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Interaction of External, Introjected, and Identified Regulation with Intrinsic Motivation in Exercise: Relationships with Exercise Enjoyment

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Abstract

The present study examined the way in which the exercise-related motives of external regulation, introjected regulation, and identified regulation interacted with intrinsic motivation to relate to exercise enjoyment. The study was conducted to test the "additive relationship hypothesis" emanating from Vallerand and Fortier's (1998) theoretical position regarding the interplay between extrinsic and intrinsic motivation in exercise. Exercise participants (N = 516) responded to a self-report questionnaire assessing their reasons for exercise participation before the commencement of a single exercise class. One week later, and immediately prior to the corresponding class, participants reported on their levels of exercise enjoyment. Interactional analyses using linear regression showed a significant interaction between identified regulation and intrinsic motivation. Specifically, the co-existence of high levels of identified regulation with high levels of intrinsic motivation corresponded with higher scores on exercise enjoyment. External regulation and introjected regulation did not interact with intrinsic motivation thus supporting the research hypotheses. Collectively, the present findings supported the validity of Vallerand and Fortier's theoretical propositions in the exercise domain and specifically the additive relationship hypothesis between identified regulation and intrinsic motivation with respect to exercise enjoyment.

Keywords: Additive relationship hypothesis, extrinsic, motives, self-determination theory

Interaction of External, Introjected, and Identified Regulation with Intrinsic Motivation in Exercise: Relationships with Exercise Enjoyment

Understanding the psychological processes that underlie motivation for exercise participation has been of seminal interest to researchers in exercise psychology (McAuley, 1992; McAuley, Pena, & Jerome, 2001; Rejeski, 1992; Vallerand, 2001). This is due in part to the social significance of exercise and physical activity. Sedentary lifestyles account for an estimated 200,000 deaths annually in the US caused by coronary heart disease, type II diabetes mellitus, and colon cancer, while at the same time the combination of physical inactivity and excess calorific intake has accounted for 50% in obesity prevalence among the US adults during the past decade (Buckworth & Dishman, 2002). In addition, a great deal of research evidence has accumulated regarding the physiological and psychological benefits accruing from systematic participation in physical activity (Biddle, 1995; International Society of Sport Psychology, 1992; Leon & Norstrom, 1995; Mutrie, 1997; Shephard, 1995; Weyerer & Kupfer, 1994). However, despite the growing body of research on motivation for exercise participation and adherence, the problem of exercise participation still remains unsolved. That is, only 25% of US adults participate regularly at a level sufficient to reduce premature mortality or maintain cardiorespiratory fitness (Buckworth & Dishman, 2002) while 50% of the adults who initiate exercise, drop out within the first six months of participation (Dishman, 1990).

While the emphasis placed on the study of enjoyment in exercise has been considerable (Fox, Rejeski, & Gauvin, 2000; Motl, Berger, & Leuschen, 2000), an informal consensus is evident in the exercise science literature that the experience of enjoyment from exercise participation is central to understanding the phenomenon of exercise adherence (Dishman, Sallis, & Orenstein, 1985; Heinzelmann & Bagley, 1970; Martin & Dubbert, 1982; Wankel, 1985). Attempts to prevent or change the alarming attrition rates from organized exercise programs (Dishman, 1988, 1994) have led to the study of factors that may determine the degree of enjoyment derived from exercise

participation (Ashford, Biddle, & Goudas, 1993; Fox et al., 2000; Frederick, Morrison, & Manning, 1996). However, the limited number of such research studies highlights the need for a better understanding of how to promote the experience of enjoyment in exercise settings.

One of the factors that has been associated with enjoyment in the psychological literature has been intrinsic motivation (Deci, 1975; Deci & Ryan, 1985; Ryan & Deci, 2000a). Indeed, there is a consensus among theorists that feelings of enjoyment are a consequence of intrinsically motivated behavior (Deci & Ryan, 1985; Pelletier, Fortier, Vallerand, Tuson, & Blais, 1995; Reeve & Deci, 1996). Despite such consensus, there has been scant research examining the determinants of enjoyment in exercise from an intrinsic/extrinsic motivation perspective. One study that has demonstrated the important role of enjoyment to exercise adherence from an intrinsic/extrinsic motivation perspective was conducted by Ryan, Frederick, Lepes, Rubio, and Sheldon (1997). The researchers demonstrated that it was the intrinsic motives of enjoyment and competence that were mainly associated with exercise adherence rather than the body-related motives of the exercise participants. However, despite the important contribution of the study by Ryan and associates in better understanding the role intrinsic motives may play in determining exercise enjoyment and adherence, little is yet known about the role of the extrinsic and intrinsic motivation in determining enjoyment in exercise.

Self-determination theory (SDT: Deci & Ryan, 1985, 1991; Ryan & Deci, 2000a, 2000b) has been a major focus of motivation research promising to shed light on the psychological processes underlying adherence to exercise. According to Deci and Ryan (1985), behavior is determined by three distinct psychological forces: Intrinsic motivation, extrinsic motivation, and amotivation. Intrinsically motivated is the behavior performed for the pleasure and satisfaction derived from the process of participation in the activity (Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand, 1997). That is, the mainspring underlying initiation of a course of action is the expectation of deriving pleasure and satisfaction from engaging in the activity. When the behavior

is performed to attain a goal separate from the process of participation, or to avoid negative consequences, the behavior is extrinsically motivated. In this case, the course of action is initiated for reasons different from the enjoyment of being involved in the activity. Finally, Deci and Ryan (1985) introduced the concept of amotivation which indicates the relative absence of motivation or lack of intention to engage in an activity. Amotivation is conceptually similar to the concept of "learned helplessness" (Abramson, Seligman, & Teasdale, 1978) because it is accompanied by feelings of low competence and perceptions of the lack of a reliable link between the behavior and the desired outcomes (Vallerand, 1997).

Based on White's (1959) and Deci's (1975) conceptualization of intrinsic motivation, Vallerand and associates (Vallerand, 1997; Vallerand et al., 1992, 1993) have proposed a finer differentiation of intrinsic motivation into more specific motives. These types of intrinsic motivation are "intrinsic motivation to know" (IMKNOW), "intrinsic motivation toward accomplishments" (IMAC) and "intrinsic motivation to experience stimulation" (IMES). According to Vallerand (1997), individuals are intrinsically motivated to know, when the reason for engaging in the behavior is the pleasure and satisfaction experienced while they explore, learn, or try to understand something new. Individuals who are intrinsically motivated toward accomplishments engage in the behavior to experience pleasure and satisfaction by trying to extend their limits, surpass themselves, or try to achieve something new. Finally, individuals who participate in an activity for the pleasure and satisfaction derived while experiencing pleasurable sensations are intrinsically motivated to experience stimulation.

Extrinsic motivation has also been conceptualized from a multidimensional perspective. Specifically, Deci, Ryan, and associates (Deci & Ryan, 1985; Ryan & Connell, 1989; Ryan, Connell, & Grolnick, 1992) have shown that extrinsically motivated behavior can be differentiated into four specific motives. These are "external regulation", "introjected regulation", "identified regulation" and "integrated regulation". When externally regulated, behavior is engaged for reasons

external to the process of participation such as pay, rewards, or coercive pressures. An example is an individual who attends an exercise program out of pressure applied by their spouse. When individuals apply pressure on themselves to engage in the behavior, their motivation is termed introjected. In this case, the initially external reason for the behavior has been internalized, but is still experienced as pressuring. The individual does not experience a sense of choice for engaging in the behavior, that is, the behavior is not experienced as self-determined. An example would be an individual who participates in exercise out of feelings of guilt and dissatisfaction with their body weight or body shape. Identified regulation is in operation when individuals participate in an activity because they view participation as important for their personal growth. When the activity is valued, the behavior is engaged in out of choice and experienced as self-determined. An example of identified regulation is an individual who participates in physical activity to derive physical and mental health benefits. Finally, under integrated regulation, behavior is also engaged in out of choice. Under this type of regulation, the choice of the activity is made because it is in congruence with other aspects of the self such as individuals' needs and values. An example would be individuals who participate in exercise not only because they know it is beneficial for their health but also because participation can satisfy their need to socialize with friends. To sum up, external and introjected regulations represent non self-determined types of extrinsic motivation whereas identified and integrated regulations represent self-determined types of extrinsic motivation.

A number of studies has been conducted to examine the relationships between these types of motivation and various types of cognitive, affective, and behavioral consequences in various contexts such as education, work, leisure, and sport (see Ryan, 1995; Vallerand, 1997, 2001; Vallerand & Reid, 1990 for reviews). Typically, the pattern of findings showed that the most self-determined types of motivation have been associated with the most positive consequences while the least self-determined types of motivation have been associated with the most negative consequences. This is the case because according to Deci and Ryan (1985), these behavioral

regulations are assumed to lie on a continuum running from low (i.e., amotivation) to high levels of self-determination (i.e., intrinsic motivation), and high levels of self-determination are associated with enhanced psychological functioning (Deci, 1980; Ryan, Deci, & Grolnick, 1995). Findings in the sport domain have confirmed the expected association between levels of self-determination and positive motivational consequences. For example, using the Sport Motivation Scale (SMS), Pelletier et al. (1995) demonstrated that positive motivational consequences such as effort and future intention to practice the activity were progressively and positively associated with SMS scores, as one moved from the least (i.e., amotivation) to the most self-determined types of behavioral regulation (i.e., intrinsic motivation). The reverse pattern of association was evident for negative motivational consequences such as distraction during the activity.

Interaction of Intrinsic and Extrinsic Motivation

Vallerand (1997, 2001) has suggested that it is not appropriate to describe individuals as simply being either extrinsically or intrinsically motivated because both types of motivation can co-exist within individuals to different degrees. Therefore, studying the interplay between the two types of motivation and their influence on various motivational consequences would further advance our understanding of motivational processes underlying exercise participation. Vallerand and Fortier (1998) have described two prevalent theoretical positions regarding the nature of the interplay between extrinsic and intrinsic motivation. On the one hand, the “additive relationship hypothesis” posits that intrinsic and extrinsic motivation may combine to lead to higher levels of motivation (Atkinson, 1964; Porter & Lawler, 1968). On the other hand, the “interactional” approach holds that when individuals score high on the one type of motivation, they are expected to score low on the other (Harter, 1981; Lepper & Hodell, 1989).

Vallerand and Fortier (1998) have forwarded an alternative theoretical position regarding the nature of this relationship. They have postulated that the nature of the relationship between intrinsic and extrinsic motivation depends on the degree to which the type of extrinsic motivation

involved is self-determined, as well as the level of generality of the constructs. That is, at the contextual level (e.g., the domains of education, work, leisure etc.), the relationship between self-determined forms of extrinsic motivation (e.g., identified regulation) and intrinsic motivation may be additive because both types of motivation are self-determined in nature. However, the relationship between non self-determined forms of extrinsic motivation (e.g., external regulation and introjected regulation) and intrinsic motivation is expected to be orthogonal or slightly negative.

The purpose of the present study was to examine the nature of the interaction between extrinsic and intrinsic motivation and more specifically to test the additive relationship hypothesis in an exercise context with respect to the outcome of exercise enjoyment. The present study extended previous research in the exercise domain by attempting to examine whether the co-existence of high levels of either external or introjected or identified regulation with high levels of intrinsic motivation, would correspond with higher levels of enjoyment. This outcome variable was employed because it is theoretically related to the concepts of intrinsic and extrinsic motivation (see Vallerand, 1997) and it is deemed a key variable in understanding sustained exercise involvement.

As far as the interaction between external regulation and intrinsic motivation is concerned, it was hypothesized that high levels of external regulation when combined with high levels of intrinsic motivation would not correspond with higher levels of exercise enjoyment. This prediction was based on the motivational incompatibility between external regulation and intrinsic motivation as these two types of motivation do not both reflect high levels of self-determination. That is, external regulation is a highly controlling type of motivation, and thus was expected to be incompatible with intrinsic motivation that reflects the highest level of self-determination. In combination, it was expected that these two types of motivation would operate in a motivationally antithetical manner, hence not resulting in higher levels of enjoyment. The same prediction was made when introjection and intrinsic motivation were considered. Again, under this combination, it

was predicted that the additive relationship hypothesis would not be supported because the participants' experience would not be maximally self-determining.

With regard to the interaction between identified regulation and intrinsic motivation, it was expected that the co-existence of high levels of both identified regulation and intrinsic motivation would correspond with higher levels of enjoyment. This is because both types of motivation share the quality of self-determination and so were considered to be motivationally compatible.

Method

Participants and Procedures

The sample comprised 516 exercise participants ranging in age from 18 to 64 years (M = 33.08 years, SD = 12.09). There were 205 males (39.7%) and 311 female participants (60.3%). Participants described their ethnicity as White, Afro-Caribbean, Asian, and White-African. More than 90% of the sample described themselves as White. Participants took part in the activities of aerobics, circuits, running, boxercise, weights, swimming, step, and cardiovascular activity (i.e., aerobic-type exercise such as endurance running, stepping, or cycling). Fifty-eight participants (11.2%) reported that they usually exercised at a low intensity, 309 (59.9%) at a moderate intensity, and 148 (28.7%) at a high intensity.

Data were collected from five health clubs. Four of these were situated at Middlesex, whereas one was situated at Sussex, all were in England. Having obtained permission from the club managers to approach exercise participants, one of the researchers together with a research assistant approached the participants in the club immediately prior to their exercise class. First, participants were presented with the general purpose of the study and were assured that no harm was involved in participating in the study and that their responses would be kept in confidence. Participants were then asked to sign an informed consent form and to complete the first part of a questionnaire assessing demographic information and their motives for exercise participation. A week later and

immediately prior to the corresponding exercise class, the participants were approached again to complete the second part of the questionnaire that comprised the outcome variable of the study.

Measurement Tools

Motives for exercise participation. To assess the participants' motives for exercise participation, the Behavioural Regulation in Exercise Questionnaire (BREQ: Mullan, Markland, & Ingledew, 1997) was employed. The BREQ comprises four subscales that assess four types of motivation: External regulation (EXT: e.g., "I exercise because other people say I should"), introjected regulation (IJ: e.g., "I feel like a failure when I haven't exercised for a while"), identified regulation (ID: e.g., "I value the benefits of exercise"), and intrinsic motivation (IM: e.g., "I find exercise a pleasurable activity"). Participants were requested to indicate the degree of their agreement with 15 statements reflecting various reasons for exercise participation. Responses were provided on a 5-point Likert-type scale ranging from 0 ("*Not true for me*") to 4 ("*Very true for me*") with the median being represented by 2 ("*Sometimes true for me*"). Mullan et al. (1997) have demonstrated an adequate factor structure for the BREQ using confirmatory factor analytic procedures and high internal consistency indexes for all the subscales.

Exercise enjoyment. To assess the extent to which participants enjoyed their participation in exercise in general, the four items used by Scanlan, Simons, Carpenter, Schmidt, and Keeler (1993) to assess sport enjoyment within the context of the Sport Commitment Model, were adapted for use in exercise. These items assess different aspects of the construct of sport enjoyment as conceptualized by Scanlan and Simons (1992). Specifically, the sport-related items "Do you enjoy/Are you happy/Do you have fun/Do you like playing in (program) this season" were modified to "Do you enjoy/Are you happy/Do you have fun/Do you like participating in exercise this season". The same answer scale used by Scanlan and associates to assess sport enjoyment (see Scanlan, Carpenter, Schmidt, Simons, & Keeler, 1993) was also used with these items. This answer scale ranged from 1 to 5 with the anchors of 1 ("*Not at all*"), 2 ("*A little*"), 3 ("*Sort of*"), 4 ("*Pretty*

much"), and 5 ("*Very much*"). Scanlan, Simons *et al.* (1993) have reported a Cronbach's alpha coefficient of .90 for this scale.

Data Analysis

The purpose of the present study was to examine the way in which external regulation, introjected regulation, and identified regulation interacted with intrinsic motivation to influence levels of exercise enjoyment. For the purpose of data analysis, linear regression was employed. A priori we adopted a strategy to be implemented in case that the interaction term that was included in the regression equation emerged as non-significant. Aiken and West (1991) suggested that in such a case, the non-significant interaction term should be retained in the equation for two reasons. First, this strategy will facilitate the accumulation of knowledge about the theory under scrutiny because the multiple estimates of the effect sizes of the interaction terms across studies can be combined through meta-analytical techniques. Second, because it is incorrect to report constant effects when theory postulates the existence of an interaction (i.e., the existence of conditional effects).

The data analysis steps taken in the present study were as follows: First, the internal consistency indexes of the variables were examined using alpha coefficients (Cronbach, 1951). Second, the first-order predictor variables were centered (i.e., put in a deviation score form so that their means are zero) to avoid introducing multicollinearity in the regression equation that contains interaction terms (Marquardt, 1980). High levels of multicollinearity can cause technical problems in estimating regression coefficients (Aiken & West, 1991). Third, for each regression equation, the data were examined for the possible existence of outlying cases to determine the degree to which the equation is an accurate representation of the sample data (Field, 2000). Hence, the standardized residuals were examined for each regression model separately. In addition, it was examined whether certain cases existed that could exert undue influence on the model parameters. In other words, if certain cases were to be deleted, would that change the regression coefficients (Field, 2000)? For this purpose, Field (2000) recommends the use of Cook's distance, a measure of the

impact of a single case on the model's ability to predict all cases. According to Cook and Weisberg (1982), a value greater than 1 may be cause for concern. Fourth, a number of statistical assumptions were examined for each regression equation separately, which if true, allow conclusions to be drawn about a population based on a sample (Field, 2000). The assumptions are the lack of collinearity between the predictor variables as well as the existence of normality, linearity, and homoscedasticity between predicted dependent variable scores and errors of prediction (i.e., residuals) (see Tabachnick & Fidell, 2001). When these assumptions are met, the regression model based on the sample data is on average the same as the population model (Field, 2000). Three regression equations were computed. Each equation included a different interaction term (i.e., either external regulation by IM, or introjected regulation by IM, or identified regulation by IM).

In each regression equation, the types of motivation that were not involved in the particular interaction term were still entered in a standardized form in the first step of the equation to statistically control for their influence on the outcome variable. The purpose of doing this was to conduct a more accurate assessment of the possible effects of the interaction term. At Step 1 the only covariates retained were those significantly associated with the outcome variable in order to increase the statistical power of the analysis and efficiency of the regression coefficients (greater efficiency corresponds with a smaller standard error for a regression coefficient) (Aiken & West, 1991). The individual predictors of interest for each equation were entered in a standardized form at Step 2 of the equation. Finally, the interaction term was added at Step 3 to assess its possible contribution to the prediction of the outcome variable.

Statistical Power

Cohen (1988) defines the effect size (*ES*) f^2 for an interaction term in linear regression as the proportion of the systematic variance accounted for by the interaction term over and above the systematic variance accounted for by lower-order terms relative to unexplained variance in the criterion. Hence, an f^2 of .02 represents a "small" *ES*, an f^2 around .15 a "moderate" *ES*, and an f^2

around .35 a "large" *ES*. According to Aiken and West (1991), to achieve statistical power of .80 at *a* = .05 in order to detect an interaction and assuming no measurement error in the predictor variables, the sample sizes needed are 26, 55, and 392 to detect a large, moderate, and small effect size, respectively. The sample size of the present study was 516 cases. Aiken and West (1991) have also suggested that ". . .when reliabilities drop from 1.00 to .80, the effect size is reduced by a minimum of 50%; when reliabilities drop from 1.00 to .70, effect size is approximately 33% of its original size" (p. 161). Hence, based on the internal consistency coefficients of the predictor variables in the present study (i.e., external regulation: *a* = .89, introjected regulation: *a* = .76, identified regulation: *a* = .75, and intrinsic motivation: *a* = .89) one can conclude that the effect sizes of the interaction terms may be reduced by at least 50% of their true size.

Results

Internal Consistency

The alpha coefficients for the independent variables and dependent variable were as follows: External regulation = .89, introjected regulation = .76, identified regulation = .75, intrinsic motivation = .89, and exercise enjoyment = .94.

Regression Analyses

Regression of Enjoyment on External Regulation and IM

Outliers, influential cases, and statistical assumptions. To examine the degree to which the regression model is an accurate representation of the sample data and whether it is biased, the existence of possible outlying cases was investigated by inspection of the standardized residuals (Field, 2000). In a normally distributed sample, 95% of the cases should lie between $\pm$ 2 standard deviation units whereas 99% of the sample should lie between $\pm$ 2.5 standard deviation units. Hence, if there is a percentage of cases in the sample substantially > 1% that have standardized residuals with an absolute value > 2.5, it means that the level of the error in the model is unacceptable (Field, 2000). The same applies if there is a percentage of cases substantially > 5%

with an absolute value of the standardized residuals > 2. However, according to Field (2000) simply identifying such cases in the sample does not justify removing them to cause desirable changes in the regression parameters.

Twenty-four cases (4.6%) were identified with a standardized residual value > 2.0, 9 cases (1.7%) with a residual value > 2.5, and 4 cases (0.7%) with a value > 3.0. In general, the regression model represented the sample data fairly accurately. Examination of the Cook's distances for all cases showed that no case existed with a value > 1.0 that could exert undue influence on the regression parameters. The average VIF was 1.7 indicating no collinearity among the predictor variables of the equation while no variable had a VIF value > 10. Finally, the assumptions of linearity, homoscedasticity, and normality were met.

Main analyses. Only identified regulation was retained among the covariates at Step 1 because it predicted exercise enjoyment significantly. Both variables from Step 2 significantly predicted the outcome variable whereas the interaction term emerged as non-significant with an *ES* of .00 (see Table 1).

Insert Table 1 about here

Regression of Enjoyment on Introjected Regulation and IM

Outliers, influential cases, and statistical assumptions. Twenty two cases (4.2%) were identified with a residual value > 2.0, 12 cases (2.3%) with a residual > 2.5, and 3 cases (0.5%) had a residual > 3.0. The present results should be interpreted with some degree of caution as the model may not be a very accurate representation of the sample data. Examination of the Cook's distances showed that no case existed with a value > 1.0 than could exert undue influence on the regression parameters. Hence, all cases were retained for further analyses. Examination of the VIF values

showed that the average VIF was 1.5 indicating that no collinearity existed among the predictors of the equation. Also, the assumptions of linearity, homoscedasticity, and normality had been met.

Main analyses. Both external and identified regulations were retained in the equation as significantly predicting the outcome variable. Between the predictors of Step 2, only intrinsic motivation significantly predicted the outcome variable. The interaction term emerged as non-significant with an *ES* of .000 (see Table 2).

Insert Table 2 about here

Regression of Enjoyment on Identified Regulation and IM

Outliers, influential cases, and statistical assumptions. Twenty three cases (4.4%) had a residual value > 2.0 whereas 12 cases (2.3%) had a residual > 2.5. Four cases (0.7%) had a residual > 3.0. In general, the model did not represent the sample data very accurately and some degree of caution should be exercised in interpreting the results. Examination of the Cook's distances showed that no case existed that could exert undue influence on the regression parameters. Hence, all cases were retained for further analysis. The average VIF of 1.5 indicated that no collinearity existed among the predictor variables while no variable had a VIF value > 10. Finally, the assumptions of linearity, homoscedasticity, and normality had been met.

Main analyses. Only external regulation was retained at Step 1 as a significant covariate. At Step 2 intrinsic motivation significantly predicted enjoyment, whereas identified regulation was a marginally significant predictor (p = .053). The interaction term emerged as significant with a small *ES* of .01 (see Table 3). Analysis of the interaction term showed that for either high, moderate, or low levels of intrinsic motivation, high levels of identified regulation corresponded with higher levels of exercise enjoyment in comparison to low levels of identified regulation (see Figure 1).

Insert Table 3 about here

Insert Figure 1 about here

Discussion

The present study was an initial attempt to shed light on the dynamics of the interaction of external, introjected, and identified regulation with intrinsic motivation in the exercise domain. Specifically, the interactions were examined with respect to levels of exercise enjoyment. The theoretical basis of the study was the position put forth by Vallerand and Fortier (1998) with respect to the interplay between intrinsic and extrinsic motivation. This position stated that the nature of the interplay between intrinsic and extrinsic motivation depends on the type of extrinsic motivation involved and the level of generality of the constructs. Specifically, they have postulated that, at the contextual level, non self-determined types of extrinsic motivation might have an orthogonal or slightly negative relationship with intrinsic motivation. On the other hand, self-determined types of extrinsic motivation are expected to display an additive relationship with intrinsic motivation owing to the high levels of self-determination shared by the constructs. An additive relationship means that the combination of two particular types of motivation will correspond with even higher levels for particular positive motivational consequences. Overall, and based on the above theoretical grounds, the present study tested the validity of the Vallerand and Fortier's (1998) theoretical position with respect to the interplay between intrinsic motivation and either non self-determined or self-determined types of extrinsic motivation at the contextual level.

The results showed that the study hypotheses were supported with respect to the outcome variable of exercise enjoyment. Specifically, and as far as the interplay between external regulation and intrinsic motivation is concerned, the results supported Vallerand and Fortier's (1998) contention with respect to the motivationally antithetical operation of external regulation and intrinsic motivation. This was evident through the lack of any statistically significant interaction between the two variables of interest and the antithetical signs of the respective regression coefficients in predicting the outcome variable. A similar finding emerged with respect to the interplay between introjected regulation and intrinsic motivation. Once more, no statistically significant interaction emerged between the two types of motivation with respect to the outcome variable of exercise enjoyment while the signs of the regression coefficients were again antithetical. These findings supported the study hypotheses demonstrating the motivationally antithetical operation of the non self-determined types of motivation in contrast to intrinsic motivation.

As far as the interplay between identified regulation and intrinsic motivation is concerned, the results provided support for the study hypothesis. Specifically, a statistically significant interaction emerged between identified regulation and intrinsic motivation showing that under all three levels of intrinsic motivation, higher levels of identified regulation corresponded with slightly higher self-report scores of exercise enjoyment. In support of the expected pattern of findings, it was shown that higher levels of identified regulation corresponded with higher levels of enjoyment and this held true under all three levels of intrinsic motivation. That is, the more the participants reported that they participated in exercise because they valued the benefits of physical activity, the higher the levels of enjoyment they reported from their participation, under all conditions of intrinsic motivation. It is important to note that even under high intrinsic motivation, the simultaneous adoption of identified reasons for participation corresponded with even higher levels of exercise enjoyment. This specific finding supported the validity of the additive relationship hypothesis as part of Vallerand and Fortier's (1998) theoretical position. Overall, the present results

supported Vallerand and Fortier's (1998) theoretical position with respect to the patterns of the interplay between extrinsic and intrinsic motivation at the contextual level. This became evident through demonstrating that, the degree to which the type of extrinsic motivation involved is self-determined in nature, determines its compatibility with intrinsic motivation in influencing exercise enjoyment.

The practical implications of the present findings lie in promoting greater adherence by facilitating stronger feelings of enjoyment through enhancing identified regulation and intrinsic motivation; indeed, previous research has supported the link between enjoyment-related motives (i.e. intrinsic motives) and sustained physical activity involvement (Ryan *et al.*, 1997). Specific ways in which intrinsic motivation can be promoted in an exercise context include emphasizing immersion in the *process* of exercise rather than the potential bodily outcomes (Csikszentmihalyi, 1990), giving participants choice in terms of the modality of exercise (e.g., fixed resistance vs. free weights) and intensity (e.g., high vs. low impact movements), and promoting good interpersonal relationships through interactive activities (e.g., partner-assisted stretching) and regular social events. In addition, music has significant potential to promote the enjoyment of exercise and should be selected with the participants' age, gender, preferences, and socio-cultural background in mind (Priest, Karageorghis, & Sharp, in press).

Further, exercise leaders should adopt practices that not only enable participants to find the process of participation pleasurable (i.e. intrinsic motivation), but also increase their knowledge of the benefits that might accrue from systematic exercise participation. By making exercise participants more knowledgeable about the benefits of physical activity, it is likely that identified regulation will be strengthened and, possibly in combination with high intrinsic motivation, will result in greater enjoyment of the activity. Thus, exercise leaders should offer their clients regular information on the benefits of exercise via interactive seminars, handouts, and notice boards/web sites. Such information can be underscored by periodic informational rewards (Deci & Ryan, 1985)

such as "Exerciser of the Month" or "Slimmer of the Year" which serve to give public recognition to the accomplishment of target behaviors. Such a strategy is likely to reinforce self-determined types of extrinsic motivation.

The major contribution of the present study was to demonstrate that the combination of high levels of motives that reflected identified regulation and intrinsic motivation corresponded with higher levels of exercise enjoyment. The present results provided initial evidence for the motivationally beneficial role of combining identified regulation with IM. The present study extended past research by showing that the combination of particular motives is relevant to the motivational consequences that may be experienced in exercise. Previous research in the exercise domain has examined the independent influence of various types of motivation on particular consequences (see Mullan *et al.*, 1997; Ryan *et al.*, 1997) but not how such motives might interact. Considering the present findings, it is suggested that the way that types of motivation for exercise participation interact should be taken into account in attempting to explain and predict motivational outcomes in the exercise domain.

To better understand the psychological dynamics of exercise involvement, future research should attempt to examine the way such motives interact at the situational level. Replication of the present study in a single exercise class would appear fruitful in order to examine the extent to which the present findings are replicable at the situational level. Further, to more deeply understand the relationship between motivation and motivational consequences in exercise it would appear fruitful to examine the way that the interaction between extrinsic and intrinsic motives corresponds with other motivational outcomes such as levels of exercise adherence. From the present findings, it has become apparent that employing an intrinsic/extrinsic motivational perspective to the study of the motivational processes underlying exercise participation has great potential to contribute to a better understanding of the phenomenon of exercise participation and adherence.

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Table 1

Linear Regression of Enjoyment on External Regulation and Intrinsic Motivation

Predictor variables	Regression coefficients	*R* squared	*R* squared change	*F* change	*ES* (f^2)
Step 1					
Identified regulation	.44*	.24	.24	167.31*	
Step 2					
Identified regulation	.09*				
External regulation	-.17*				
Intrinsic motivation	.46*	.48	.23	117.34*	
Step 3					
Identified regulation	.09*				
External regulation	-.19*				
Intrinsic motivation	.46*				
External x Intrinsic	-.01				
Constant	3.83	.48	.00	.48	.00

Note. The regression coefficients presented are the “non-standardized” ones that have been calculated on the basis of standardized (*z*) scores. Therefore, they represent standardized values.
ES (f^2) = effect size of the estimate of the interaction term.
* $p < .05$.
$N = 516$.

Table 2

Linear Regression of Enjoyment on Introjected Regulation and Intrinsic Motivation

Predictor variables	Regression coefficients	*R* squared	*R* squared change	*F* change	*ES* (f^2)
Step 1					
External regulation	-.27*				
Identified regulation	.36*	.33	.33	128.52*	
Step 2					
External regulation	-.15*				
Identified regulation	.12*				
Introjected regulation	-.05				
Intrinsic motivation	.45*	.48	.15	75.61*	
Step 3					
External regulation	-.14*				
Identified regulation	.12*				
Introjected regulation	-.05				
Intrinsic motivation	.45*				
Introjected x Intrinsic	.00				
Constant	3.84	.48	.00	.03	.00

Note. The regression coefficients presented are the "non-standardized" ones that have been calculated on the basis of standardized (*z*) scores. Therefore, they represent standardized values.
ES (f^2) = effect size of the estimate of the interaction term.
* $p < .05$.
$N = 516$.

Table 3

Linear Regression of Enjoyment on Identified Regulation and Intrinsic Motivation

Predictor variables	Regression coefficients	*R* squared	*R* squared change	*F* change	*ES* (f^2)
Step 1					
External regulation	-.37*	.17	.17	110.31*	
Step 2					
External regulation	-.17*				
Identified regulation	.09*				
Intrinsic motivation	.46*	.48	.30	151.43*	
Step 3					
External regulation	-.16*				
Identified regulation	.07*				
Intrinsic motivation	.45*				
Identified x Intrinsic	-.05*				
Constant	3.88	.48	.00	5.29*	.01

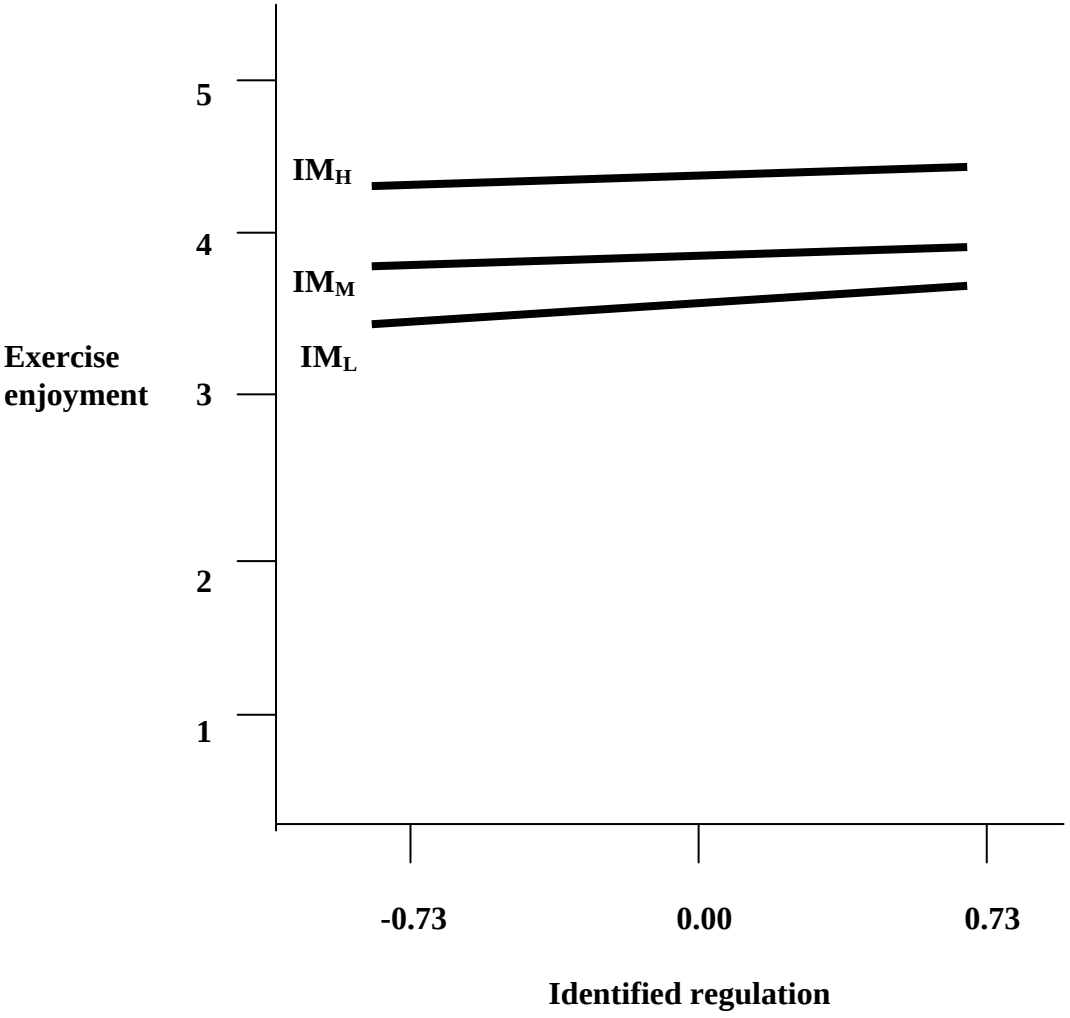
Note. The regression coefficients presented are the "non-standardized" ones that have been calculated on the basis of standardized (*z*) scores. Therefore, they represent standardized values.
ES (f^2) = effect size of the estimate of the interaction term.
* $p < .05$.
$N = 516$.

Figure Captions

Figure 1. Interaction between identified regulation and intrinsic motivation on exercise enjoyment. The standard deviation unit of identified regulation is .73; the standard deviation unit of intrinsic motivation is .88.

IM_H indicates one standard deviation above the mean of intrinsic motivation; IM_M indicates the mean of the distribution of intrinsic motivation; IM_L indicates one standard deviation below the mean of intrinsic motivation.

Exercise enjoyment is assessed on a Likert-type scale ranging from 1 to 5.


5
4
3
2
1
IM_H
IM_M
IM_L
Exercise enjoyment
-0.73
0.00
0.73
Identified regulation