Running Head: Exercise, Motivation, and Attentional Style

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

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

Abstract

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

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

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

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

Individual Differences

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

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

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

Attention as an Individual Difference Factor

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

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

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

Motivation as an Individual Difference Factor

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

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

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

Interaction of Attention and Motivation

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

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

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

Purpose and Hypotheses

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

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

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

Methodology

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

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

Participants

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

Measures

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

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

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

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

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

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

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

Procedure

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

Data Analysis

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

Results

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

Analysis of Variance

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

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

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

Correlations

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

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

Multiple-Groups Structural Equation Model

SEM results for Associators (IFI = 0.98; RMSEA = 0.12; CFI = 0.98; NFI = 0.97; SRMR = 0.03, χ^2 (6) = 32.35, *P* = 0.001) and Dissociators (IFI = 0.96; RMSEA = 0.17; CFI = 0.96; NFI = 0.95; SRMR = 0.04, χ^2 (6) = 21.16, *P* = 0.002) indicated good fit for IFI (>0.95), marginal fit for RMSEA (>0.08), acceptable fit for the CFI (>0.95), good fit for NFI (>0.94), good fit for SRMR (<0.08), and poor fit for χ^2 (*P* <0 .05). The two SEMs including the two attentional styles (association and dissociation) are presented in Figs 2 and 3 respectively.

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

were associated with the lowest levels of concentration.

The structural model for Dissociators indicates that 29% of variance in affective valence was accounted for by the behavioral regulations (see Fig. 3). Path coefficients showed that high scores for IM to accomplish were associated with the most positive affective valence scores ($P < 0.05$); conversely, high amotivation scores were associated with the lowest affective valence scores ($P < 0.05$). Findings also show that 19% of concentration variance was accounted for by behavioral regulations. Path coefficients indicated that high scores for IM to learn and identified regulation were associated with high levels of concentration, whereas high scores for IM to accomplish were associated with low concentration levels ($P < 0.05$). The analysis indicates that 18% of behavioral intent variance was accounted for by behavioral regulations. Path coefficients showed that high scores for integrated regulation and IM to accomplish were associated with stronger behavioral intent ($P < 0.05$).

Discussion

The purpose of the present study was to explore the relationships between attentional style, motivation, and a range of outcome measures that followed a structured exercise class. The hypothesis that Associators would experience the most positive psychological outcomes is accepted (H_1) as Associators exhibited significantly ($p < 0.05$) more positive affective, cognitive, and behavioral outcomes. The small-to-moderate effect sizes associated with these findings would suggest that caution should be taken in interpreting these preliminary data. There is equivocal evidence as to whether a tendency toward an Associative or a Dissociative focus during exercise should lead to more positive outcomes (see e.g., Hutchinson & Karageorghis, 2013), but the results of the present study suggest that a tendency toward association during the exercise classes promoted the most positive affective and cognitive outcomes. Moreover, the results indicate that Associators reported a stronger intention to

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

The Link between Attention and Motivation

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

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

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

Self-determination and Positive Outcomes

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

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

Findings from the Structural Equation Models

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

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

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

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

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

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

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

Practical Implications

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

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

Limitations of the Present Study

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

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

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

Future Directions

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

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

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

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

Perspectives

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

Ingledew DK, Markland D, Sheppard KE. Personality and self-determination of exercise behaviour. Pers Indiv 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 Indiv 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

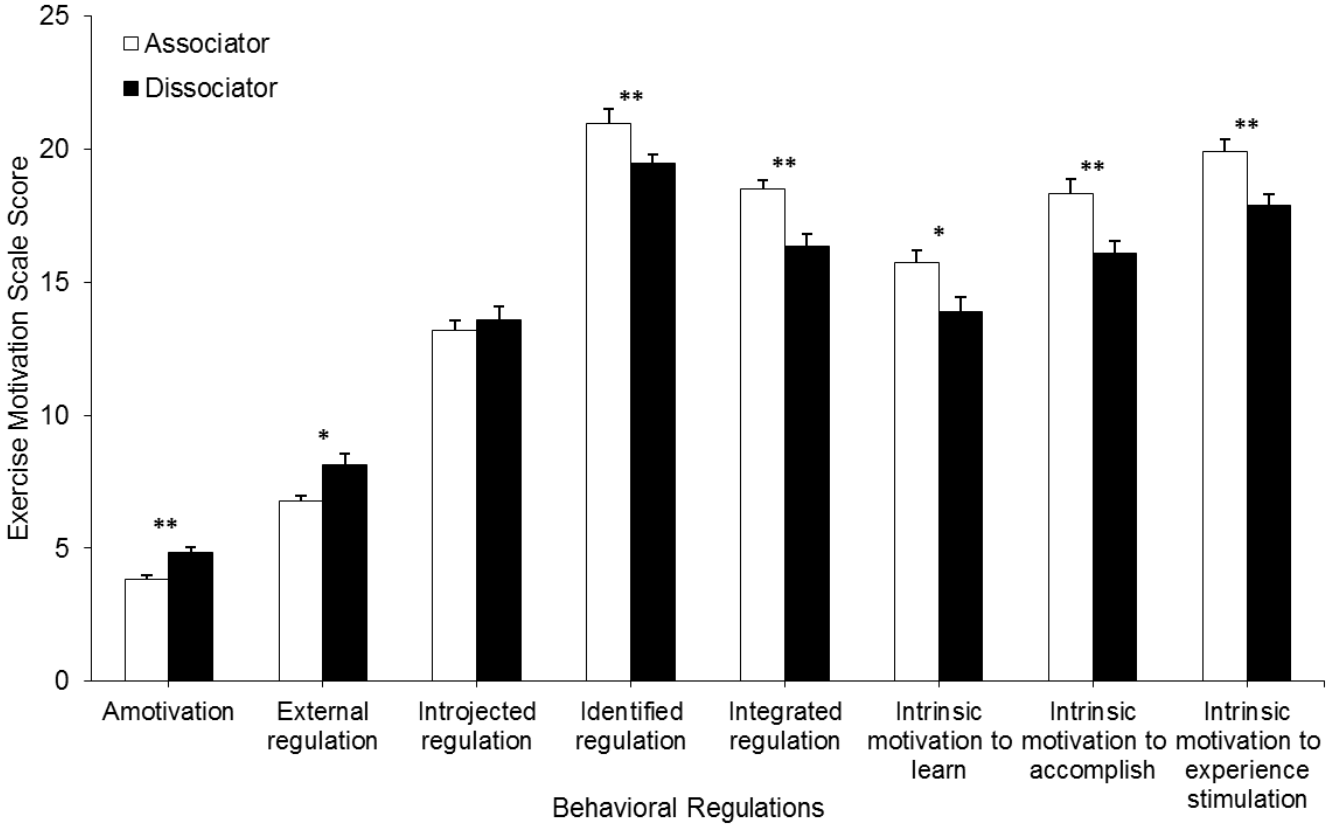

Fig. 1. Mean Exercise Motivation Scale subscale scores for Associators and Dissociators (T-bars represent standard error). * $P < 0.01$, ** $P < 0.001$.

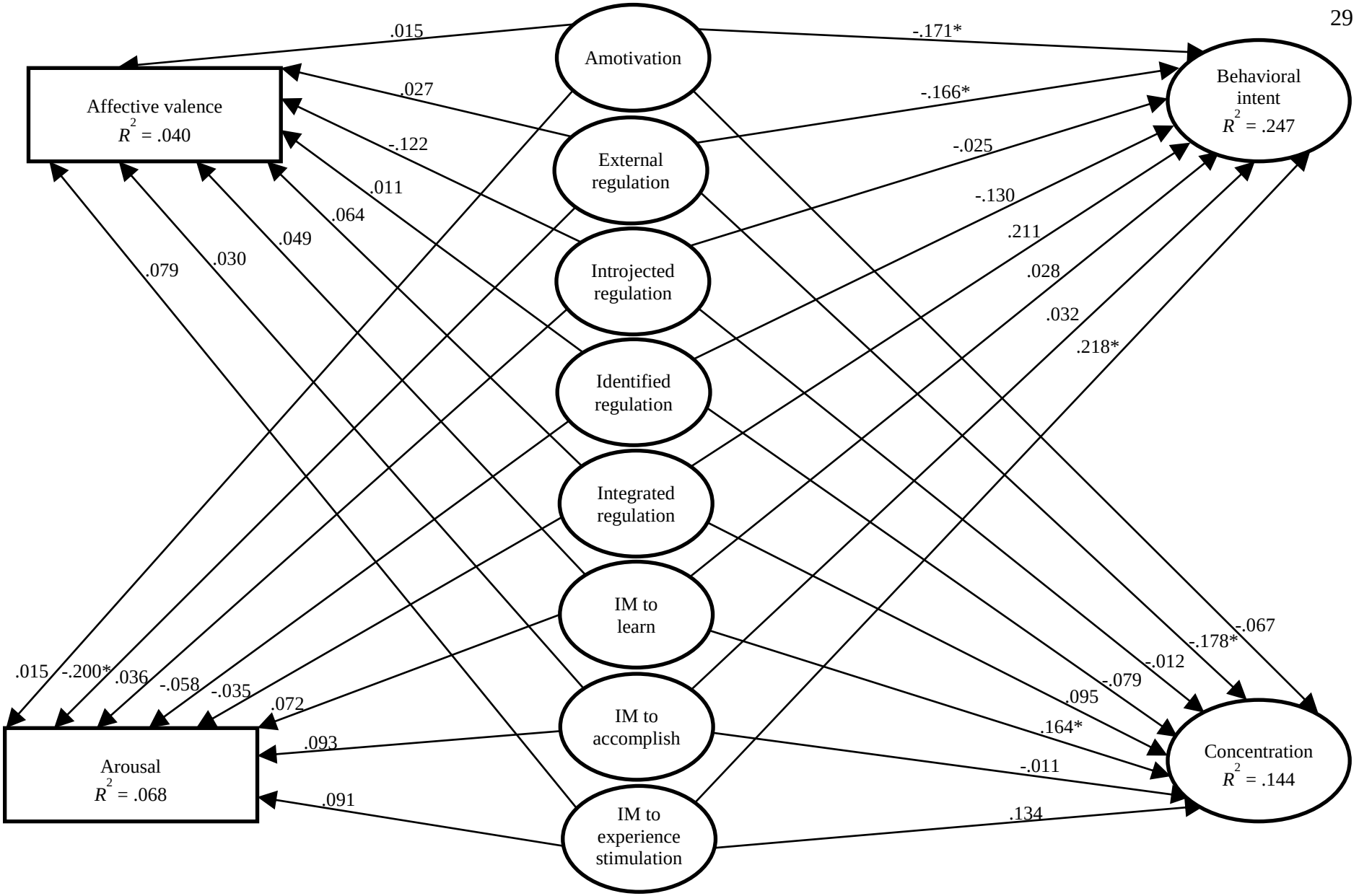

Fig. 2. Structural model showing the associations between motivational orientation at a contextual level and affective, behavioral, and cognitive outcome measures for Associators. *$P < 0.05$.

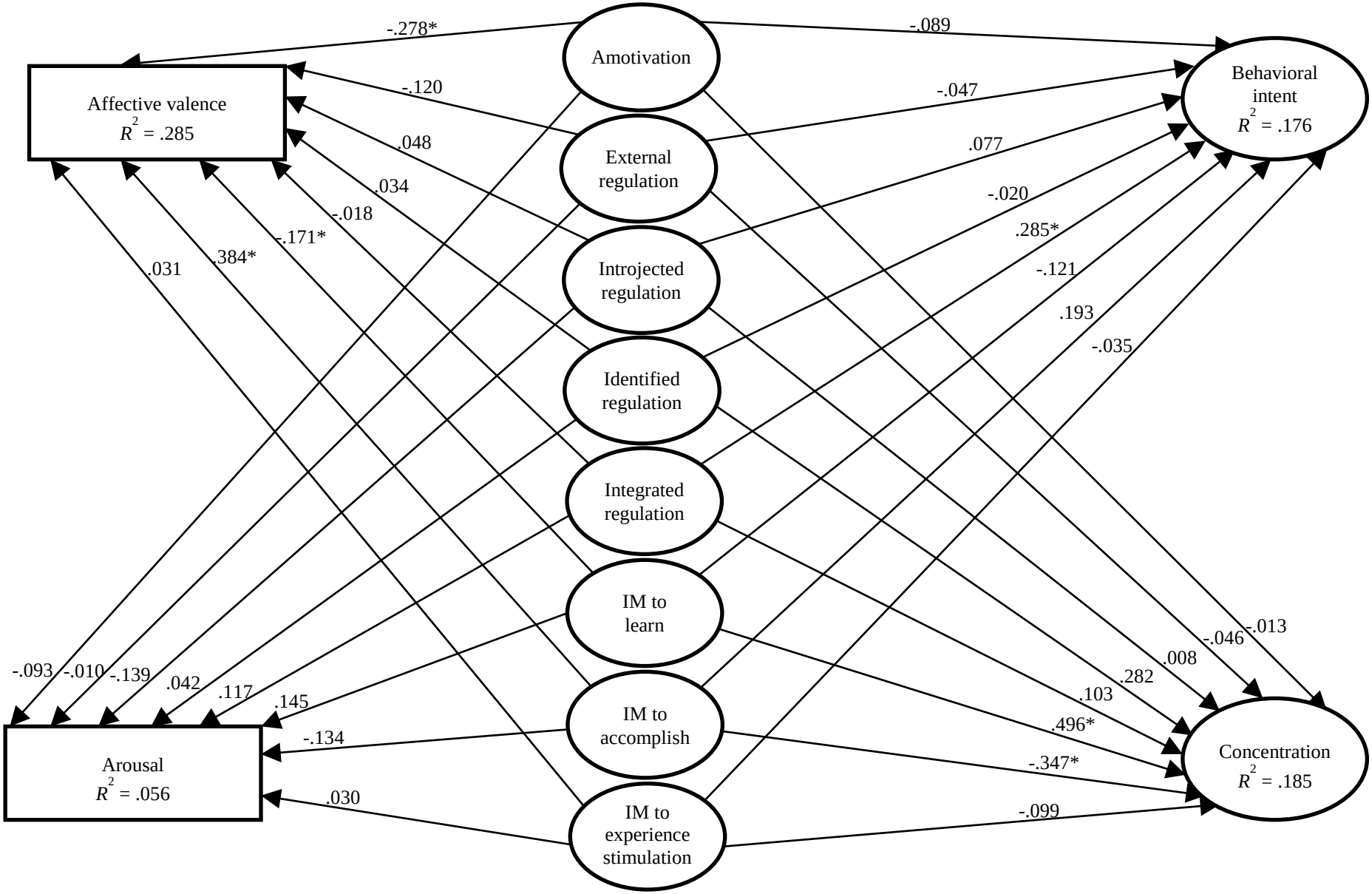

Fig. 3. Structural model showing the associations between motivational orientation at a contextual level and affective, behavioral, and cognitive outcome measures for Dissociators. *$P < 0.05$.

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

	M	*SE*	*F*	*P*	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***

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