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Three Levels of Exercise Motivation

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The aim was to test a three-level model of motivation, derived from self-determination theory. According to the model, dispositional motives (represented by life goals) influence participatory motives (exercise participation motives), which influence regulatory motives (exercise behavioural regulations), which influence behaviour (exercise participation). The participants were 251 young adults. They completed the Aspirations Index, Exercise Motivations Inventory version 2, Behavioural Regulation in Exercise Questionnaire version 2, and a quantity-frequency measure of exercise participation. The model was tested using partial least squares latent variable modelling. Exercise participation was positively predicted by identified and intrinsic but not predicted by external or introjected behavioural regulations. Behavioural regulations were predicted by participation motives: intrinsic regulation by affiliation and challenge motives; identified regulation by health/fitness and stress management motives; introjected regulation by appearance/weight motive; external regulation by social recognition and appearance/weight motives; all positively. Participation motives were themselves predicted by corresponding life goals. The findings support the three-level model of motivation. Health promotion programmes need to take account of individuals' participatory motives and underlying dispositional motives.

Keywords: behavioural regulation, exercise, life goals, motivation, motives, self-determination

INTRODUCTION

Aim

In this study, the aim was to test a conceptual model in which dispositional motives influence participatory motives, which influence regulatory motives, which influence behaviour (Figure 1). The model was derived from

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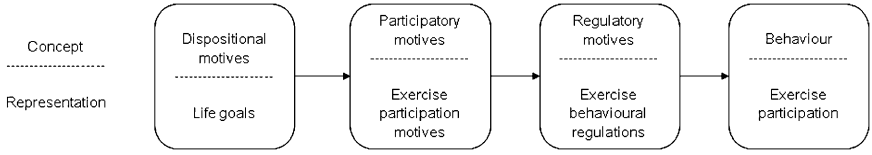

FIGURE 1. Conceptual model.

self-determination theory (Deci & Ryan, 2000), and tested in an exercise context. In the following literature review, we consider the constructs within the model and how they can be measured, and existing evidence relating the constructs to each other. We then formulate more specific hypotheses.

Constructs and Measurement

Dispositional Motives. Dispositional motives are the contents of individuals' goals for life in general. They are what individuals generally aim to attain or avoid. A distinction is sometimes made between implicit and self-attributed motives (McClelland, Koestner, & Weinberger, 1989). Most recent work has been on self-attributed motives. These include values (Feather, 1995) and life goals (Kasser, 2002). As typically measured, values have moral connotations, whereas life goals do not. Life goals can be measured using the Aspirations Index (Kasser & Ryan, 1996). One widely used version of this measures seven goals: growth, relationships, community, wealth, fame, image, and health. In self-determination theory the person-focused goals (growth, relationships, and community) are characterised as intrinsic, whereas the status-focused goals (wealth, fame, and image) are characterised as extrinsic (Deci & Ryan, 2000; Kasser, 2002). This is because the pursuit of the person-focused goals is thought to be conducive to the satisfaction of innate needs for autonomy, competence, and relatedness, whereas the pursuit of the status-focused goals is thought to be more dependent on external conditionalities. Health goal may have both intrinsic qualities (attaining a positive state of well-being) and extrinsic qualities (avoiding health problems).

Participatory Motives. Participatory motives are the contents of individuals' goals for a particular domain of behaviour. They are what individuals aim to attain or avoid through participating in the behaviour. In the exercise domain, Ryan, Frederick, Lepes, Rubio, and Sheldon (1997) distinguished between enjoyment, competence, appearance, fitness, and social motives. Markland and Ingledew's (1997) Exercise Motivation

Inventory version 2 (EMI-2) is more differentiated, distinguishing between 14 specific motives: affiliation, appearance, challenge, competition, enjoyment, health pressures, ill-health avoidance, nimbleness, positive health, revitalisation, social recognition, strength/endurance, stress management, and weight management. These specific motives can be grouped into appearance/weight, social engagement, health/fitness, and enjoyment-related composites (Ingledew & Markland, 2008). According to self-determination theory, appearance/weight motives would be predominantly extrinsic, social engagement and enjoyment-related motives would be predominantly intrinsic, and health/fitness motives could have both intrinsic and extrinsic qualities (Markland & Ingledew, 2007).

Regulatory Motives. Regulatory motives are the perceived loci of causality of individuals' behavioural goals. In self-determination theory (Deci & Ryan, 2000), individuals are intrinsically motivated when they engage in an activity for the inherent satisfaction that they derive from the activity. They are extrinsically motivated when they engage in an activity for rewards attained or punishments avoided through the activity. However, within extrinsic motivation there is a continuum. *External regulation* is when the behaviour is controlled by external conditionalities. *Introjected regulation* is when the external conditionalities have been internalised to some extent, so that the individual acts for example to heighten self-esteem or lessen guilt. *Identified regulation* is when the outcomes of the behaviour are consciously valued by the individual. *Integrated regulation* is when the outcomes of the behaviour are fully congruent with the individuals' other values. External and introjected regulation are relatively controlled forms of regulation, whereas identified, integrated, and intrinsic regulation are relatively autonomous forms of regulation. Some self-determination researchers (e.g. Sheldon, Ryan, Deci, & Kasser, 2004) refer to these different forms of behavioural regulation simply as *motives*. We refer to them as *regulatory motives*, to distinguish them from dispositional and participatory motives. Various instruments have been developed to measure regulatory motives for exercise (e.g. Levesque et al., 2007; Li, 1999; Markland & Tobin, 2004). For example, the Behavioural Regulation in Exercise Questionnaire version 2 (BREQ-2; Markland & Tobin, 2004) assesses amotivation, external regulation, introjected regulation, identified regulation, and intrinsic regulation. In common with instruments from which it was derived (e.g. Ryan & Connell, 1989), the BREQ-2 does not distinguish between integrated and intrinsic regulation. These two forms of regulation, whilst easy to distinguish theoretically (integrated regulation is still an extrinsic form of motivation), can be difficult to distinguish empirically (Mullan, Markland, & Ingledew, 1997).

Relationships between Constructs

Effects of Regulatory Motives. There is extensive evidence relating regulatory motives to exercise participation. More autonomous regulation has been found to positively predict sustained participation (e.g. Daley & Duda, 2006; Fortier, Sweet, O'Sullivan, & Williams, 2007; Gillison, Standage, & Skevington, 2006; Hagger & Chatzisarantis, 2009; Levesque et al., 2007; Standage, Sebire, & Loney, 2008; Wilson, Blanchard, Nehl, & Baker, 2006). Identified regulation has sometimes been found to have a stronger effect than intrinsic regulation on participation (e.g. Edmunds, Ntoumanis, & Duda, 2006; Ingledew & Markland, 2008; Peddle, Plotnikoff, Wild, Au, & Courneya, 2008; Rose, Parfitt, & Williams, 2005; Thøgersen-Ntoumani & Ntoumanis, 2006). Introjected regulation has also sometimes been found to have a positive effect on participation, at least in the short term (e.g. Daley & Duda, 2006; Edmunds et al., 2006; Peddle et al., 2008; Rose et al., 2005). External regulation has sometimes been found to have a negative, not just a neutral, effect on participation (e.g. Edmunds et al., 2006; Ingledew & Markland, 2008; Levesque et al., 2007; Thøgersen-Ntoumani & Ntoumanis, 2006).

Effects of Participatory Motives. There is evidence relating participatory motives to exercise participation and to regulatory motives. In a study of new users of a fitness centre, Ryan et al. (1997) found that high adherers had higher baseline enjoyment, competence, and social motives than did low adherers, whereas there was no difference on fitness or appearance/weight motives. In a study of office workers' leisure-time physical activity, Ingledew, Markland, and Medley (1998) found 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. Also in office workers, Sebire, Standage, and Vansteenkiste (2008) found that a composite of social affiliation, health management, and skill development motives was positively associated with autonomous regulation of exercise, whereas a composite of social recognition and image motives was positively associated with controlled regulation. In middle-aged women, Segar and colleagues found that clusters with high weight-related motives, compared with some other clusters, had more introjected regulation and less intrinsic regulation (Segar, Eccles, Peck, & Richardson, 2007), and less participation (Segar, Eccles, & Richardson, 2008). In adolescents, Gillison et al. (2006) found that a composite of fitness, mood, health, and enjoyment motives was positively related to relatively autonomous regulation, whereas a composite of weight control, attractiveness, and body tone motives was negatively related to autonomous regulation, and that autonomous regulation was in turn positively related to behaviour. In office workers, Ingledew and Markland (2008) found that

appearance/weight motive had a positive effect on external regulation, which in turn had a negative effect on participation. Health/fitness motive had a positive effect on identified regulation, which in turn had a negative effect on participation. Social engagement motive had a positive effect on intrinsic regulation, but intrinsic regulation had no effect on participation.

Effects of Dispositional Motives. There is some research relating dispositional motives to exercise participation and participatory motives. In adolescents, Piko and Keresztes (2006) found that a more physically active group was lower than a less active group on status-focused life goals and health goal, but no different on person-focused goals. Also in adolescents, Martin, Leary, and O'Brien (2001) found that dispositional self-presentational (i.e. image-related) motive was higher in nonexercisers than in exercisers, and that dispositional self-presentational motive was positively correlated with self-presentational motive for exercise. There is also research relating dispositional motives to other health-related behaviours (e.g. Martin & Leary, 2001; Williams, Cox, Hedberg, & Deci, 2000) and participatory motives (e.g. Ingledew, Ferguson, & Markland, in press; Martin et al., 2001). In young adults, Ingledew et al. (in press) found that the effects of life goals on sun-related behaviour were substantially mediated by participatory motives. For example, fame and image life goals positively predicted exposure behaviour through appearance enhancement motive for exposure.

We know of no research relating dispositional motives to regulatory motives for exercise or any other health-related behaviours. However, person-focused life goals, relative to status-focused life goals, have been found to be associated with better well-being (Kasser & Ryan, 2001). Relatively autonomous regulation of goal pursuit has also been found to be associated with better well-being (Sheldon, 2001). This had led to speculation (reviewed by Sheldon et al., 2004) that the effects of life goals on well-being might be explained by regulatory motives. The balance of evidence suggests that regulatory motives partially but not entirely mediate the effects of life goals on well-being (Sheldon et al., 2004).

Present Study

Much of the evidence reviewed above is consistent with the model depicted in Figure 1, but no study has tested the full model. The present study can be viewed as an extension of Ingledew and Markland (2008), in that it will test, in an exercise context, the effects of dispositional as well as participatory and regulatory motives on behaviour. Conceptually, dispositional motives are relatively distal and general causes of behaviour, likely to shape participatory and regulatory motives, and with the potential to influence more than one domain of behaviour. Therefore, adding dispositional motives makes the

theoretical framework more complete and potentially more useful for health promotion purposes. Several multi-level models of motivation have been derived from self-determination theory (see, e.g. Hagger & Chatzisarantis, 2007). The most notable of these, vis-à-vis the present study, is Vallerand's (1997) hierarchical model of intrinsic and extrinsic motivation. Vallerand's model posits three levels of generality of regulatory motives (global, contextual, and situational). In contrast, the present model's contribution is to distinguish between dispositional, participatory, and regulatory motives and clarify their relationships with each other and with behaviour.

Our specific hypotheses were as follows:

1. Exercise behavioural regulations will predict participation. More autonomous regulations (intrinsic and identified) will positively predict participation, whereas more controlled regulations (external and introjected) will be unrelated or will negatively predict participation. These hypotheses are based on self-determination theory and on the previous research relating behavioural regulations to participation (especially Ingledew & Markland, 2008).
2. Exercise participation motives will predict behavioural regulations. Social recognition motive will positively predict external regulation. Appearance/weight motives will positively predict external and introjected regulation. Health and stress management motives will positively predict identified regulation. Affiliation and challenge motives will positively predict intrinsic regulation. These hypotheses are based on self-determination theory and on the previous research relating participation motives to exercise (especially Ingledew & Markland, 2008).
3. Thereby, exercise participation motives will indirectly predict participation. Social recognition and appearance/weight motives will be unrelated to or will negatively predict participation. Stress management and health/fitness motives, and affiliation and challenge motives, will positively predict participation.
4. Life goals will predict exercise participation motives corresponding in content. Fame life goal will positively predict social recognition motive, image life goal will positively predict appearance/weight motive, health life goal will positively predict stress management and health/fitness motives, relationships life goal will positively predict affiliation motive, and growth life goal will positively predict challenge motive. These hypotheses are based primarily on the content of the goals.
5. Thereby, dispositional motives will indirectly predict behavioural regulation and behaviour. Fame and image life goals will be unrelated or will negatively predict participation, health life goal and relationship and growth life goals will positively predict participation.

METHOD

Design and Participants

The study was a cross-sectional survey. Ethical approval was obtained from a university departmental research ethics committee. Participants were recruited from student residences of a British university. The sample size was 251. The mean age was 19.48 ($SD = 1.90$) years and 52 per cent were female.

Measures

Life Goals. Life goals were measured using the Aspirations Index (Kasser & Ryan, 1996). The measure comprised Wealth, Fame, Image, Growth, Relationships, Community, and Health scales, with five items per scale. The stem was "How important is this to you?" Response options ranged from *not at all* (1) to *very* (7). In the present study, the Wealth items were not included in the modelling, because there was no reason to hypothesise that this life goal would influence any of the exercise participation motives. Whereas Fame and Image blatantly reflect concern with how one is perceived by others, Wealth does not. Similarly, there was no reason to include the Community items.

Exercise Participation Motives. Participation motives were measured using the EMI-2 (Markland & Ingledew, 1997). The scales were Affiliation, Appearance, Challenge, Competition, Enjoyment, Health Pressures, Ill-Health Avoidance, Nimbleness, Positive Health, Revitalisation, Social Recognition, Strength and Endurance, Stress Management, and Weight Management, with three or four items per scale. The stem was "Personally, I exercise (or might exercise) . . . ". Response options ranged from *not at all true for me* (0) to *very true for me* (5). In the modelling, the Ill-Health Avoidance, Nimbleness, and Positive Health items were combined to represent health/fitness motive. The Appearance and Weight Management items were combined to represent appearance/weight management motive. The Competition and Strength/Endurance items were not included in the modelling because there was no reason to hypothesise that these participation motives would be influenced by any of the life goals. The Health Pressures items were not included because such a motive is not salient in a young population. The Enjoyment and Revitalisation items were not included because of overlap with the BREQ-2 Intrinsic Regulation scale (see Ingledew & Markland, 2008).

Exercise Behavioural Regulations. Behavioural regulations were measured using the BREQ-2 (Markland & Tobin, 2004). The scales were

Amotivation, External Regulation, Introjected Regulation, Identified Regulation, and Intrinsic Regulation, with three or four items per scale. The BREQ-2 items were intermingled with the EMI-2 items, using the same stem and response format. The Amotivation items were not included in the modelling. Empirically, it is difficult to distinguish amotivation from a lack of controlled or autonomous regulation (Ingledew & Markland, 2008), so including amotivation along with controlled and autonomous regulation in the same model would introduce a confound.

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 minutes?" 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), and was previously used by Ingledew and Markland (2008). It is akin to the Leisure Time Exercise Questionnaire (Godin & Shephard, 1985).

Analytical Procedure

Missing values were imputed. The overall amount of missing data was 0.11 per cent (33 data points among 115 variables and 251 participants). The maximum amount of missing data per variable was 1.6 per cent (four participants). Given the small amount of missing data, we used single imputation by expectation-maximisation (cf. Olinsky, Chen, & Harlow, 2003).

The theoretical model was tested using partial least squares (PLS) analysis with the SmartPLS Version 2.0 (M3) software (Ringle, Wende, & Will, 2005). PLS is a structural equations modelling approach that uses a least-squares estimation procedure. It makes no restrictive assumptions about the distributions of the data, and can be used with relatively small sample sizes (Chin, 1998). The model was analysed in two stages. In the first stage, the measurement model was tested according to the following criteria. For reliability of an indicator, the standardised loading of the indicator on its intended latent variable should be statistically significant and higher than .40 (Hulland, 1999). For internal consistency of a scale, the composite reliability (CR) should be at least .70 (Fornell & Larcker, 1981). For convergent validity, the average variance extracted (AVE) by the latent variable should be at least .50, that is to say the latent variable should explain on average at least 50 per cent of the variance in its indicators (Fornell & Larcker, 1981). For discriminant

validity, the AVE should be greater than its squared correlation with any other latent variable (Fornell & Larcker, 1981).

In the second stage, the structural model was tested. The standardised path coefficients (β) and the variance explained in the endogenous variables (R^2) were examined. Where there were significant intervening paths between distal variables, tests of mediation were conducted. Full mediation is evidenced when the indirect effect is significantly greater than zero, and there is a significant direct effect in the absence of intervening variables (C path) that becomes non-significant when controlling for intervening variables (C′ path). Partial mediation is evidenced when the C′ path is substantially reduced but still significant (Baron & Kenny, 1986). The strength of the mediation can be represented by the ratio of the indirect to the direct effect, known as the effect ratio (Shrout & Bolger, 2002).

The sampling distribution of the estimates generated by the PLS algorithm is unknown. Consequently, a normal theory test of the significance of the parameter estimates is not available. Instead, SmartPLS implements a bootstrapping procedure to assess the significance of the parameter estimates. In the present analyses 5,000 bootstrap samples with replacement were requested. SmartPLS does not generate significance tests for the variance explained in the dependent latent variables. Instead, we calculated the effect sizes of the R^2 values: Cohen's $f^2 = R^2/(1 - R^2)$. Effect sizes of .02, .15, and .35 are considered small, medium, and large, respectively (Cohen, 1988).

RESULTS

Measurement Model

Initial analysis showed that three observed indicators, two growth life goal items and light exercise, had very low factor loadings, and that the AVEs for growth and exercise with these indicators included were below acceptable levels. These indicators were eliminated and the model re-estimated. Table 1 shows that all loadings were then greater than .40 and significantly greater than zero. A table showing the CRs, AVEs, and intercorrelations between latent variables is available from the first author on request. All CRs were greater than .70. All AVEs were .50 or greater, and the AVE of each latent variable was greater than its squared correlation with any other latent variable. Taken together, these findings suggest that the measurement model was satisfactory.

Structural Model

Figure 2 shows the PLS and bootstrapped parameter estimates for the structural paths, and the variance accounted for in the dependent variables (R^2).

TABLE 1
Measurement Model Factor Loadings

Factor and Items	*PLS Estimate*	*Bootstrap Estimate*
Fame Life Goal		
To have my name known by many people	.79	.79***
To be admired by many people	.74	.74***
To be famous	.73	.73***
To have my name appear frequently in the media	.75	.74***
To be admired by lots of different people	.80	.79***
Image Life Goal		
To successfully hide the signs of ageing	.74	.74***
To have people comment often about how attractive I look	.80	.80***
To keep up with fashions in hair and clothing	.81	.81***
To achieve the "look" I've been after	.82	.81***
To have an image that others find appealing	.84	.84***
Health Life Goal		
To be physically healthy	.85	.85***
To feel good about my level of physical fitness	.85	.85***
To keep myself healthy and well	.86	.85***
To be relatively free from sickness	.61	.61***
To have a physically healthy life style	.91	.91***
Relationships Life Goal		
To have good friends that I can count on	.82	.81***
To share my life with someone I love	.77	.70***
To have committed, intimate relationship(s)	.76	.69***
To feel that there are people who really love me, and whom I love	.80	.74***
To have deep enduring relationships	.75	.69***
Growth Life Goal		
To grow and learn new things	.79	.75***
To choose what I do, instead of being pushed along by life	.67	.62***
To gain increasing insight into why I do the things I do	.65	.58**
Social Recognition Motive		
To compare my abilities with other people's	.77	.77***
To gain recognition for my accomplishments	.86	.86***
To accomplish things that others are incapable of	.85	.85***
To show my worth to others	.88	.88***
Appearance/Weight Motive		
To help me look younger	.55	.55***
Because exercise helps me to burn calories	.78	.78***
To help control my weight	.80	.80***
To look more attractive	.81	.81***
To have a good body	.79	.79***
To improve my appearance	.81	.81***
To lose weight	.77	.76***
To stay slim	.78	.77***
Stress Management Motive		
Because it helps to reduce tension	.88	.87***
To help manage stress	.88	.88***
To give me space to think	.69	.68***
To release tension	.89	.89***

TABLE 1
Continued

Factor and Items	*PLS Estimate*	*Bootstrap Estimate*
Health/Fitness Motive		
To maintain flexibility	.62	.62***
To feel more healthy	.79	.79***
Because I want to maintain good health	.80	.80***
To stay/become flexible	.73	.73***
To stay/become more agile	.77	.77***
To prevent health problems	.80	.80***
To have a healthy body	.82	.82***
To avoid heart disease	.62	.62***
To avoid ill-health	.71	.70***
Affiliation Motive		
To enjoy the social aspects of exercising	.88	.88***
To make new friends	.83	.83***
To spend time with friends	.86	.86***
To have fun being active with other people	.91	.91***
Challenge Motive		
To give me goals to work towards	.81	.81***
To measure myself against personal standards	.68	.68***
To give me personal challenges to face	.89	.89***
To develop personal skills	.82	.82***
External Regulation		
Because other people say I should	.79	.78***
Because my friends/family/partner say I should	.89	.89***
Because others will not be pleased with me if I don't	.84	.84***
Because I feel under pressure from my friends/family to exercise	.84	.84***
Introjected Regulation		
Because I feel guilty when I don't exercise	.79	.79***
Because I feel ashamed when I miss an exercise session	.88	.88***
Because I feel like a failure when I haven't exercised in a while	.87	.87***
Identified Regulation		
Because I value the benefits of exercise	.83	.83***
Because it's important to me to exercise regularly	.87	.87***
Because I think it is important to make the effort to exercise regularly	.87	.87***
Because I get restless if I don't exercise regularly	.75	.75***
Intrinsic Regulation		
Because it's fun	.89	.89***
Because I enjoy my exercise sessions	.91	.91***
Because I find exercise a pleasurable activity	.88	.87***
Because I get pleasure and satisfaction from participating in exercise	.92	.92***
Exercise		
Vigorous exercise	.96	.95***
Moderate exercise	.55	.55***

Note: $N = 251$.
** $p < .01$; *** $p < .001$.

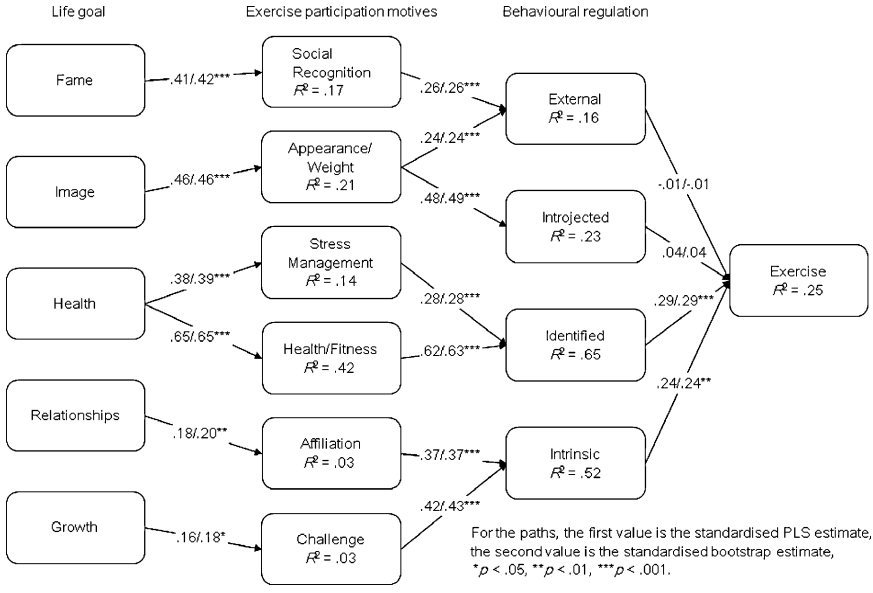

FIGURE 2. Partial least squares model.

With the exception of the effects of external and introjected regulations on exercise, all hypothesised paths were significant. The effect size was moderate for appearance/weight (f^2 = .27), social recognition (f^2 = .20), stress management (f^2 = .16), affiliation (f^2 = .03), and challenge (f^2 = .03) motives, and large for health/fitness motive (f^2 = .72). It was moderate for external (f^2 = .19) and introjected (f^2 = .30) regulation, and large for identified (f^2 = 1.86) and intrinsic (f^2 = 1.08) regulation. It was moderate for exercise (f^2 = .33).

Table 2 shows the indirect effects and tests of mediation. Stress management and health/fitness motives both had indirect effects on exercise, mediated by identified regulation (effect ratios .26 and .55, respectively). Affiliation motive had an indirect effect on exercise mediated by intrinsic regulation (effect ratio .25), and challenge motive had an indirect effect on exercise partially mediated by intrinsic regulation (effect ratio .23). Fame life goal had an indirect effect on external regulation partially mediated by social recognition motive (effect ratio .38). Image life goal had an indirect effect on external regulation, partially mediated by appearance/weight motive (effect ratio .37), and an indirect effect on introjected regulation mediated by appearance/weight motive (effect ratio .92). Health life goal had an indirect effect on identified regulation, partially mediated by stress management and health motives (effect ratio .78). Health life goal had an indirect effect on exercise, partially mediated by the paths through stress management and

TABLE 2
Structural Model Indirect Effects and Tests of Mediation

		Indirect Effect		*Direct Effect (C path)*		*Direct Effect Controlling for Mediator(s) (C′ path)*		
From	*To*	*PLS Estimate*	*Bootstrap Estimate*	*PLS Estimate*	*Bootstrap Estimate*	*PLS Estimate*	*Bootstrap Estimate*	*Effect Ratio*
Stress Management Motive	Exercise	.08	.08**	.31	.32***	.01	.01	.26
Health/Fitness Motive	Exercise	.18	.18***	.33	.35***	.10	.07	.55
Affiliation Motive	Exercise	.09	.09**	.36	.37***	.09	.08	.25
Challenge Motive	Exercise	.10	.10***	.44	.45***	.26	.26***	.23
Fame Life Goal	External Regulation	.11	.11***	.29	.31***	.17	.18*	.38
Image Life Goal	External Regulation	.11	.11***	.30	.31***	.18	.18**	.37
Image Life Goal	Introjected Regulation	.22	.23***	.24	.26***	.03	.04	.92
Health Life Goal	Identified Regulation	.52	.52***	.67	.67***	.26	.26***	.78
Health Life Goal	Exercise	.15	.15**	.39	.40***	.13	.13*	.38
Relationships Life Goal	Intrinsic Regulation	.07	.07**	.12	.03	.02	.05	.58
Relationships Life Goal	Exercise	.02	.02	.14	.13	.14	.13	.14
Growth Life Goal	Intrinsic Regulation	.07	.08**	.18	.21**	.07	.08	.39
Growth Life Goal	Exercise	.02	.02	.15	.15	.14	.02	.13

Note: $N = 251$.
* $p < .05$; ** $p < .01$; *** $p < .001$.

health/fitness motives and identified regulation (effect ratio .38). Relationships life goal had an indirect effect on intrinsic regulation, though not mediated by affiliation motive (effect ratio .58), but no significant indirect effect on exercise (effect ratio .14). Growth life goal had an indirect effect on intrinsic regulation mediated by challenge motive (effect ratio .39), but no significant indirect effect on exercise (effect ratio .13).

DISCUSSION

Main Findings in Relation to Hypotheses

In relation to Hypothesis 1, behavioural regulations predicted participation. Identified and intrinsic regulation positively predicted participation, whereas neither external nor introjected regulation predicted participation. In relation to Hypothesis 2, participation motives predicted behavioural regulation. Social recognition motive positively predicted external regulation, appearance/weight motive positively predicted external and introjected regulation, stress management, and health/fitness motives positively predicted identified regulation, and affiliation and challenge motives positively predicted intrinsic regulation. In relation to Hypothesis 3, participation motives indirectly predicted behaviour. Stress management, health/fitness, affiliation and challenge motives positively predicted participation. In relation to Hypothesis 4, life goals predicted participation motives corresponding in content. Fame life goal positively predicted social recognition motive, image life goal positively predicted appearance/weight motive, health life goal positively predicted stress management and health motives, relationships life goal positively predicted affiliation motive, and growth life goal positively predicted challenge motive. In relation to Hypothesis 5, life goals indirectly predicted behavioural regulation and behaviour. Fame life goal positively predicted external regulation, image life goal positively predicted external and introjected regulation, health life goal positively predicted identified regulation, and relationships and growth life goals positively predicted intrinsic regulation. Health life goal positively predicted participation. The indirect effects of relationships and growth life goals on participation were not significant, perhaps because the causal chains included some links that, though significant, were relatively weak. With these two exceptions, indirect effects explained substantial proportions of total effects (effect ratios). Prediction of variance was moderate to strong (f^2). Thus, overall, the findings are consistent with the general conceptual model depicted in Figure 1.

However, this was a cross-sectional study of the associations between self-reported life goals, participatory motives, behavioural regulations, and current (last seven days) exercise participation. The terms *prediction* and

effect describe statistical association not causal directionality. The presumed directions of causation are theoretically plausible, but reverse or reciprocal causation is possible. For instance, behavioural regulations may change as a consequence of participating in exercise (e.g. through exercising, individuals may come to enjoy it). Stronger research designs might entail studying how naturally occurring or experimentally induced changes in life goals predict changes in the other variables. However, it is not clear that the primary causal variables, life goals, would be sufficiently changeable for such designs to be feasible. Over the course of young adulthood, only a small minority of individuals manifest significant changes in life goals (Sheldon, 2005). Short-term changes in professed life goals can be induced by psychological threat (Sheldon & Kasser, 2008), but we are not aware of any ethically acceptable means of inducing more durable change in life goals.

Theoretical Implications

The finding that more autonomous regulatory motives (identified and intrinsic regulation) rather than more controlled regulatory motives (external and introjected regulation) predict exercise participation is consistent with self-determination theory and with previous research (e.g. Ingledew & Markland, 2008). In the present study of young adults, both intrinsic and identified regulation positively predicted participation, and neither external nor introjected regulation predicted participation. In Ingledew and Markland's (2008) study of older adults, identified but not intrinsic regulation positively predicted participation, and external regulation negatively predicted participation. It may be that, with increasing age, health issues become more salient, bringing out the positive effect of identified regulation, and weight problems become more pressing, bringing out the negative effect of external regulation. However, this is speculative. There is a need for a meta-analysis of the effects of behavioural regulations on exercise participation, looking for moderator variables such as age, health status, and obesity.

The findings that appearance/weight participation motive predicted external and introjected regulation, and that health- and stress-related motives predicted identified regulation, and that affiliation and challenge motives predicted intrinsic regulation, are consistent with previous research (e.g. Ingledew & Markland, 2008). The finding that social recognition participation motive positively predicted external regulation differs from Ingledew and Markland (2008). Ingledew and Markland (2008), based on the results of a principal components analysis, included social recognition with affiliation, challenge, and competition motives in a higher-order social engagement motive. This higher-order social engagement motive was positively associated with intrinsic regulation. However, social recognition is conceptually an extrinsic motive. Hence, we believe, the present study improves on Ingledew

and Markland (2008) by isolating the effect of social recognition participation motive on external regulation.

The effects of life goals, through corresponding participation motives, on behavioural regulation and thereby participation are consistent with self-determination theory. The nominally intrinsic life goals of relationships and growth predicted intrinsic regulation, whereas the nominally extrinsic goals of fame and image predicted external and introjected regulation. Health life goal predicted identified regulation, that is to say a form of regulation that is autonomous but not intrinsic. According to self-determination theory, it is by satisfying innate needs for autonomy, competence, and relatedness that nominally intrinsic goals engender intrinsic regulation (Deci & Ryan, 2000). In the present study, such need satisfaction is presumed rather than established.

A distinctive contribution of the present study was to incorporate dispositional motives along with participatory motives. Dispositional motives, such as life goals, conform to principles of equifinality and equipotentiality (Pervin, 2001). According to the principle of equifinality, the same endpoint can be reached from several different starting points. Thus, the same behaviour can result from several different motives. For example, in the present study, exercise served several dispositional motives, including image, social, and health motives. According to the principle of equipotentiality, several different endpoints can be reached from the same starting point. Thus, several different behaviours can result from one motive. For example, the image motive might be instead or additionally served by dieting, tanning, or following fashion; the health motive by healthy eating, uptake of screening programmes, or general self-care; the social motive by social drinking, sexual relationships, or social networking. For a fuller understanding of exercise behaviour, therefore, future research should consider not only the various dispositional motives underlying exercise, but also the various other behaviours that might serve those motives.

Implications for Exercise Promotion

We have previously discussed how exercise promotion programmes can take into account individuals' motives (Ingledew & Markland, 2008). The present study allows us to extend the argument, as follows. Adults may consider exercising for a variety of participation motives, underpinned by dispositional motives. Appearance-related participation motive, underpinned by image-related dispositional motive, is likely to be prominent. Such individuals are motivated rather than amotivated, even if the motivation is controlled. As a means of initially engaging individuals in exercise, exercise promotion programmes can highlight incentives (desirable and attainable outcomes) relevant to individuals' motives. This can be done on an individualised basis,

or by appealing to a range of motives. However, appearance-related participation motive is likely to induce controlled rather than autonomous regulation. Actual changes in appearance may materialise gradually if at all. Actual changes in appearance, if perceived as goal attainment, could lead to disengagement (see Gebhardt, 2008). Therefore, the probability of relapse is high. The problem is exacerbated because the individual has the option (equipotentiality) of switching to some alternative means of satisfying the underlying image-related dispositional motive, even if that other means may be no more successful (e.g. dieting) or may be harmful (e.g. tanning) or may be ephemeral (e.g. fashion). Fortunately, exercise will, for most people, be motivated by more than one underlying dispositional motive (equifinality), even if image-related motive is prominent. Therefore, incentives relevant to other motives can be increasingly emphasised, especially as they begin to actually materialise. The original appearance motive can be superseded by other, functionally autonomous, motives (Allport, 1937). Clearly, exercise promotion programmes also have a role to play in affording opportunities and skills for behaviour change. However, individuals' motives form the basis upon which exercise promotion programmes can build.

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