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# THE MEDIATING ROLE OF BEHAVIOURAL REGULATIONS IN THE RELATIONSHIP BETWEEN PERCEIVED BODY SIZE DISCREPANCIES AND PHYSICAL ACTIVITY AMONG ADULT WOMEN

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***Abstract*:** Research has shown a negative relationship between perceived body size discrepancies and exercise participation among women. This might be explained from a self-determination theory perspective by perceived discrepancies between actual and ideal body size causing individuals to feel less autonomous in the regulation of their exercise behaviour. The aim of this study was to test the mediating role of exercise behavioural regulations in the relationship between body size discrepancies and physical activity participation. Participants were 102 women who completed measures of body size discrepancies, behavioural regulations and physical activity. Analyses showed that a reduction in more autonomous regulations mediated a negative relationship between discrepancies and physical activity. Less autonomous regulations did not play a mediating role. Thus it appears that body size discrepancies exert a negative influence on physical activity by decreasing feelings that exercise is a valued and enjoyable activity rather than by leading people to feel more externally or internally controlled in their behaviour.

***Key words*:** Body image, Exercise, Self-determination.

## INTRODUCTION

Body-related concerns and dissatisfaction with the physique are increasing in prevalence in Western societies (Lindeman, 1999; McCabe & Ricciardelli, 2001, 2003a). Both younger and older women tend to desire a smaller body size (Fallon

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& Rozin, 1985; McCabe & Ricciardelli, 2003a; McCreary, Sasse, Saucier, & Dorsch, 2004) and the media promotes exercise as a means of achieving the ideal physique (Lindeman, 1999). However, despite these pressures, the proportion of women in Western societies who are regularly physically active is low. For example, a recent European Union survey found that 65% of adult women reported not having engaged in any vigorous physical activity in the previous seven days, with 43.2% not having engaged in any moderate activity (European Opinion Research Group, 2003). Anton, Perri, and Riley (2000) found that among young women, even though body size discrepancies were associated with greater body dissatisfaction, discrepancies were associated with low levels of physical activity. The authors speculated that this relationship might reflect a decrease in motivation to exercise when unrealistic body standards are not met. Self-determination theory (SDT; Deci & Ryan, 1985, 1991) offers an alternative motivational explanation for the apparent paradox that those who are dissatisfied with their body size are less likely to engage in a behaviour that could help alleviate the problem.

Self-determination theory conceptualises the regulation of behaviour as lying along a continuum of relative autonomy, or self-determination. This continuum reflects the extent to which external contingencies have become internalised and integrated into the person's sense of self so that they feel that they are engaging in behaviours with no sense of compulsion and in accordance with their personal values. Self-determination theory contrasts extrinsic behavioural regulations, which vary in their degree of autonomy, with amotivation and intrinsic motivation. Amotivation refers to a lack of intention to engage in a behaviour reflecting a sense of personal incompetence and/or a failure to value the behaviour or its outcomes, and is completely non-self-determined. The least autonomous form of extrinsic motivation is external regulation, where the person is motivated to obtain rewards or avoid punishments administered by significant others. Somewhat autonomous is introjected regulation where a person has partially internalised external contingencies and imposes pressures on themselves to act. Identified regulation is a more internalised and autonomous form of regulation, involving a conscious acceptance that the behaviour is important in order to achieve personally valued outcomes. The most autonomous form of extrinsic motivation is integrated regulation. Here the person has fully internalised the regulation of a behaviour and acts because it is consistent with their core values and beliefs. Finally, intrinsically motivated behaviours are engaged in for the inherent interest and enjoyment of participating and are fully self-determined. A substantial body of research using this continuum framework has shown that more autonomous behavioural regulations predict more adaptive behaviour and greater

well being in many life domains including education, work, sport, health, and exercise (Deci & Ryan, 2000; Ryan & Deci, 2000). With respect to exercise, research has shown that more autonomous forms of behavioural regulation are associated with greater participation in physical activity and other adaptive consequences in a variety of exercise contexts (Landry & Solmon, 2004; Mullan & Markland, 1997; Thøgersen-Ntoumani & Ntoumanis, 2006; Wilson, Rodgers, Blanchard, & Gesell, 2003; Wilson, Rodgers, & Fraser, 2002).

The continuum conception of motivation in SDT suggests a mechanism by which the negative relationship between body size discrepancies and exercise engagement observed by Anton et al. (2000) could be explained. According to SDT, a social environment that is excessively controlling and evaluative, pressurizing individuals to act in certain ways, thwarts the process of internalisation and is associated with less autonomous functioning (Deci & Ryan, 2000). Cusumano and Thompson (1997) discuss how social pressures and culturally-endorsed aesthetic standards of an ideal physique are ubiquitous in Western societies whilst being almost impossible for individuals to achieve without engaging in excessive dieting or exercise. Thus perceived discrepancies between one's actual body size and a socially-sanctioned ideal body size are likely to be experienced as a controlling pressure to meet those demands, undermining autonomous regulation for engaging in physique-relevant behaviours such as regular exercise (Markland & Ingledew, 2007). This in turn would lead to less exercise involvement. Therefore the relationship between perceived body size discrepancies and exercise behaviour is likely to be mediated by the extent to which behavioural regulations are more or less autonomous.

Markland and Ingledew (2007) found that body size discrepancies predicted autonomous motivation for exercise among adolescent males and females. However, they did not examine the effects of this relationship on exercise behaviour and they collapsed the different behavioural regulations into a single index of relative autonomy. The aim of the present study was to examine the unique role of each regulation in the relationship between body size discrepancies and physical activity among adult women. It was predicted that behavioural regulations would mediate a negative relationship between body size discrepancies and physical activity. Greater discrepancies would be related to lower levels of autonomous forms of behavioural regulation (identified and intrinsic) and to higher levels of less autonomous regulations (introjected and external) and to amotivation. More autonomous regulations would be related to greater physical activity participation and less autonomous regulations to less participation.

## METHOD

### *Participants*

Participants were 112 adult women recruited from among hospital workers and a community church group. Initial data screening indicated no extreme multivariate outliers but five cases had missing values on one or more of the scales and these were removed prior to the data analyses. Five cases with positive body size discrepancy scores were also removed (see below), resulting in a final sample of 102. Ages ranged from 18 to 55 years ($M$ = 29.16 years, $SD$ = 11.41).

### *Measures*

***Body size discrepancies.*** Body size discrepancies were measured using the Figure Rating Scale (Stunkard, Sorenson, & Schlusinger, 1983). This scale comprises a set of nine figures depicting women ranging in body size from very thin to very heavy and scaled from one (thinnest) to nine (heaviest). Respondents are asked to indicate which figure looks most like their body shape now (perceived body size) and which figure shows the way they would like their body to look (ideal body size). Body size discrepancy is calculated by subtracting the perceived body size score from the ideal body size score. A negative discrepancy indicates that a participant's ideal size is less than their perceived size. A positive discrepancy indicates that a participant's ideal size is greater than their perceived size. Of the present sample, 74.8% indicated a negative discrepancy, 20.5% a zero discrepancy, and only 4.7% (five cases) a positive discrepancy. Markland and Ingledew (2007) found that among females a desire to decrease in size has different motivational consequences than wanting to increase in size. Specifically, a negative body size discrepancy was associated with less autonomous motivation for exercise, but a positive discrepancy was not detrimental to autonomous motivation for exercise. Given this, and that there were so few positive discrepancy cases, the cases with a positive discrepancy were eliminated from the analyses.

To aid interpretation of the results, the absolute values of the discrepancy scores were calculated. Thus, higher (positive) discrepancy scores indicate a greater desire to be thinner. The Figure Rating Scale has been shown to have good test-retest reliability and to correlate with measures of body image dissatisfaction, eating disturbance and self-esteem (Thompson & Altabe, 1991) and with measures of body image disturbance (Thompson, Altabe, Johnson, & Stormer, 1994).

***Behavioural regulations for exercise.*** Behavioural regulations for exercise were

assessed by the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004). The BREQ-2 measures amotivated, external, introjected, identified, and intrinsic regulation of exercise behaviour, based on Deci and Ryan's (1991) continuum conception of extrinsic and intrinsic motivation. The BREQ-2 has been shown to have good factorial validity (Markland & Tobin, 2004; Wilson et al., 2002) and is a widely used measure of exercise motivation. In common with some other behavioural regulation instruments for different contexts the BREQ-2 does not include an integrated regulation subscale. The instrument comprises 19 items scored on a five-point scale ranging from 0 (not true for me) to 4 (very true for me). Cronbach's alpha reliability coefficients for the BREQ-2 subscales in the present study ranged from .80 to .95 (see Table 1 in the Results section).

***Physical activity.*** Physical activity was assessed by a modification of the Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985). Respondents indicate the frequency of mild, moderate, and strenuous exercise undertaken in a typical week. These scores are weighted by approximate metabolic equivalents for the different levels of activity (3, 5, and 9, respectively) and summed to produce an overall weekly physical activity score. The LTEQ instructions include examples of types of activity for each of the three intensity levels. These examples were modified for the present study to reflect activities more likely to be representative of activities undertaken by a British sample. Studies have shown the LTEQ to have adequate reliability and validity with respect to objective assessments of exercise behaviour and indices of fitness (Jacobs, Ainsworth, Hartman, & Leon, 1993).

### *Procedure*

Ethical approval for the study was obtained from the author's departmental Ethics Committee. Approval to approach participants was obtained from hospital departmental managers and the community church leader. Potential respondents were approached on an individual basis and asked to take part in a study examining motivation to exercise with regard to body image. Respondents were assured that all information obtained would be held in confidence and informed consent was obtained. Order of presentation of the scales was counterbalanced.

### *Data analysis*

The data analysis required testing the indirect effects of body size discrepancies on physical activity through multiple mediators (the behavioural regulations). Ideally, one would accomplish this through structural equation modelling with

latent variables. However, the sample size in the present study was too small relative to the number of parameters to be estimated in such a model to allow for this approach. Instead, the causal steps procedure described by Baron and Kenny (1986) together with the bootstrapping method advocated by a number of authors for testing for significance of indirect effects was used (Bollen & Stine, 1990; Mackinnon, Lockwood, & Williams, 2004; Shrout & Bolger, 2002). Bootstrapping is considered more efficient than the normal theory (Sobel test) approach to testing for indirect effects because it provides more accurate Type I error rates and greater power for detecting indirect effects than the normal theory approach, especially in small samples (Mackinnon et al., 2004).

Specifically, in the present study the procedures described by Preacher and Hayes (2004) and their extension to testing models with multiple mediators (Preacher & Hayes, 2005) were employed. Preacher and Hayes (2005) provide macros for implementing the analysis in the widely used statistical packages SPSS and SAS. These allow one to specify a multiple mediator model and simultaneously determine the specific indirect effects of each mediator whilst controlling for all the other mediators. Bias-corrected bootstrapped point estimates for the indirect effects of the independent variable on the dependent variable through each mediator are calculated, together with standard errors and 95% confidence intervals. One can conclude that an indirect effect is significant (at alpha = .05) if its 95% confidence interval does not encompass zero. The macros also provide regression coefficients for the causal steps approach and Sobel test results for the specific indirect effects, and one can include one or more covariates as control variables that are not hypothesised to be mediators. When there are covariates in the model, however, Sobel test results are not computed.

In the present study, Preacher and Hayes' (2005) SPSS macro was used to analyse the data. Body size discrepancy was entered as the independent variable, physical activity was the dependent variable and the behavioural regulations were the mediators. For the analysis, 5000 bootstrap samples with replacement were requested. Given the wide age range of the participants it was important to rule out age as a confounding variable in the relationship between discrepancies and physical activity. Prior analyses indicated that age was not significantly associated with body size discrepancies ($r = -.06$, $p > .05$). Furthermore, when the sample was split into three age groups (less than 30 years; between 30 and 40 years; and greater than 40 years), there was no significant difference in body size discrepancies by age group, $F(2,101) = 1.50$, *ns*. Thus a potential confounding effect of age could be discounted. However, age was significantly negatively associated with physical activity, $r = -.20$, $p < .05$. Therefore, age was included as a covariate in the analyses.

## RESULTS

Table 1 shows the means, *SD*, and correlations among the variables. Body size discrepancies were significantly negatively related to physical activity, identified and intrinsic regulation, and significantly positively related to amotivation and external regulation. Intrinsic, identified and introjected regulations were significantly positively related to physical activity. Amotivation was significantly negatively related to physical activity. The correlations between the behavioural regulations conformed to a simplex-like pattern, with stronger more positive correlations between factors more adjacent on the self-determination continuum than between more distal factors, as predicted by SDT (Ryan & Connell, 1989).

***Table 1. Means, SDs and Pearson's correlations between physical activity, body size discrepancy and behavioural regulations. Cronbach's alpha reliabilities for the behavioural regulations on the diagonal***

| | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Physical activity | 24.86 | 14.92 | -- | | | | | | |
| 2. Body size discrepancy | 1.24 | .92 | -.22* | -- | | | | | |
| 3. Amotivation | 1.42 | .79 | -.29** | .30** | .83 | | | | |
| 4. External regulation | 1.54 | .84 | .02 | .20* | .27** | .87 | | | |
| 5. Introjected regulation | 1.30 | .99 | .25* | .05 | -.28** | .26** | .80 | | |
| 6. Identified regulation | 2.73 | 1.01 | .45** | -.22* | -.63** | -.19 | .41** | .87 | |
| 7. Intrinsic regulation | 2.85 | 1.07 | .41** | -.32** | -.66** | -.29** | .28** | .83** | .95 |

***Note***: * $p < .05$; ** $p < .01$.

Introjected regulation was not correlated with body size discrepancies and external regulation was not correlated with physical activity. Thus these two regulations could not function as mediators of the relationship between discrepancies and physical activity. Therefore, they were not included in the regression or bootstrap analyses. Table 2 shows the results of these analyses. The model explained 33% of the variance in physical activity. The causal steps approach results showed that discrepancies were significantly related to all three mediators but only identified and intrinsic regulations were significantly related to physical activity. The total effect of discrepancies on physical activity was significant but the direct effect when controlling for the mediators was reduced from 3.59 to 1.05 (standardized effects from .21 to .06) and became nonsignificant. Thus, the Baron and Kenny (1986) criteria for mediation were met for identified and intrinsic regulations but not for amotivation. The bootstrapped 95% confidence intervals for identified and intrinsic regulations, but not for amotivation, did not encompass zero, showing that the indirect effects of discrepancies on physical activity through intrinsic and identified regulations were significant.

***Table 2. Summary of mediated regression analyses***

| | *B* | *SE* | β |
|---|---|---|---|
| IV (body size discrepancy) to mediators | | | |
| Amotivation | .23 | .08 | .29** |
| Identified regulation | -.23 | .11 | -.20* |
| Intrinsic regulation | -.43 | .11 | -.36*** |
| Mediators to DV (physical activity) | | | |
| Amotivation | -1.30 | 2.64 | -.06 |
| Identified regulation | 4.98 | 2.53 | .32* |
| Intrinsic regulation | 4.62 | 2.35 | .32* |
| Total effect of IV on DV | | | |
| Body size discrepancy | -3.59 | 1.73 | -.21* |
| Direct effect of IV on DV controlling for mediators | | | |
| Body size discrepancy | -1.05 | 1.69 | -.06 |
| Partial effect of covariate on DV | | | |
| Age | -.34 | .12 | -.25** |
| Bootstrap estimates (Estimate 95% Confidence Interval) | | | |
| Amotivation | .25 | -.66 | 2.05 |
| Identified regulation | -1.18 | -3.65 | -.06 |
| Intrinsic regulation | -1.78 | -5.47 | -.15 |
| Fit statistics | $R^2 = .33$; $F(2, 94) = 6.74$, $p < .001$. | | |

***Note*:** IV = independent variable; DV = dependent variable. * $p < .05$; ** $p < .01$; *** $p < .001$.

## DISCUSSION

The aim of the study was to test a model in which the relationship between perceived body size discrepancies and physical activity participation was mediated by exercise behavioural regulations. It was predicted that greater discrepancies would be associated with less physical activity by enhancing amotivation and the less self-determined forms of motivation (external and introjected regulation) and undermining the more self-determined forms of motivation (identified and intrinsic). Examination of the bivariate correlations among the variables showed that discrepancies were not associated with introjected regulation and that external regulation was not associated with physical activity. Thus introjection and external regulation could not operate as mediators. Regression analyses testing the mediating role of amotivation, identified and intrinsic regulations showed that the causal steps criteria for mediation were met but that when controlling for the presence of the other two mediators, amotivation did not have a significant influence on physical activity. The bootstrapped confidence intervals for the indirect effects reinforced this, indicating that the effects of body size discrepancies on physical activity were mediated by identified and intrinsic regulations.

Thus the study predictions were only partially supported. Body size discrepancies had a negative effect on physical activity, replicating Anton et al.'s (2000) results, and the effects were mediated by more autonomous regulations but not by less autonomous regulations or by amotivation. With regard to amotivation, the failure to find a mediating effect is most likely due to the fact that the analysis examines the specific indirect effects through each mediator whilst controlling for the other mediators, and amotivation shared a considerable amount of variance with both identified and intrinsic regulations. Indeed, a post hoc analysis with amotivation as a single mediator showed a significant mediation effect in the absence of identified and intrinsic regulations. Thus it appears that body size discrepancies exert a negative motivational influence on physical activity by undermining feelings that exercise is a valued and enjoyable activity rather than by leading people to feel more externally or internally controlled in their behaviour.

Although external regulation did not impact on physical activity, it was significantly associated with body size discrepancies. This is what one would expect if, as outlined in the introduction, social pressures for an ideal physique thwart the process of internalization of behavioural regulation. The finding that introjection was not associated with body size discrepancies, however, is surprising. One would expect that a failure to meet these social norms, as evidenced by an actual-ideal body size discrepancy, would be associated with the feelings of guilt and lowered self-esteem that characterise introjected regulation (Deci & Ryan, 2000). However, it is interesting that the correlations between discrepancies and the behavioural regulations followed an ordered sequence. Discrepancies were most strongly positively related to amotivation, followed by external regulation, and most strongly negatively related to intrinsic motivation, followed by identified regulation. The correlation with introjection, which was not significantly different to zero, fell in the middle of this sequence. This fits with the self-determination continuum conception of behavioural regulations, and with the correlations among the regulations conforming to a simplex-like pattern as would be expected from this conceptualisation of motivation. Further work is required to elucidate why, or under what conditions, discrepancies are unrelated to introjection despite the ordered sequence of relationships found here. Introjection was also positively related to physical activity, whereas a negative relationship had been predicted. However, introjected regulation has sometimes been found to be associated with adaptive behaviours. In the context of physical activity, Thøgersen-Ntoumani and Ntoumanis (2006) found that introjected regulation was higher in the maintenance stage of change for exercise than in the preparation and action stages and was positively associated with intentions to exercise in the future.

The bootstrapping approach used in this study both complements and augments the interpretation of the causal steps results based upon Baron and Kenny's (1986) procedures because the latter do not directly address the principle hypothesis of interest: whether the indirect effects of the independent variable on the dependent variable through the mediators are significantly greater than zero (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). In the case of single mediator models, the Sobel test does directly test the indirect effect. However, it carries the assumption that the sampling distribution of the indirect effect is normal, which is typically found not to be the case, especially in small samples (Bollen & Stine, 1990). The nonparametric bootstrapping approach does not carry assumptions about the distribution of the variables or the sampling distribution of the statistics and can be extended to multiple mediator models. Thus, in the present study we can be more confident that the mediation hypothesis was supported by the data with respect to identified and intrinsic regulations. However, MacKinnon, Krull, and Lockwood (2000) have discussed the statistical similarities in third variable models between mediation, confounding and suppression. Suppression can be ruled out in the present study because the direct effect of the independent variable on the dependent variable controlling for the mediators was less than the total effect, and the indirect effects were of the same sign as the direct effects. Mediation and confounding, however, are statistically equivalent and one can only distinguish between them on theoretical/conceptual grounds or by employing a randomized experimental design.

Due to the cross-sectional nature of the present study, therefore, we cannot rule out the possibility that the behavioural regulations did not mediate the relationship between discrepancies and physical activity but that there was an alternative causal ordering of relationships among the variables (i.e., the behavioural regulations were confounding variables). For example, being more autonomously regulated might lead participants to not internalise societal pressures to be thin (therefore having lower perceived-ideal body size discrepancies) and also independently lead them to exercise more. This would imply a causal effect of behavioural regulations on both discrepancies and physical activity rather than a mediating effect. Indeed, Pelletier, Dion, and Lévesque (2004) presented evidence that would support such a causal ordering in the context of the exhibition of bulimic symptoms among young women. Their study showed that the more self-determined women were, the less they were influenced by socio-cultural pressures and beliefs about body image, and the less they experienced bulimic symptoms. However, Pelletier et al. (2004) assessed self-determination at a global level across different aspects of life in general, whereas in the present study self-

determination was assessed at the contextual level (Vallerand, 1997) with regard to the regulation of exercise behaviour. It seems less likely that behavioural regulations at this level would have a causal influence on body image. Clearly it would be difficult to experimentally manipulate the variables in order to determine the nature of the causal sequence. However, longitudinal studies could help in taking a step in that direction.

Most research on body image has focussed on younger populations (McCabe & Ricciardelli, 2003b), especially adolescents (Presnell, Bearman, & Stice, 2004), or on individuals with eating disorders (Stice & Shaw, 2002). Clearly the present sample was not necessarily representative of the general adult female population and the findings may not be generalisable to females beyond the age range of the sample nor, of course, to males. Nevertheless, a potential strength of the current study is the wide age range of participants drawn from worksite and community settings. However, this would only be a strength if age did not confound the relationship between body size discrepancies and physical activity. Prior analyses showed that age was significantly associated with physically activity but the possibility of confounding was ruled out by the lack of an association between age and body size discrepancies. It appears from these results that although physical activity declines with age, younger women are no more or less likely to perceive body size discrepancies than older women. Similarly, Bedford and Johnson (2006) found no difference in body image dissatisfaction between younger and older women.

To summarise, this study found that a reduction in more autonomous exercise behavioural regulations mediated the negative relationship between body size discrepancies and physical activity participation in adult women. There is considerable scope for further research on the nature of the relationships between body image, motivation and behaviour. For example, the present study focused on body size discrepancies, assuming that these are indicative of a negative body image. Although much previous research has shown that measures of body size discrepancies correlate with body dissatisfaction (Anton et al., 2000; Thompson & Altabe, 1991; Thompson et al., 1994), these are not wholly isomorphic concepts (Thompson, 1995). Future studies that more directly assess dissatisfaction with the body might find the predicted mediating role of less autonomous behavioural regulations on exercise behaviour that was not supported by the present data.

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