.

17 Questionnaires offer a practical means by which to assess psychological phenomena
18 in large cohorts of participants but invariably present a number of limitations. For example,
19 within the physical activity literature there is an acknowledgement that self-report
20 questionnaires often result in the over-reporting of positive behaviors and the under-reporting
21 of negative behaviors (Sallis & Saelens, 2000; Shephard, 2003). We also acknowledge
22 that responses to certain items, particularly those for behavioral intent, could have been
23 negatively skewed by social desirability bias – not least because the questionnaires were
24 administered within a group environment.

1 **Future Directions**

2 The present results indicate that Associators tend to report higher levels of self-
3 determination and the implications of this warrant further examination. To manipulate class
4 attendees' attentional focus and then subsequently assess changes in motivation may shed
5 greater light on the nature of the relationship between attentional style and behavioral
6 regulations. A simple intervention could be implemented that instructs exercisers to either
7 associate (e.g., "focus on maintaining perfect form in your movement patterns") or dissociate
8 ("try to sing along to the music as you exercise"), and the effects of this change in attentional
9 focus could be measured on a range of outcomes including perceptions of self-determination.

10 Future studies could explore how and why individuals who are externally regulated
11 with regard to exercise have a tendency to favor environmental distractors (e.g., music,
12 fellow exercisers) during classes. Further, owing to the shift toward an associative focus as
13 exercise intensity increases (Lind et al., 2009), individuals who are externally regulated
14 toward exercise will not readily be able to focus on external stimuli (which they have a
15 tendency to do) during high-intensity exercise, and so a reason for attending the exercise
16 class will all but disappear as the intensity of exercise increases. A greater understanding of
17 what may constitute meaningful external stimuli for Dissociators may help to develop
18 interventions that can promote a more positive exercise experience for that group and help
19 maintain a dissociative focus during exercise (Jones et al., 2014).

20 The marked difference in the number of participants who report a preference for an
21 associative attentional style compared to a dissociative style warrants additional exploration.
22 This consistent finding could serve as the basis for exploring whether exercise per se, or
23 whether exercise environments, appeal to a greater degree to individuals with an associative
24 attentional style, and therefore account for the dominance of participants reporting a
25 preference for an associative style in exercise contexts. Further, the present study focused

1 solely on female participants; hence a similar study exploring male responses is likely to
2 provide additional detail on the nature of the relationship between attention and motivation in
3 an exercise context. Such an approach would also facilitate generalization of the present
4 findings; we cannot assume that the same pattern of results would be replicated with a male
5 sample.

6 **Perspectives**

7 The present findings offer some insight into the role of attentional style during
8 exercise; an area that has been highlighted as warranting further research attention (Lind et
9 al., 2009). Associators reported the most positive affective and cognitive outcomes, as well as
10 stronger behavioral intent to continue exercise when compared to Dissociators. Moreover, the
11 results support the notion that attention and motivation are intertwined with a trend emerging
12 between Associators and the more self-determined forms of motivation. Consistent with
13 extant literature, individuals reporting high levels of self-determination toward exercise
14 experienced the most positive psychological outcomes following a structured exercise class.
15 The findings may help to address the issue of female physical inactivity by providing further
16 understanding of key individual difference factors in the relationship between *attendance* at
17 exercise classes and *maintained* attendance at exercise classes over time. Additionally, the
18 nature of the relationship between attention and motivation in exercise contexts warrants
19 greater research focus. Specifically, investigators should seek to further understand the
20 influence that these two individual difference factors may exert on each other when
21 considering initiation of, and adherence to, an exercise regimen.

References

- Akpinar S, Kirazci S, Asci FH. Group cohesion in exercise classes: an examination of gender and type of exercise class differences. *Int J Human Sci* 2011; 8: 845–862.
- American College of Sports Medicine. ACSM's guidelines for exercise testing and prescription 2013 (9th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.
- Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJ, Martin BW, Lancet Physical Activity Series Working Group. Correlates of physical activity: why are some people physically active and others not? *The Lancet* 2012; 380: 258–271.
- Bentler PM. EQS structural equations modeling software (Computer software), 6.1 edn. Encino, CA: Multivariate Software, 2004.
- Biddle SJ, Braithwaite R, Pearson N. The effectiveness of interventions to increase physical activity among young girls: a meta-analysis. *Prev Med* 2014; 62: 119–131.
- Brewer BW, Van Raalte JL, Linder DE. Attentional focus and endurance performance. *ARCAA* 1996; 11: 1–14.
- Connolly CT, Janelle CM. Attentional strategies in rowing: performance, perceived exertion, and gender considerations. *J Appl Sport Psychol* 2003; 15: 195–212.
- Couture RT, Tihanyi J, St Aubin M. Can performance in a distance swim be improved by increasing a preferred cognitive thinking strategy? *Sport J* 2003; 6: 1-6.
- Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior* 1985. New York, NY: Plenum Publishing Company.
- Deci EL, Ryan RM. The “what” and “why” of goal pursuits: human needs and the self-determination of behavior. *Psychol Inq* 2000; 11: 227–268.
- Elliott D, Carr S, Orme D. The effect of motivational music on sub-maximal exercise. *Eur J Sport Sci* 2005; 5: 97–106.

- Engelmann JB, Damaraju E, Padmala S, Pessoa L. Combined effects of attention and motivation on visual task performance: transient and sustained motivational effects. *Front Human Neurosci* 2009; 3: 1–10.
- Erthal FS, De Oliveira L, Mocaiber I, Pereira MG, Machado-Pinheiro W, Volchan E, Pessoa L. Load-dependent modulation of affective picture processing. *Cog Affect Behav Neurosci* 2005; 5: 388–395.
- Hagger MS, Chatzisarantis NL. *Intrinsic motivation and self-determination in exercise and sport 2007*. Champaign, IL: Human Kinetics.
- Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, Lancet Physical Activity Series Working Group. Global physical activity levels: surveillance progress, pitfalls, and prospects. *The Lancet* 2012; 380: 247–257.
- Hawley-Hague H, Horne M, Campbell M, Demack S, Skelton DA, Todd, C. Multiple levels of influence on older adults' attendance and adherence to community exercise classes. *Gerontologist* 2013; 54: 599–610.
- Hutchinson JC, Karageorghis CI. Moderating influence of dominant attentional style and exercise intensity on responses to asynchronous music. *J Sport Exerc Psychol* 2013; 35: 625–643.
- Ingledeew DK, Markland D, Sheppard KE. Personality and self-determination of exercise behaviour. *Pers Individ Diff* 2004; 36: 1921–1932.
- Jackson SA, Eklund RC. Assessing flow in physical activity: The Flow State Scale-2 and Dispositional Flow Scale-2. *J Sport Exerc Psychol* 2002; 24: 133–150.
- Jones L, Karageorghis CI, Ekkekakis P. Can high-intensity exercise be more pleasant?: attentional dissociation using music and video. *J Sport Exerc Psychol* 2014; 36: 528–541.

- Karageorghis CI, Vlachopoulos SP, Terry PC. Latent variable modelling of the relationship between flow and exercise-induced feelings: an intuitive appraisal perspective. *Eur Phys Educ Rev* 2000; 6: 230–248.
- Kohlstedt SS, Weissbrod CS, Colangelo AM, Carter MM. Psychological factors influencing exercise adherence among females. *Psychol* 2013; 4: 917–923.
- Koivula N, Hassmen P. Central, local, and overall ratings of perceived exertion during cycling and running by women with an external or internal locus of control. *J Gen Psychology* 1998; 125: 17–29
- LaBar KS, Gitelman DR, Parrish TB, Kim YH, Nobre AC, Mesulam MM. Hunger selectively modulates corticolimbic activation to food stimuli in humans. *Behav Neurosci* 2001; 115: 493–500.
- Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The Lancet* 2012; 380: 219–229.
- Li F. The exercise motivation scale: Its multifaceted structure and construct validity. *J Appl Sport Psychol* 1999; 11: 97–115.
- Lind E, Welch AS, Ekkekakis P. Do “mind over muscle” strategies work? examining the effects of attentional association and dissociation on exertional, affective, and physiological responses to exercise. *Sports Med* 2009; 39: 743–764.
- Masters KS, Ogles BM. Associative and dissociative cognitive strategies in exercise and running: 20 years later, what do we know? *Sport Psychol* 1998; 12: 253–270.
- McDonough M, Crocker PR. Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. *J Sport Exerc Psychol* 2007; 29: 645–663.

Moran AP. Attention, concentration and thought management. In: Brewer BW, Ed, Sport psychology 2009 (pp. 18–29). Oxford, UK: Wiley-Blackwell.

doi:10.1002/9781444303650.ch3

Most SB, Smith SD, Cooter AB, Levy BN, Zald DH. The naked truth: positive, arousing distractors impair rapid target perception. *Cogn Emot* 2007; 21: 964–981.

Oliveira L, Mocaiber I, David IA, Erthal F, Volchan E, Pereira MG. Emotion and attention interaction: a trade-off between stimuli relevance, motivation and individual differences. *Front Hum Neurosci* 2013; 7: 364.

Ortony A, Norman D, Revelle W. Effective functioning: a three level model of affect, motivation, cognition, and behavior. In: Fellous J, Arbib M, Eds. *Who needs emotions: the brain meets the machine* 2005 (pp. 173–202). New York, NY: Oxford University Press.

Parschau L, Fleig L, Koring M, Lange D, Knoll N, Schwarzer R, Lippke S. Positive experience, self-efficacy, and action control predict physical activity changes: a moderated mediation analysis. *Brit J Health Psych* 2013; 18: 395–406.

Pelletier LG, Rocchi MA, Vallerand RJ, Deci EL, Ryan RM. Validation of the revised sport motivation scale (SMS-II). *Psychol Sport Exerc* 2013; 14: 329–341.

Rhodes, RE, Smith NEI. Personality correlates of physical activity: a review and meta-analysis. *Brit J Sports Med* 2006; 40: 958–965.

Rhodes RE, Warburton DE, Murray H. Characteristics of physical activity guidelines and their effect on adherence. *Sports Med* 2009; 39: 355–375.

Russell JA, Weiss A, Mendelsohn GA. Affect grid: A single-item scale of pleasure and arousal. *J Pers Soc Psychol* 1989; 57: 493–502.

Sallis JF, Saelens BE. Assessment of physical activity by self-report: status, limitations, and future directions. *Res Q Exerc Sport* 2000; 71: 1–14.

- Schomer HH. Mental strategy training programme for marathon runners. *Int J Sport Psychol* 1987; 18: 133–151.
- Shephard RJ. Limits to the measurement of habitual physical activity by questionnaires. *Br J Sports Med* 2003; 37: 197–206.
- Trost SG, Blair SN, Khan KM. Physical inactivity remains the greatest public health problem of the 21st century: evidence, improved methods and solutions using the “7 investments that work” as a framework. *Brit J Sports Med* 2014; 48: 169–170.
- Vallerand RJ. Toward a hierarchical model of intrinsic and extrinsic motivation. In: Zanna MP, Ed, *Advances in experimental social psychology* 1997 (pp. 271–360). San Diego, CA: Academic Press.
- Vlachopoulos SP, Karageorghis CI, Terry PC. Motivation profiles in sport: a self-determination theory perspective. *Res Q Exerc Sport* 2000; 71: 387–397.
- Williams DM, Dunsiger S, Ciccolo JT, Lewis BA, Albrecht AE, Marcus BH. Acute affective response to a moderate-intensity exercise stimulus predicts physical activity participation 6 and 12 months later. *Psychol Sport Exerc* 2008; 9: 231–245.
- Williams DM, Dunsiger S, Jennings EG, Marcus BH. Does affective valence during and immediately following a ten-minute walk predict concurrent and future physical activity? *Ann Behav Med* 2012; 44: 43–51.
- Wilson KE, Dishman RK. Personality and physical activity: a systematic review and meta-analysis. *Pers Individ Diff* 2015; 72: 230–242.
- Wilson PM, Rodgers WM, Fraser SN, Murray TC. The relationship between exercise regulations and motivational consequences in men and women. *Res Q Exerc Sport* 2004; 75: 81–91

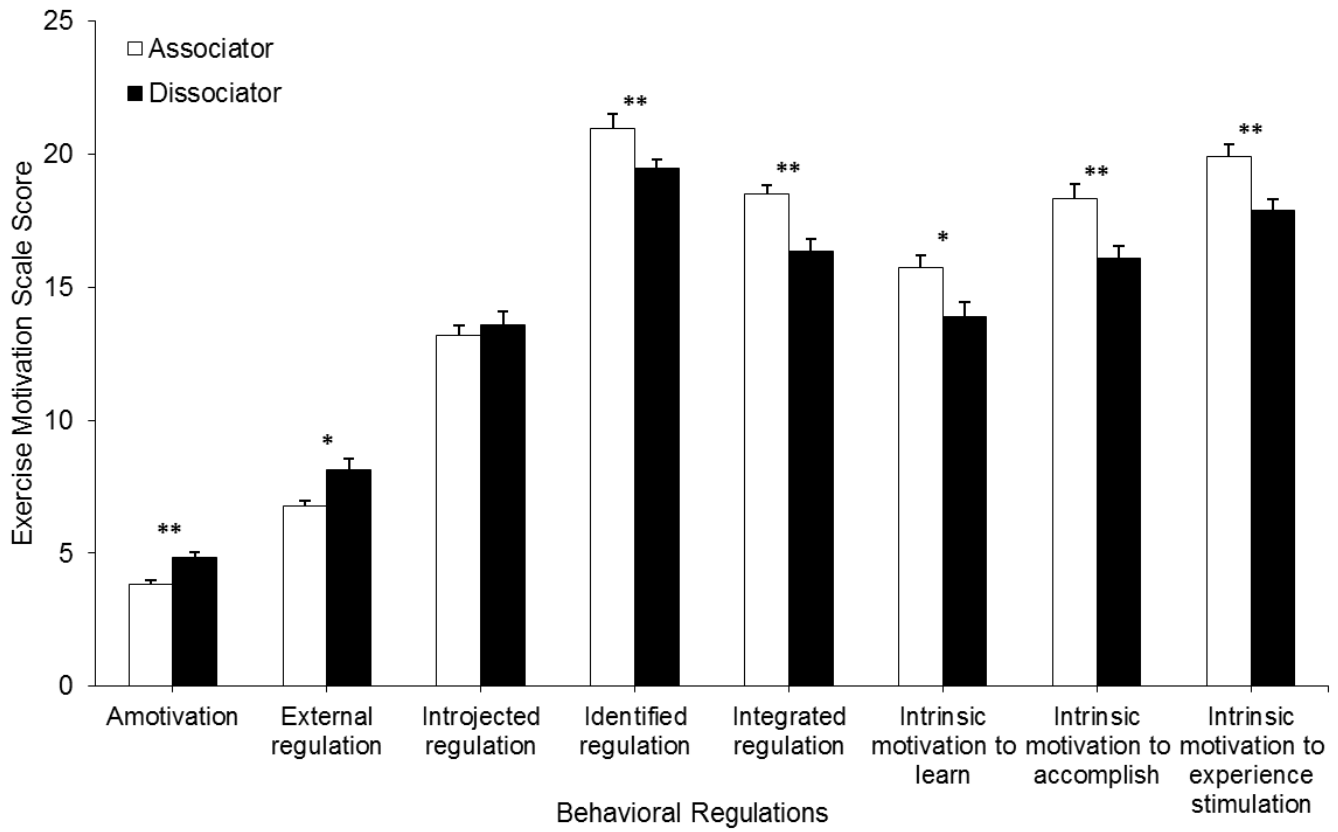


Fig. 1. Mean Exercise Motivation Scale subscale scores for Associators and Dissociators (T-bars represent standard error). * $P < 0.01$, ** $P < 0.001$.

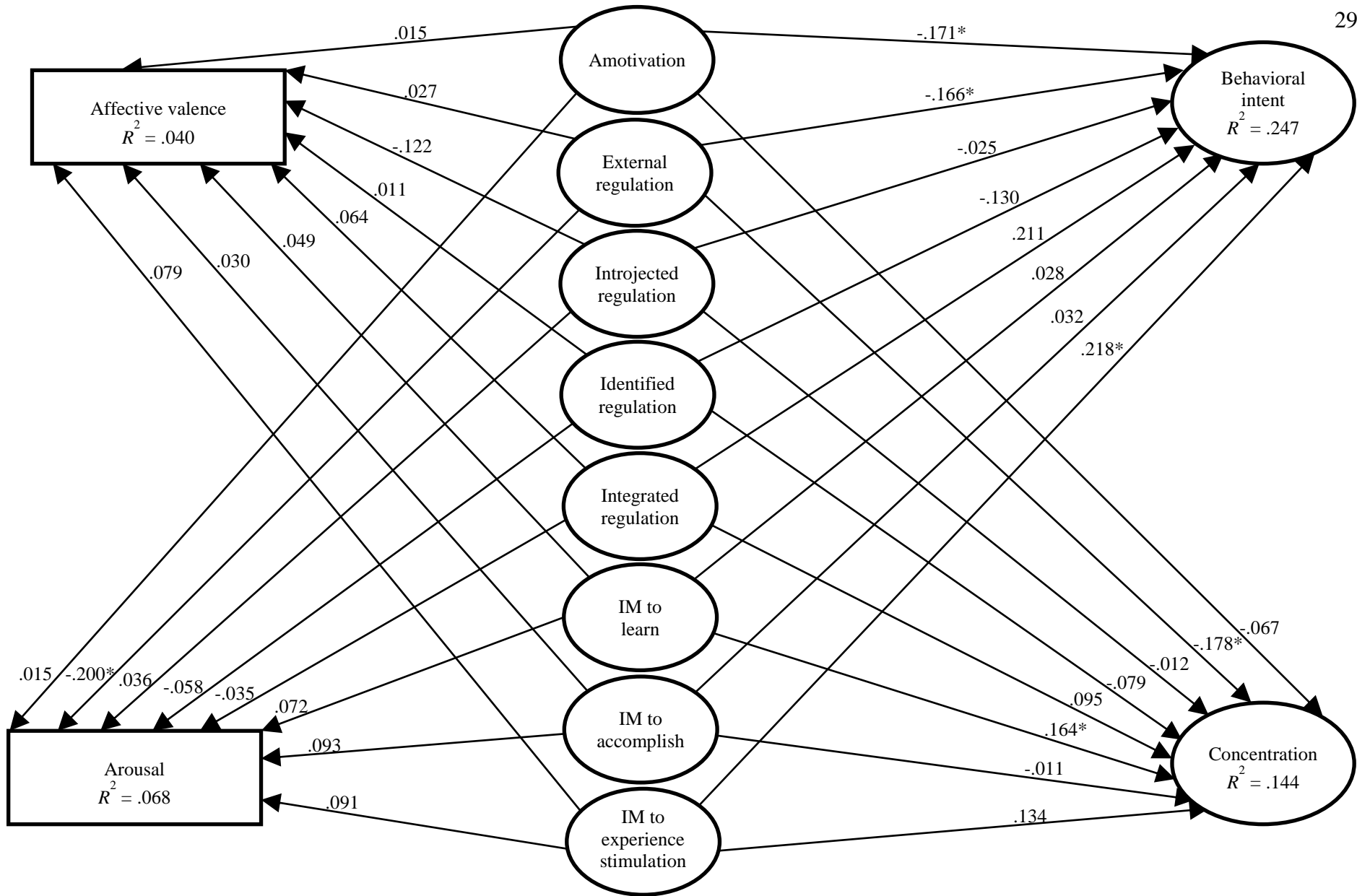


Fig. 2. Structural model showing the associations between motivational orientation at a contextual level and affective, behavioral, and cognitive outcome measures for Associators. $*P < 0.05$.

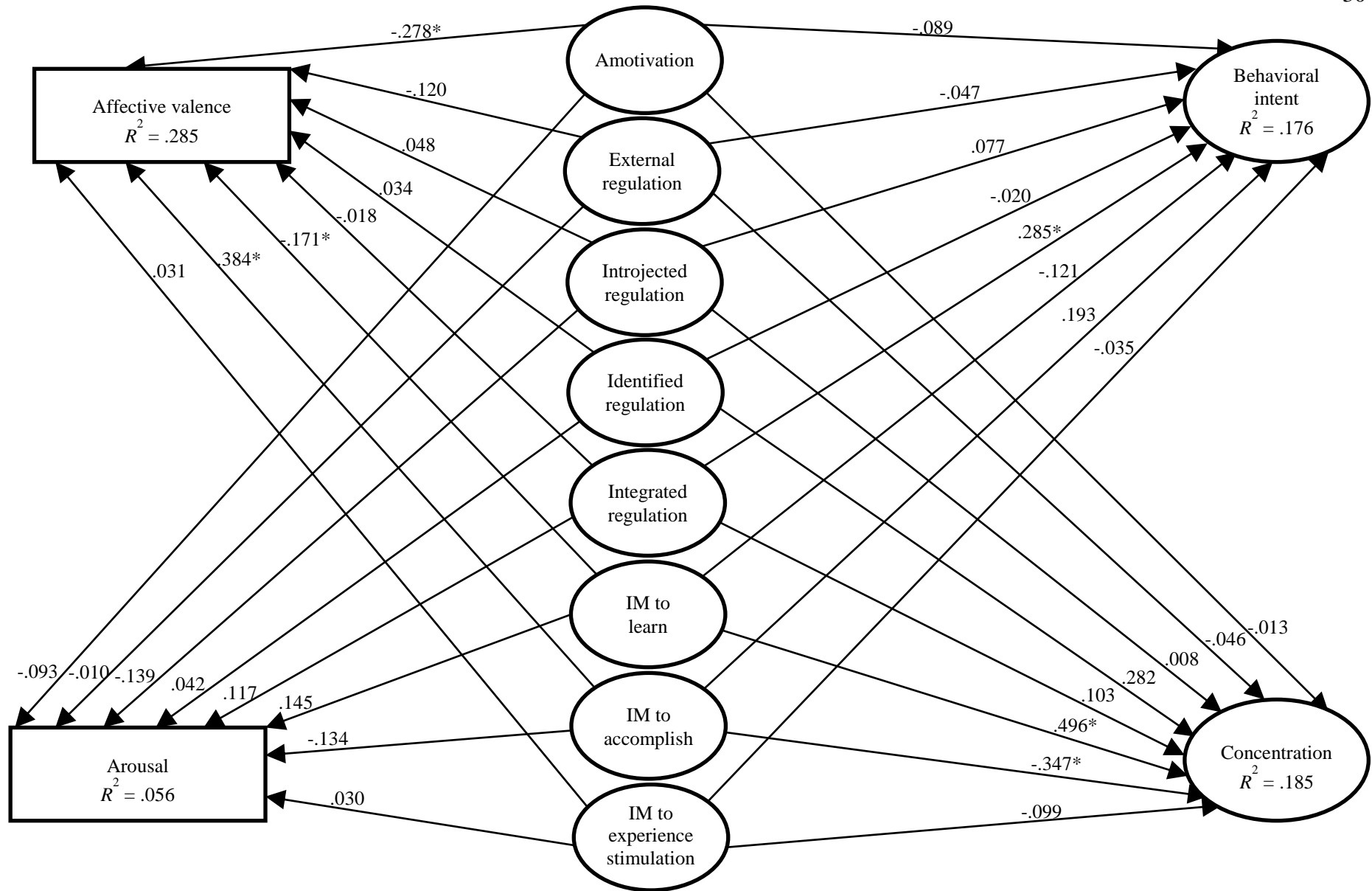


Fig. 3. Structural model showing the associations between motivational orientation at a contextual level and affective, behavioral, and cognitive outcome measures for Dissociators. $*P < 0.05$.

Table 1. Descriptive and inferential statistics for outcome measures and behavioral regulations by attentional style

	<i>M</i>	<i>SE</i>	<i>F</i>	<i>P</i>	η_p^2
Affective valence					
Associators	7.78	0.07	7.86	0.005	0.02
Dissociators	7.34	0.14			
Arousal					
Associators	6.29	0.11	0.40	0.529	0.00
Dissociators	6.13	0.23			
Behavioral intent					
Associators	6.72	0.03	2.39	0.028	0.03
Dissociators	6.52	0.07			
Concentration on the task					
Associators	4.11	0.04	2.58	0.002	0.07
Dissociators	3.65	0.09			
Amotivation					
Associators	3.82	0.09	27.50	0.000	0.06
Dissociators	4.84	0.18			
External regulation					
Associators	6.78	0.18	11.77	0.001	0.03
Dissociators	8.15	0.36			
Introjected regulation					
Associators	13.18	0.24	0.52	0.472	0.00
Dissociators	13.56	0.48			
Identified regulation					
Associators	20.97	0.14	22.01	0.000	0.05
Dissociators	19.46	0.29			
Integrated regulation					
Associators	18.51	0.21	21.13	0.000	0.05
Dissociators	16.35	0.42			
IM to learn					
Associators	15.74	0.25	11.00	0.001	0.03
Dissociators	13.88	0.50			
IM to accomplish					
Associators	18.33	0.20	24.13	0.000	0.06
Dissociators	16.10	0.41			
IM to experience stimulation					
Associators	19.92	0.19	22.79	0.000	0.05
Dissociators	17.89	0.38			

Table 2. Pearson's Product moment correlations for behavioral regulations and cognitive, behavioral, and affective outcomes

All participants ($N = 417$)				
EMS subscales	Concentration	Behavioral intent	Affective valence	Arousal
Amotivation	-0.22***	-0.32***	-0.14**	-0.16**
External regulation	-0.19***	-0.23***	-0.18**	-0.10*
Introjected regulation	-0.03	0.03	-0.05	-0.05
Identified regulation	0.21***	0.26***	0.09	0.15**
Integrated regulation	0.27***	0.37***	0.13**	0.16**
IM to learn	0.30***	0.26***	0.16**	0.15**
IM to accomplish	0.26***	0.35***	0.16**	0.19***
IM to experience stimulation	0.30***	0.37***	0.19***	0.20***
Associators ($N = 335$)				
EMS subscales	Concentration	Behavioral intent	Affective valence	Arousal
Amotivation	-0.21***	-0.34***	-0.10	-0.05
External regulation	-0.23***	-0.27***	-0.19***	-0.03
Introjected regulation	-0.07	-0.01	-0.04	-0.07
Identified regulation	0.14**	0.22***	0.07	0.11*
Integrated regulation	0.22***	0.34***	0.10	0.13*
IM to learn	0.26***	0.26***	0.15**	0.15**
IM to accomplish	0.23***	0.33***	0.16***	0.15**
IM to experience stimulation	0.28***	0.39***	0.17***	0.16***
Dissociators ($N = 82$)				
EMS subscales	Concentration	Behavioral intent	Affective valence	Arousal
Amotivation	-0.08	-0.22*	-0.15	-0.44***
External regulation	0.06	-0.07	-0.09	-0.29**
Introjected regulation	-0.07	-0.01	-0.09	0.01
Identified regulation	0.14	0.20	0.07	0.27*
Integrated regulation	0.28**	0.27**	0.12	0.28**
IM to learn	0.26*	0.38***	0.12	0.12
IM to accomplish	0.17	0.33***	0.07	0.35***
IM to experience stimulation	0.19	0.25*	0.14	0.32***

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.