

The role of motives in exercise participation†

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Abstract

The aim was to better understand the role of motives in exercise participation. It was hypothesised that motives influence exercise participation by influencing behavioural regulation, and that motives are themselves influenced by personality traits. Data were from a cross-sectional questionnaire survey of 252 office workers, mean age 40 years. Analysis was by structural equation modelling. According to the final model, appearance/weight motive increased external regulation, thereby reducing participation, and also increased introjected regulation. Health/fitness motive increased identified regulation, thereby increasing participation. Social engagement motive increased intrinsic regulation. Neuroticism increased appearance/weight motive, openness increased health/fitness motive, and conscientiousness, without affecting motives, reduced external and introjected regulation. It is inferred that exercise promotion programmes, without denigrating appearance/weight motive, should encourage other motives more conducive to autonomous motivation.

Keywords: *Physical exercise, participation motives, motivation, behavioural regulation, self-determination, personality*

Introduction

The aim of the present research was to reach a fuller understanding of the role of participation motives in determining exercise participation. To that end, we hypothesised a general motivational model (Figure 1). According to this model, motives influence behaviour by influencing behavioural regulation, and motives

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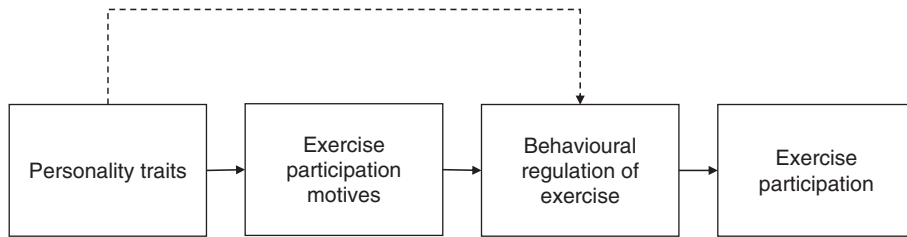


Figure 1. General motivational model of exercise participation.

are themselves influenced by personality, though behavioural regulation may also be directly influenced by personality. We justify this general model in the following literature review.

Participation motives and exercise participation

Participation motives are the contents of individuals' goals for participating in a particular domain of behaviour. Austin and Vancouver (1996, p. 340) define goal content as "classifications of outcomes or states that individuals approach or avoid", distinguishing this from goal structure ("the properties, organization, and dimensions of multiple goals within and between persons") and goal process ("the temporal cycle of establishing, striving toward, and resisting goals"). Participation motives apply to a domain of behaviour rather than to life in general or to a specific act of behaviour. That different participation motives can have different behavioural consequences has been demonstrated in domains such as alcohol use (e.g., Cooper, 1994), smoking (e.g., Shiffman, 1993), food choice (e.g., Steptoe & Wardle, 1999), tanning behaviour (e.g., Hillhouse, Turrisi, & Kastner, 2000), sexual behaviour (e.g., Cooper, Shapiro, & Powers, 1998; Ingledew & Ferguson, 2007), and volunteering (Clary et al., 1998), as well as exercise (e.g., Ingledew, Markland, & Medley, 1998).

Various instruments have been developed to measure exercise participation motives. For example, Frederick and Ryan (1993) distinguished between interest/enjoyment, competence, and body-related motives, and Ryan, Frederick, Lepes, Rubio and Sheldon (1997) further distinguished between enjoyment, competence, appearance, fitness, and social motives. Markland and Ingledew (1997) developed a more differentiated instrument, assessing 14 motives which can if necessary be grouped into higher order motives. Importantly, Markland and Ingledew's measure is phrased in such a way that it can be answered by individuals who are not currently participating in exercise (but who might do so) as well as those who are currently participating.

Exercise motives have been related to type, extent, and stage of exercise participation (e.g., Frederick, Morrison, & Manning, 1996; Frederick & Ryan, 1993; Hsiao & Thayer, 1998; Ingledew et al., 1998; Maltby & Day, 2001; Ryan et al., 1997). Frederick and Ryan (1993) compared individuals whose primary physical activity was a sport with individuals whose primary physical activity was

a non-sport fitness activity. The sport participants had higher interest/enjoyment and competence motives whereas the fitness participants had higher body-related motive. Ryan et al. (1997) found, in a longitudinal study of new users of a fitness centre, that high adherers (attending at least 1 day in every 5 over the first 10 weeks) and low adherers (attending less than this) differed significantly on baseline enjoyment, competence, and social motives (adherers being higher) but not fitness or appearance/weight motives. Ingledew et al. (1998) found, in a longitudinal study of British government employees, that whereas appearance and weight management motives were prominent during early stages of change, enjoyment and revitalisation motives were important for progression to and maintenance of actual activity. Furthermore, appearance and weight management motives tend to be associated with negative body image (e.g., Ingledew & Sullivan, 2002) and negative affect (e.g., Maltby & Day, 2001).

Participation motives and behavioural regulations

Whereas participation motives are the contents of goals for participating, behavioural regulations represent the perceived locus of causality of the goal. This conception of behavioural regulations has been developed within the framework of self-determination theory (Deci & Ryan, 2000). According to self-determination theory, individuals are intrinsically motivated when they engage in an activity for the inherent satisfaction that they derive from the activity (e.g., "I exercise because it's fun"). They are extrinsically motivated when they engage in an activity for separable outcomes that they attain through the activity, whether rewards attained or punishments avoided. However, within extrinsic motivation there is a continuum of behavioural regulations, along which the individual can progress, reflecting the degree to which the behaviour has been integrated into the individual's sense of self. The continuum comprises *external regulation*, when behaviour is controlled by external contingencies (e.g., "I exercise because other people say I should"), *introjected regulation*, when the external contingencies have been internalised to some extent, so that the individual acts for example to heighten self-esteem or lessen guilt (e.g., "I feel guilty when I don't exercise"), *identified regulation*, when the behaviour is consciously valued by the individual (e.g., "I value the benefits of exercise"), and *integrated regulation*, when the behaviour is fully congruent with the individuals' other values. As the individual progresses along this continuum, their motivation becomes less controlled and more autonomous. External and introjected regulation are classed as controlled motivation. Identified, integrated and intrinsic regulation are classed as autonomous motivation. Generally, more autonomous motivation is associated with sustained engagement in the behaviour. This has been found for various health promoting behaviours (e.g., Williams, 2002), including exercise participation (e.g., Landry & Solmon, 2004; Mullan & Markland, 1997; Wilson, Rodgers, Blanchard, & Gessell, 2003; Wilson, Rodgers, & Fraser, 2002).

Markland and Ingledew (2007) have argued that different participation motives are more or less conducive to controlled or autonomous motivation, with different consequences for behaviour and affect; see also Frederick-Recascino (2002), Ingledew et al. (1998), and Markland and Ingledew (1997). According to Markland and Ingledew (2007), motives such as appearance and weight management will tend to be experienced as controlling (as when an individual thinks “I *must* exercise to lose weight”) and so contribute little to long-term participation. Motives such as personal challenge and social affiliation will tend to be experienced as autonomous (as when an individual thinks “I *want* to exercise to be with friends”) and so contribute positively to long term participation. In some preliminary work, Markland (1999) contrasted the effects of archetypically extrinsic motives (weight management, appearance, and health pressures) and archetypically intrinsic motives (enjoyment and affiliation) on the degree of autonomy for exercise, assessed by the Locus of Causality for Exercise Scale (Markland & Hardy, 1997). Weight management, appearance, and health pressures had negative effects on autonomy. Enjoyment was positively related to autonomy, although affiliation was unrelated to autonomy. Moreover, autonomy mediated the relationship between the motives and interest/enjoyment of exercise. However, there was no measure of exercise itself, and so no test of whether the effects of participation motives on participation were mediated by autonomy.

The distinction in the present research between participation motives and behavioural regulations reflects a general distinction in self-determination theory (Deci & Ryan, 2000) between the “what” (goal contents) and the “why” (regulatory processes) of goal pursuits (cf. Austin & Vancouver, 1996). The same distinction is reflected in research into life goals (Deci & Ryan, 2000; Kasser, 2002). It is thought that the content of some life goals (e.g., growth, relationships, and community) makes them inherently intrinsic because they satisfy needs for autonomy, competence and relatedness, whereas the content of other life goals (e.g., wealth, fame, and image) makes them inherently extrinsic because they do not satisfy these needs. Intrinsic life goals, relative to extrinsic life goals, have been found to be associated with better well-being and with more autonomous regulatory processes. The question has then arisen as to whether the effects of life goal contents on well-being are explained (mediated) by regulatory processes, or whether goal contents have direct effects on well-being. The balance of evidence (Sheldon, Ryan, Deci, & Kasser, 2004) has suggested that the effects of life goal contents on well-being are partially but not entirely mediated by regulatory processes.¹ In our conceptual framework (Figure 1), the effects of participation motives (“what”) on exercise participation are entirely mediated by behavioural regulations (“why”), but in our model testing we were careful to check for any evidence of direct effects of motives on participation.

Personality, participation motives and behavioural regulation

Personality traits have commonly been found to be associated with health-related behaviours, although the findings have not always been consistent (Vollrath &

Torgersen, 2002). Conscientiousness is of particular interest because it has been found to be associated in a health-promoting direction with many behaviours (Bogg & Roberts, 2004). In the exercise domain, Courneya and colleagues have studied the relationship of the five-factor model of personality with exercise participation, finding participation to be associated with higher conscientiousness, higher extraversion, and lower neuroticism (Courneya, Bobick, & Schinke, 1999; Courneya & Hellsten, 1998; Rhodes, Courneya, & Bobick, 2001; Rhodes & Smith, 2006).

It has been suggested that personality traits can activate motives that are then satisfied by engaging in health-related behaviours (e.g., Cooper, Agocha, & Sheldon, 2000). Similarly, Roberts and Robins (2000) have argued that personality traits influence life goals, because those life goals allow individuals to select and shape their social environment in ways that reinforce their existing dispositions. That different personality traits are associated with different participation motives has been found in domains such as smoking (e.g., Joseph, Manafi, Iakovaki, & Cooper, 2003), alcohol use (e.g., Cooper et al., 2000), and sexual behaviour (Cooper et al., 2000; Ingledeu & Ferguson, 2007), as well as exercise (e.g., Courneya & Hellsten, 1998). In the domain of alcohol use, it has repeatedly been found that the effects of various personality traits on alcohol use and problems are partially mediated by different motives for alcohol use (e.g., Cooper et al., 2000; Cooper, Frone, Russell, & Mudar, 1995; Stewart, Loughlin, & Rhyno, 2001). Similarly, in the domain of sexual behaviour, it has been found that motives mediate some of the effects of personality on risky behaviour (Cooper et al., 2000; Ingledeu & Ferguson, 2007). In the exercise domain, research has found that different personality traits are associated with different motives (Courneya & Hellsten, 1998; Davis, Fox, Brewer, & Ratusny, 1995; Hsiao & Thayer, 1998), but it is hard to discern a consistent pattern in the findings, perhaps because the different studies used different populations, measures and analyses. Furthermore, these exercise studies did not test whether motives mediated the effects of personality traits on participation.

Personality has also been associated with behavioural regulation. Ingledeu, Markland, and Sheppard (2004) studied the relationships between personality and behavioural regulation of exercise in users of a sports centre, all of whom were in the maintenance stage of exercise participation. Neuroticism was associated with more introjected regulation, extraversion with more identified and intrinsic regulation, openness with less external regulation, and conscientiousness with less external and more intrinsic regulation. However, Ingledeu et al. (2004) did not include a measure of participation motives, so they could not test whether participation motives mediated the relationship between personality and behavioural regulation. Nor did they include a measure of exercise participation, so they could not test whether behavioural regulation actually mediated the relationship between personality and exercise participation. In a study of sexual behaviour, Ingledeu and Ferguson (2007) found that both agreeableness and conscientiousness had positive effects on autonomous motivation for safer sex. The effect of agreeableness on autonomous motivation

was fully mediated by intimacy motive for sex. The effect of conscientiousness on autonomous motivation was direct, not mediated by any particular motive for sex. Autonomous motivation for safer sex led in turn to less risky sexual behaviour. Little, Lecci and Watkinson (1992) found that conscientiousness was positively associated with the “meaning” (importance, enjoyment, self-identity, and absorption) of personal projects, in other words with more autonomous regulation. These fragments of evidence together suggested that conscientiousness is associated with greater relative autonomy, and that this association is not necessarily mediated by any particular participation motive.

Present study

Thus previous literature provided some theoretical and some evidential justification for some of the paths depicted in Figure 1. The present study was designed to test the model as a whole. A similar model was tested by Ingledew and Ferguson (2007). The present study is both a replication and an extension of the Ingledew and Ferguson study. Whereas Ingledew and Ferguson focussed on a health jeopardising behaviour (risky sexual behaviour) in a young population, the present study focusses on a health promoting behaviour in an older population, and whereas Ingledew and Ferguson made a simple distinction between autonomous and controlled motivation, the present study considers the full behavioural regulation continuum.

Method

Participants

The participants were 252 office workers, recruited from two civil service sites, one in the midlands and one in the north of England. The mean age was 40.36 years (SD 10.96). 52% of the sample was male. Being employed and currently at work, participants were likely to be in reasonably good health. Being office workers, participants were likely to be sedentary at work. The focus of the present study was on leisure-time physical activity.

Measures

Personality. To measure the five factors of personality, public domain scales from the International Personality Item Pool (Goldberg, 1999) were used as proxies for the commercial scales of the NEO Five-Factor Inventory (Costa & McCrae, 1992). The public-domain scales correlate highly with the commercial scales, and substantial evidence has accrued for their validity (Buchanan, Johnson, & Goldberg, 2005; Goldberg et al., 2006). The response format was *very inaccurate* (1) to *very accurate* (5). Scale scores for Agreeableness, Extraversion, Neuroticism and Openness were each computed as the mean of 10 item scores. The scale score for Conscientiousness was computed as the mean of six facet scores, where each facet score was itself the mean of 10 item scores. However, the facet scores are not considered in this article.

Participation motives. Participation motives were measured using the Exercise Motivations Inventory version 2 (EMI-2: Markland & Ingledew, 1997). The instrument comprised 14 scales: Affiliation, Appearance, Challenge, Competition, Enjoyment, Health Pressures, Ill-Health Avoidance, Nimbleness, Positive Health, Revitalisation, Social Recognition, Strength and Endurance, Stress Management, and Weight Management. Each scale comprised three or four items. The response format was *not at all true for me* (0) to *very true for me* (5). Scale scores were computed as the mean of item scores. However, we excluded the EMI-2 Enjoyment and Revitalisation scales from subsequent analyses, because they overlapped with the Behavioural Regulation in Exercise Questionnaire version 2 (BREQ-2) Intrinsic Regulation scale. The overlap was essentially conceptual, in that enjoyment is a defining characteristic of intrinsic motivation. It was also operational, in that the items were similar. It was also statistical, in that the scales were highly correlated: Enjoyment with Intrinsic Regulation, $r=0.85$, $N=251$, $p<0.001$; Revitalisation with Intrinsic Regulation, $r=0.80$, $N=251$, $p<0.001$.

We also considered whether to exclude EMI-2 Health Pressures from subsequent analyses, because of possible overlap with BREQ-2 External Regulation. Operationally, the Health Pressures items were “To help recover from an illness/injury”; “To help prevent an illness that runs in my family”, and “Because my doctor advised me to exercise” (so the scale might more accurately be called Health Concerns), whereas the External Regulation items all referred directly to social pressure. So, the only possible overlap lay in the item about advice from a doctor, but even then there was nothing in the item to indicate that the advice was controlling rather than informational. Statistically, Health Pressures and External Regulation correlated only modestly: $r=0.35$, $N=251$, $p<0.01$. Conceptually, being concerned about health is not a defining property of external regulation. Therefore, we decided to retain Health Pressures in the subsequent analyses. However, as an extra check, we did rerun the final structural equation model using a Health Pressures scale that omitted the doctor item. This made no substantive difference.

The EMI-2 scales, excluding Enjoyment and Revitalisation, were subjected to principal components analysis with orthogonal rotation (Table I). Three components emerged. The Strength and Endurance scale loaded ambiguously across the three components. The Health Pressures scale loaded modestly but nevertheless unambiguously on the first component. Each of the other scales loaded strongly and unambiguously on a single component. The components were labelled Health/Fitness, Social Engagement, and Appearance/Weight. Based on these findings, the Strength and Endurance scale was excluded, and three higher-order motives were computed from the remaining scales: Appearance/Weight Motive as the mean of Appearance and Weight Management; Health/Fitness Motive as the mean of Health Pressures, Ill-Health Avoidance, Nimbleness, Positive Health, and Stress Management; and Social Engagement Motive as the mean of Affiliation, Challenge, Competition,

Table I. Principal components analysis of exercise motive (EMI-2) scales.

Exercise motive	Component		
	1	2	3
Affiliation	0.13	0.72	-0.04
Appearance	0.24	0.28	0.83
Challenge	0.26	0.82	0.13
Competition	0.05	0.82	-0.05
Health pressures	0.48	0.04	0.15
Ill-health avoidance	0.86	-0.03	0.13
Nimbleness	0.75	0.22	0.11
Positive health	0.76	0.04	0.33
Social recognition	0.01	0.81	0.25
Stress management	0.65	0.31	0.00
Strength and endurance	0.52	0.50	0.32
Weight management	0.23	-0.07	0.85

Notes: $N = 250$. Variance explained = 65%.

and Social Recognition. Thereby, the EMI-2 scales were reduced to a manageable number of conceptually coherent higher-order scales.

Behavioural regulation. Behavioural regulation was measured using the BREQ-2 (Markland & Tobin, 2004). The instrument comprised five scales: Amotivation (four items), External Regulation (four items), Introjected Regulation (three items), Identified Regulation (four items), and Intrinsic Regulation (four items). The BREQ-2, in common with instruments from which it was derived (e.g., Ryan & Connell, 1989), does not attempt to distinguish between integrated and intrinsic regulation. Rather than presenting the BREQ-2 separately, the items were intermingled with the EMI-2, with the same response format of *not at all true for me* (0) to *very true for me* (5). This proved acceptable to participants. One item, "Because I get restless if I don't exercise regularly", was dropped from the Identified Regulation scale, because reliability analysis indicated that it detracted from the internal consistency of the scale, and principal components analysis indicated that it was ambiguous between identified and intrinsic regulation; further details of these preliminary analyses are available from the first author on request. This left the Identified Regulation scale with three items, each referring to the personal importance or value of exercise.

The BREQ-2 scales were subjected to principal components analysis with orthogonal rotation (Table II). Two components emerged. One component comprised Introjected and External Regulation. The other comprised Identified Regulation, Intrinsic Regulation and, loading negatively, Amotivation. It was to be expected that External Regulation and Introjected Regulation would be closely allied; indeed they are sometimes combined to represent controlled motivation. It was similarly to be expected that Identified and Intrinsic Regulation would be closely allied; they are sometimes combined to represent autonomous motivation. More problematic was the strong alliance of Amotivation with lack

Table II. Principal components analysis of behavioural regulation (BREQ-2) scales.

Behavioural regulation	Component	
	1	2
Amotivation	-0.75	0.19
External regulation	-0.26	0.83
Introjected regulation	0.28	0.83
Identified regulation	0.81	0.29
Intrinsic regulation	0.79	-0.01

Notes: $N = 251$. Orthogonal rotation. Variance explained = 70%.

of Identified/Intrinsic Motivation. Because of this overlap, it was inappropriate to include Amotivation as a separate construct in the structural equation modelling.

Exercise participation. Participants were asked "During the past 7 days, how many times did you do each of the following types of exercise for at least 30 min?". The three types were "vigorous exercise, for example, running, jogging, squash, swimming lengths, aerobics, fast cycling, football", "moderate exercise, for example, fast walking, dancing, gentle swimming, golf, heavy housework, heavy gardening (e.g., digging)", and "light exercise, for example, walking at an average pace, table tennis, light housework, light gardening (e.g., weeding)". This item was taken from the Welsh Health Survey (National Assembly for Wales, 1999). To produce a score for overall extent of exercise participation, the frequencies of vigorous, moderate and light exercise were weighted and then summed. The weightings were 9 for vigorous exercise, 5 for medium, and 3 for light, based on typical metabolic equivalent (MET) ratings (Ainsworth et al., 2000). Thus the measure of exercise participation was analogous to the Leisure Time Exercise Questionnaire (Godin & Shephard, 1985), but more culturally appropriate. This type of measure can have substantial validity when assessed against other measures of physical activity including objective measures (Jacobs, Ainsworth, Hartman, & Leon, 1993). To avoid undue influence of outliers, the distribution of scores was winsorised: Three individuals with scores well in excess of 100 had their scores fixed at 100.

As a simple check on the validity of the exercise participation measure, we also included a stage of change measure (Woods, Mutrie, & Scott, 2002). There were 21 individuals in pre-contemplation, 44 in contemplation, 30 in preparation, 29 in action and 128 in maintenance. As would be expected, the mean score on exercise participation for the 95 individuals in pre-contemplation, contemplation or preparation ($M = 17.71$, $SD = 16.21$) was substantially lower than that for the 157 individuals in action or maintenance ($M = 35.83$, $SD = 19.50$): $t(226.20) = -7.96$, $p < 0.001$.

Analytical procedure

The descriptive statistics and correlations of the key variables were examined. Then the causal model of exercise participation was tested using structural

equation modelling (LISREL 8.72, Jöreskog & Sörbom, 1996). The covariance rather than the correlation matrix was analysed. It was not feasible to use multiple indicators for each latent variable, given the size of the model and the size of the sample. Therefore, we used an alternative means of adjusting for measurement error (Jöreskog & Sörbom, 1996; Netemeyer, Johnston, & Burton, 1990). There was one indicator for each latent variable: the scale score for the personality and motivational variables, and the overall score for exercise participation. For each latent variable, the path from latent variable to indicator was fixed at 1, and the measurement error was fixed at the variance of the indicator multiplied by 1 minus the reliability of the indicator. For this purpose, the reliability was taken to be Cronbach's alpha for the personality and motivational variables, and 1 for exercise participation.

Fit was assessed using the Satorra–Bentler scaled χ^2 (Satorra & Bentler, 1994) which adjusts for multivariate non-normality. For good fit, χ^2 would be non-significant at the 0.05 level. In addition, the Standardised Root Mean Square Residual would be not more than 0.09 and the Comparative Fit Index not less than 0.95 (Hu & Bentler, 1999).

Results

Descriptive statistics and correlations

Table III shows the descriptive statistics and correlations of the variables. Cronbach's alpha was above 0.70 for all multi-item scales. There were significant correlations of variables that were to be at the same level in the causal model. Agreeableness and Conscientiousness correlated positively with each other and negatively with Neuroticism; and Extraversion correlated positively with Conscientiousness and Openness and negatively with Neuroticism. The three motive scales correlated positively with each other. The four behavioural regulation scales correlated in a simplex pattern: External Regulation positively with Introjected Regulation, non-significantly with Identified Regulation, and negatively with Intrinsic Regulation; Introjected Regulation positively with Identified Regulation and, less strongly, with Intrinsic Regulation; Identified Regulation positively with Intrinsic Regulation.

There were also significant correlations of variables that were to be at different levels in the causal model. Agreeableness and Conscientiousness correlated negatively with External Regulation and Introjected Regulation. Neuroticism correlated positively with Appearance/Weight Motive, and with External Regulation and Introjected Regulation. Openness correlated positively with Health/Fitness Motive. Appearance/Weight Motive correlated positively with all the behavioural regulation scales. Health/Fitness Motive correlated positively with all the behavioural regulation scales, most notably with Identified Regulation, and with Exercise Participation. Social Engagement Motive correlated positively with Introjected Regulation, Identified Regulation, and, most notably, Intrinsic Regulation. External Regulation correlated negatively with

Table III. Descriptive statistics and correlations.

Variable	M	SD	Cronbach's alpha	Correlations														
				1	2	3	4	5	6	7	8	9	10	11	12			
1. Agreeableness	3.71	0.57	0.80	-														
2. Conscientiousness	3.71	0.41	0.82	0.26**	-													
3. Extraversion	3.34	0.64	0.84	0.09	0.14*	-												
4. Neuroticism	2.63	0.74	0.86	-0.53**	-0.32**	-0.22**	-											
5. Openness	3.40	0.62	0.74	0.10	0.02	0.25**	0.00	-										
6. Appearance/weight motive	2.56	1.28	0.75	-0.10	-0.03	0.04	0.26**	-0.03	-									
7. Health/fitness motive	2.84	0.93	0.78	0.02	0.08	0.05	0.04	0.13*	0.45**	-								
8. Social engagement motive	1.55	1.07	0.83	-0.05	-0.09	0.11	0.00	-0.03	0.23**	0.33**	-							
9. External regulation	0.77	0.98	0.83	-0.15*	-0.24**	-0.06	0.26**	-0.03	0.24**	0.14*	0.06	-						
10. Introjected regulation	1.32	1.21	0.78	-0.18*	-0.23**	-0.10	0.33**	0.03	0.48**	0.39**	0.28**	0.42**	-					
11. Identified regulation	3.29	1.21	0.83	0.08	0.11	0.09	0.03	0.10	0.44**	0.73**	0.29**	-0.01	0.38**	-				
12. Intrinsic regulation	2.63	1.51	0.94	0.05	0.08	0.08	-0.05	0.03	0.15*	0.34**	0.63**	-0.16**	0.16**	0.50**	-			
13. Exercise	29.24	20.29	-	-0.05	0.04	0.04	0.06	0.09	0.03	0.14*	0.12	-0.20**	0.12	0.26**	0.26**	-		

Notes: N = 249. * $p < 0.05$; ** $p < 0.01$.

Exercise Participation, whereas Identified and Intrinsic Regulation correlated positively with Exercise Participation. Overall, the correlations reinforced the need for structural equation modelling, so as to avoid confounding and test for mediation.

Structural equation modelling

Figure 2 shows, for the starting model, the free structural paths between latent variables, and the disturbances (unexplained variances of the endogenous latent variables). In addition to what is shown, measurement errors were fixed at the variance of the indicator multiplied by 1 minus the reliability of the indicator, and paths from latent variables to indicators were fixed at 1, as explained in the “Method” section. Measurement errors were not free to covary with each other. The personality variables were free to covary with each other, thereby ensuring that any effects of the personality variables on the motivational variables would be adjusted for the interrelationships between the personality variables. The disturbances of the motives were free to covary with each other, so as to accommodate the substantial associations between motives apparent in the correlations (Table III). Similarly, the disturbances of the behavioural regulations were free to covary with each other. The disturbances of the motives were not free to covary with the disturbances of the behavioural regulations.

As regards the free causal paths between latent variables, none of the personality variables was free to influence any of the endogenous variables in the model. Thus, although we hypothesised that personality variables would influence motive variables and possibly directly influence behavioural regulation variables, we examined the modification indices to help us determine exactly

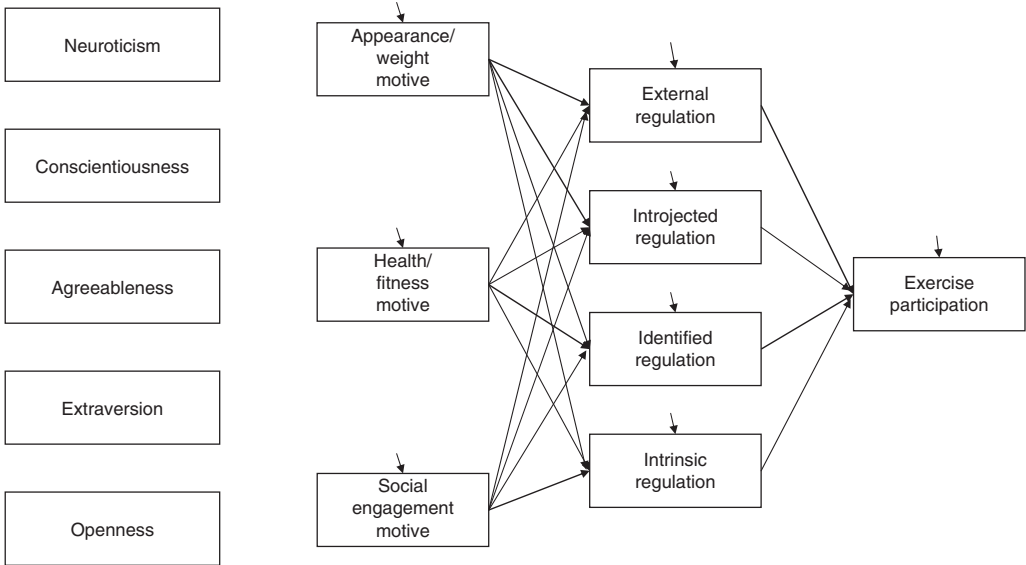


Figure 2. Initial structural equation model.

which personality variables influenced which motivational variables. Previous research relating personality to motives and behavioural regulation did not permit more specific hypotheses. All of the motives were free to influence all of the behavioural regulation variables, and all of the behavioural regulation variables were free to influence exercise participation, but none of the motives was free to influence participation directly. Thus, we hypothesised that behavioural regulation would fully mediate the effects of motives on participation, whilst treating behavioural regulation as a continuum. We anticipated that health/fitness and social engagement motives would be conducive to more autonomous (identified and/or intrinsic) regulation, whereas appearance/weight motive would be conducive to more controlled (external and/or introjected) regulation, that autonomous regulation would be conducive to exercise participation, and that controlled motivation would not affect or would be detrimental to participation. We scrutinised the modification indices for any evidence of direct effects of motives on participation.

The fit of this starting model was less than adequate: Satorra-Bentler scaled $\chi^2(43, N=249) = 87.94, p=0.00$; Standardised Root Mean Square Residual = 0.08, Comparative Fit Index = 0.95. A modification index suggested a path from Neuroticism to Appearance/Weight Motive, the valence of the expected change being positive. It seemed reasonable that the general tendency to experience negative affect would manifest in concern about appearance and weight, so this modification was allowed. A further modification index suggested a path from Openness to Health/Fitness Motive, the valence of the expected change being positive. It seemed reasonable that the general tendency to be open to experience would manifest in appreciation of the positive health benefits of exercise, so this modification was allowed. Further modification indices suggested direct paths from Conscientiousness to Introjected Regulation and External Regulation, the valence of the expected changes being negative. Based on the evidence reviewed in the Introduction, we had anticipated that conscientiousness might affect behavioural regulation directly, so these modifications were allowed. The form of the effects, conscientiousness reducing external and introjected regulation, is something that we discuss in the Discussion. Other paths were then fixed to 0 if the 95% confidence interval for the parameter estimate included zero. The fit of this final model was good: Satorra-Bentler scaled $\chi^2(49, N=249) = 66.19, p=0.05$; Standardised Root Mean Square Residual = 0.05, Comparative Fit Index = 0.98.

Figure 3 shows, for the final model, the standardised direct effects and disturbances. Table IV details the unstandardised direct and indirect effects. Appearance/Weight had a direct positive effect on External Regulation and Introjected Regulation, and External Regulation had a direct negative effect on Exercise Participation, so that Appearance/Weight Motive had an indirect negative effect on Exercise Participation. Health/Fitness Motive had a direct positive effect on Identified Regulation, and Identified Regulation had a direct positive effect on Exercise Participation, so that Health/Fitness Motive had an indirect positive effect on Exercise Participation. Social Engagement Motive

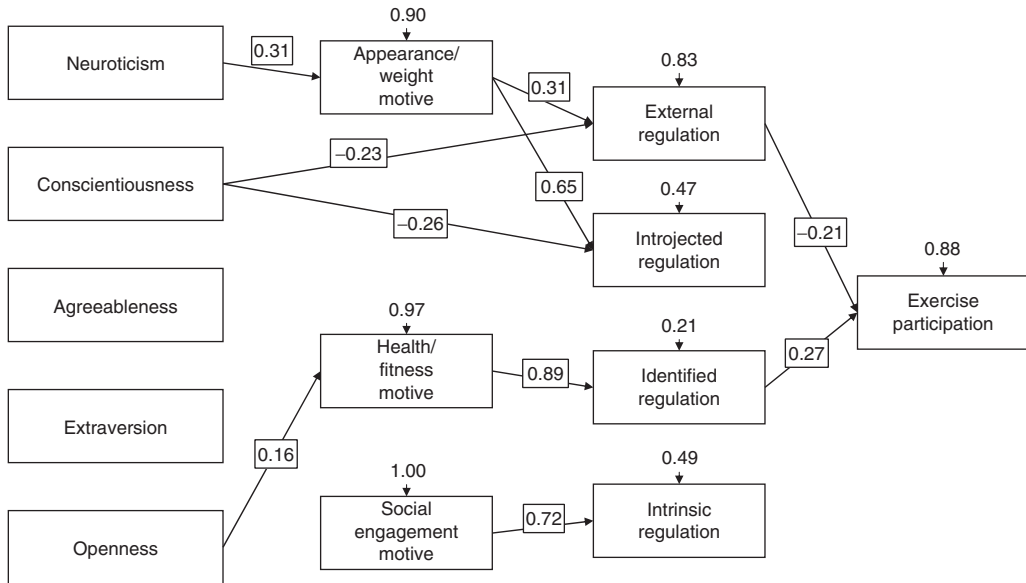


Figure 3. Final structural equation model showing standardised paths and disturbances. Standardised paths (regression coefficients) and disturbances (unexplained variances) are shown. For all paths, the 95% confidence interval excluded 0.

had a direct positive effect on Intrinsic Regulation, but Intrinsic Regulation had no effect on Exercise Behaviour, so that Social Engagement Motive had no indirect effect on Exercise Behaviour. Neuroticism had a direct positive effect on Appearance/Weight Motive, and consequently an indirect positive effect on External Regulation and an indirect negative effect on Exercise Participation. Openness had a direct positive effect on Health/Fitness Motive, and consequently an indirect positive effect on Identified Regulation and an indirect positive effect on Exercise Participation. Conscientiousness had no effects on participation motives, but did have a direct negative effect on External Regulation and Introjected Regulation, and consequently (through External Regulation) an indirect positive effect on Exercise Participation.

Discussion

Support for the general model

Overall, the results lend support to the general model depicted in Figure 1. The results are consistent with the effects of motives on participation being entirely mediated by behavioural regulation. Specifically, appearance/weight motive, through its positive effect on external regulation, had a negative effect on exercise participation. Health/fitness motive, through its positive effect on identified regulation, had a negative effect on participation. Social engagement motive, despite its positive effect on intrinsic regulation, had no effect on participation, because intrinsic regulation itself had no effect on participation.

Table IV. Unstandardised direct and indirect effects in final structural equation model.

To	From											
	Agreeableness	Conscientiousness	Extraversion	Neuroticism	Openness	Appearance/ weight motive	Health/ fitness motive	Social engagement motive	External regulation	Introjected regulation	Identified regulation	Intrinsic regulation
Agreeableness	-	-	-	-	-	-	-	-	-	-	-	-
Conscientiousness	-	-	-	-	-	-	-	-	-	-	-	-
Extraversion	-	-	-	-	-	-	-	-	-	-	-	-
Neuroticism	-	-	-	-	-	-	-	-	-	-	-	-
Openness	-	-	-	-	-	-	-	-	-	-	-	-
Appearance/weight motive	-	-	-	0.49 (0.10)**	-	-	-	-	-	-	-	-
Health/fitness motive	-	-	-	-	0.25 (0.09)**	-	-	-	-	-	-	-
Social engagement motive	-	-	-	-	-	-	-	-	-	-	-	-
External regulation	-	-0.55 (0.16)**	-	0.12 (0.04)**	-	0.25 (0.06)**	-	-	-	-	-	-
Introjected regulation	-	-0.76 (0.20)**	-	0.31 (0.07)**	-	0.64 (0.07)**	-	-	-	-	-	-
Identified regulation	-	-	-	-	0.29 (0.11)**	-	1.16 (0.07)**	-	-	-	-	-
Intrinsic regulation	-	-	-	-	-	-	-	1.08 (0.08)**	-	-	-	-
Exercise	-	2.64 (1.01)**	-	-0.60 (0.25)*	1.49 (0.71)*	-1.22 (0.44)**	5.95 (1.58)**	-	-4.84 (1.34)**	5.12 (1.34)**	-	-

Notes: $N = 249$. Direct effects in plain text, indirect effects in italics, SEs in parentheses. *95% confidence interval excluded zero; **99% confidence interval excluded zero.

The results are consistent with participation motives being influenced by personality. Specifically, neuroticism had a positive effect on appearance/weight motive. Openness had a positive effect on health/fitness motive. The results are also consistent with behavioural regulation being directly influenced by personality. Specifically, conscientiousness had direct negative effects on external and introjected regulation. Thus the results of the present study are convergent with those of Ingledew and Ferguson's (2007) study of sexual behaviour, in so far as participation motives influenced behavioural regulation and thereby behaviour, personality influenced participation motives, and in addition conscientiousness directly influenced behavioural regulation.

Specific motivational processes

Appearance/weight motive increased external regulation, and was thereby negatively related to exercise participation. However, appearance/weight motive was not in other ways detrimental to exercise participation. It increased introjected regulation (more than it did external regulation), but introjected regulation had a neutral effect on participation. It had a neutral rather than negative effect on identified regulation, and on intrinsic regulation. The effect of appearance/weight motive on external regulation is consistent with the notion that appearance/weight outcomes do not necessarily fulfil needs for competence, autonomy or relatedness. Some other studies have also found external regulation to have a negative and not just a neutral effect on exercise participation (e.g., Thøgersen-Ntoumani & Ntoumanis, 2006; Vansteenkiste, Simons, Soenens, & Lens, 2004; Wilson et al., 2002).

Health/fitness motive increased identified regulation, and was thereby positively related to exercise participation. The positive contribution of health/fitness motive to identified regulation is consistent with health being in general highly valued in this age group (Lau, Hartman, & Ware, 1986). Social engagement motive increased intrinsic regulation, but was not thereby related to exercise participation. The positive contribution of social engagement motive to intrinsic regulation is consistent with the notion that social engagement fulfils needs for autonomy, competence and relatedness. However, whereas the effect of identified regulation on participation was positive, the effect of intrinsic regulation was neutral. Some other studies have also found identified regulation, more than intrinsic regulation, to predict exercise participation (e.g., Rose, Parfitt, & Williams, 2005; Thøgersen-Ntoumani & Ntoumanis, 2006; Wilson et al., 2002). Some studies in the political and educational domains have also found identified rather than intrinsic regulation to predict positive outcomes, such as voting in elections and continuing in further education (Koestner & Losier, 2002). Koestner and Losier argue that a variety of activities contribute to participation in a domain. For example, to vote one has to register to vote, and to continue in further education one has to revise for exams. If these contributory activities are unappealing to the individual, then intrinsic regulation will be insufficient and identified regulation will be necessary for participation.

Among the middle-aged workers in the present study, it may be that many of those exercising regularly still found aspects of exercise participation unappealing, making intrinsic regulation insufficient and identified regulation essential for participation.

The specific effects of the personality traits are consistent with the nature of the traits. Neuroticism increased appearance/weight motive. In a society that denigrates fatness, a predisposition to experience negative affect (neuroticism) is likely to manifest in appearance and weight concerns. Openness increased health motive. In a society that advocates healthy lifestyles, a predisposition to adopt new ideas (openness to experience) would be expected to manifest in health improvement goals. Conscientiousness reduced controlled (external and introjected) regulation, without the mediation of participation motives, thereby having a positive effect on participation, counterbalancing the negative effect of appearance/weight motive. Research has thus found conscientiousness to reduce controlled regulation (present study), increase autonomous regulation (Ingledeu & Ferguson, 2007) or both (Ingledeu et al., 2004), without the mediation of participation motives (present study; Ingledeu & Ferguson, 2007). Thus conscientiousness seems to be conducive to *relatively* autonomous motivation. This is contrary to the presumption (which in our experience is quite prevalent) that conscientious individuals' motivation is relatively controlled. As such, conscientiousness may be one of the "inner resources" (Deci & Ryan, 2000, p. 229) that aid integration. However, further research, of a longitudinal nature, is needed to see how conscientiousness affects integration over time.

Methodological considerations

The present study had methodological strengths. There was clear conceptual and operational separation of participation motives ("what") and behavioural regulations ("why"). The structural equation modelling allowed for stringent tests of mediation, finding for example that all effects of participation motives on behaviour were mediated by behavioural regulations. However, all measures were self-report. The ultimate dependent variable, exercise participation, was a generalised measure. The study was essentially a cross-sectional survey, so causal interpretations must be tentative, despite the merits of structural equation modelling. The modelling allowed for quantification of indirect as well as direct effects. Some of the indirect effects were significant despite the zero-order correlation between the two variables being non-significant: the indirect effect of conscientiousness, neuroticism, openness, and appearance/weight motive on behaviour, and openness on identified regulation. A statistically non-significant bivariate association between two variables does not preclude the possibility that the relationship between those variables is mediated by other variables (e.g., Shrout & Bolger, 2002). Structural equation modelling affords powerful tests of the associations between distally related variables, by taking into account causal chains, competing causes, and measurement error. The findings cannot be

generalised beyond the population studied, that is to say sedentary at work and predominantly middle-aged.

Health promotion implications

We conclude by considering the implications for intervention of our research into the role of participation motives in exercise. Generally, there are two possible approaches to intervention that take account of participation motives. In one approach, it is proposed that an intervention will be most effective if its content induces the particular motive which theory or research has suggested will be most conducive to participation. Adopting such a perspective, Vansteenkiste et al. (2004), in a study of school-children being introduced to a new physical activity, found that a health-focussed message was in most respects more effective than a control condition, whereas an appearance-focussed message was in most respects less effective. In an alternative approach, it is suggested that an intervention will be most effective if its content is varied so as to appeal to the different pre-existing motives of individuals. Adopting such a perspective, Sanderson and Cantor (1995), in a study of safe sex behaviour, and Clary et al. (1998), in a study of volunteering, found that interventions were most effective when they matched individuals' motives. However, when Jones and Leary (1994) assessed the effectiveness of various messages in generating intention to practice safe sun behaviour, they found that an appearance-oriented message, though generally more effective than a health-oriented message, was primarily effective among participants who were *low* rather than high on appearance motive. Jones and Leary interpreted this finding in terms of reactance, appearance-motivated individuals rejecting the message rather than accepting the constraint on their behaviour.

Taking such considerations into account, we suggest the following health promotion implications of our research (see also Ingledew et al. 1998; Markland & Ingledew, 2007). Adults may consider exercising for a variety of motives, underpinned by their personality and other factors. Appearance/weight management is likely to be prominent among such motives. Such individuals are motivated rather than amotivated, even if it is controlled motivation. Health promotion can appeal to pre-existing motives in order to engage individuals in actual exercise programmes. Ideally, this would be done on an individualised basis. Alternatively, health promotion messages can appeal to a range of motives. However, whilst harnessing the desires to improve appearance and lose weight might be a powerful means of engaging individuals in exercise in the first instance, these particular motives are unlikely to sustain participation in the long term. Therefore, the well-being and enjoyment benefits of exercise should be emphasised, especially as they begin to actually materialise. On the other hand, care should be taken not to explicitly or implicitly denigrate appearance/weight motive or any other motive for exercising, lest individuals perceive that their autonomy is threatened, leading to defiance (Deci & Ryan, 1985, p. 71) and dropout. Individuals' motives should be acknowledged and respected. In this,

and in other ways, the intervention should be conducted in an autonomy supportive fashion (cf., Markland & Vansteenkiste, 2007; Williams, 2002). Some individuals (the less conscientious) may require more support than others.

Note

- [1] We use the term *motive* to refer to the “what” (content) of goals. This is how the term *motive* is used extensively in health psychology (e.g., Cooper, 1994; Cooper et al., 1998; Hillhouse et al., 2000; Ingledeu & Ferguson, 2007; Clary et al., 1998; Ingledeu et al., 1998; Shiffman, 1993; Steptoe & Wardle, 1999) and traditionally in motivational psychology (e.g., McClelland, Koestner, & Weinberger, 1989). Some self-determination researchers (e.g., Sheldon et al., 2004) use the term *motive* to refer to regulatory processes (“why”).

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