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J Health Psychol 1998 3: 477
DOI: 10.1177/135910539800300403

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Journal of Health Psychology

London, Thousand Oaks and New Delhi,
[1359–1053(199810)3:4]
Vol 3(4) 477–489; 005480

Abstract

The aim was to examine how exercise motives differ across stages of change. British government employees completed questionnaires measuring exercise motives and exercise stage of change at baseline (N = 425) and at 3-month follow-up (247 of the original sample). Discriminant analysis was used to determine whether exercise motives (and age and gender) could collectively discriminate between baseline stages of change; and whether exercise motives could discriminate between those who stayed inactive, stayed active, became active or became inactive over the 3 months. Taken as a whole, and with some qualifications, the results suggest that extrinsic (specifically bodily) motives dominate during the early stages of exercise adoption, but that intrinsic (specifically enjoyment) motives are important for progression to and maintenance of actual activity. This is consistent with Deci and Ryan's (1985) self-determination theory. The implications for exercise promotion are discussed.

Keywords

exercise, health promotion, motivation, stages of change

THE POTENTIAL BENEFITS of regular physical activity for physical and mental health are well documented (e.g. Morgan & Goldston, 1987; Paffenbarger, Hyde, & Wing, 1990) and calls for increases in health-related exercise have become commonplace (Bouchard, Shephard, Stephens, Sutton, & McPherson, 1990). However, it has become clear that the goal of participation in regular and vigorous physical activity by the majority of the population will not be realized easily (Dishman, Sallis, & Orenstein, 1985). Consequently, the study of potential determinants of the adoption and maintenance of exercise has become a major area of interest within exercise psychology. Much of the work in this area has examined the influence of health-related attitudes and beliefs, and perceptions of health benefits, in exercise adoption and maintenance. There are, however, problems with this health-centred approach. A number of authors (e.g. Dishman & Dunn, 1988; Janz & Becker, 1984) have pointed to the distinction between health-directed and health-related behaviours, recognizing that behaviours may be deliberately engaged in for health reasons or that health-related outcomes may be the incidental by-product of behaviours motivated by quite different reasons. Research in the exercise domain has shown that there are a diversity of non-health related participation motives for exercise (Duda, 1989; Duda & Tappe, 1988, 1989; Markland & Hardy, 1993; Markland & Ingledew, 1997; Markland, Ingledew, Hardy, & Grant, 1992; Willis & Campbell, 1992).

Deci and Ryan's (1985, 1990) self-determination theory has provided a popular framework for the study of exercise motivation. With this approach, a distinction is drawn between intrinsic and extrinsic motivation. When intrinsically motivated, individuals engage in an activity primarily for the enjoyment and satisfaction gained from participation per se; when extrinsically motivated, individuals participate in order to obtain rewards that are extrinsic to the behaviour itself (Deci & Ryan, 1985, 1990; Frederick & Ryan, 1993, 1995). According to Deci and Ryan (1985), these different motivational orientations will have different cognitive, emotional and behavioural consequences. Extrinsic motives may lead to tension, pressure to perform and feelings of compulsion, whereas intrinsic motives allow freedom from pressure and the experience of choice and are more likely to foster long-term engagement. It has been argued that exercising for reasons such as enjoyment and challenge reflect intrinsic motivation while exercising in order to lose weight, improve appearance or for social recognition purposes reflect extrinsic motivation (Duda & Tappe, 1989; Frederick & Ryan, 1993, 1995; Markland & Ingledew, 1997; Markland et al., 1992).

Studies consistently show that intrinsic reasons play a major role in long-term maintenance of exercise behaviour (e.g. Boothby, Tungatt, & Townsend, 1981; Frederick & Ryan, 1993; Perrin, 1979; Wankel, 1985, 1993). However, it has been pointed out that the intrinsic rewards of exercising may not be immediately apparent to those beginning a programme of exercise and that initial exercise adoption is more likely to be motivated by perceptions of health and fitness benefits (Dishman, 1987; McAuley, Wraith, & Duncan, 1991; Morgan, Shephard, Finucane, Schimmelfing, & Jazmaji, 1984). Thus one would expect to find that the participation motives of individuals in the early stages of exercise adoption would be more extrinsically oriented while those of individuals who are regular long-term exercisers would be more intrinsically oriented.

The stages of change construct (Prochaska, DiClemente, & Norcross, 1992) describes the different phases that individuals pass through in the acquisition and maintenance of a behaviour. The stages are labelled precontemplation, contemplation, preparation, action and maintenance. In the precontemplation stage, individuals have no intention of changing their behaviour in the foreseeable future (typically defined as the next 6 months). In the contemplation stage, they have some such intention. In the preparation stage, they make a commitment to change their behaviour in the very near future. In the action stage, they are actively involved in changing their behaviour, and if they sustain the change for long enough (typically defined as 6 months), they are classed as being in the maintenance stage. The stages of change construct has been applied to exercise participation (Prochaska & Marcus,

1994). It has been found, for example, that self-efficacy for exercise varies by stage of change (Marcus & Owen, 1992; Marcus, Selby, Niaura, & Rossi, 1992).

The aim of this study was to examine how exercise motives differ among individuals across the stages of change. It was predicted that the earlier stages of change would be associated with more extrinsic motives, whereas the later stages of change would be associated with more intrinsic motives. Exercising for weight management, appearance improvement, social recognition and for externally imposed health-related pressures were held to represent more extrinsic motives while exercising for enjoyment, challenge, feelings of revitalization and affiliation were held to represent intrinsic motivation. By including a longitudinal aspect in the study, we also aimed to gain some insight into causal directionality (that is to say the extent to which motives cause change in exercise behaviour or vice versa).

Method

Participants

The participants were British government employees from a single site. Questionnaires were distributed by and returned to a contact on site. The researchers themselves had no access to the site. At baseline, 1000 questionnaires were distributed. A total of 425 participants (282 men and 143 women) entered the study by completing the baseline questionnaire.

Measures

The baseline questionnaire was prefaced with a letter explaining that the research concerned motives for exercise. The questionnaire began with a definition of regular exercise in leisure time, adapted from Loughlan and Mutrie (1995). Regular exercise in leisure time was defined as 'exercise (e.g. swimming, jogging, weight training, aerobics) 2 to 3 times per week, or sport (e.g. golf, hockey, football) 2 to 3 times per week'. Such regular, and on the whole fairly intense, physical activity will contribute to long-term physical health, although the accumulation of more sporadic and gentler activity will confer similar benefits (Pate et al., 1995).

This was followed by a five-category measure of stage of change in exercise participation, adapted from Marcus et al. (1992). This item asked participants to tick the one statement that best described them: 'I currently do not exercise regularly, and I am not thinking of doing so for at least the next 6 months' (precontemplation); 'I currently do not exercise regularly, but I am thinking of doing so sometime in the next 6 months' (contemplation); 'I currently do not exercise regularly, but I am taking active steps to do so in the very near future' (preparation); 'I currently exercise regularly, but I have only begun doing so within the last 6 months' (action); and 'I currently exercise regularly, and I have done so for longer than 6 months' (maintenance).

This was followed by the Exercise Motivations Inventory (Markland & Hardy, 1993), extensively revised and phrased in such a way that it could be answered by individuals at any stage of change. Confirmatory factor analyses of this instrument (fully described in Markland & Ingledew, 1997) resulted in the Exercise Motivations Inventory version 2 (EMI-2). The scales of this EMI-2 are (in alphabetical order) Affiliation, Appearance (i.e. physical appearance), Challenge (i.e. personal challenge), Competition, Enjoyment (of the activity itself), Health Pressures (i.e. pressures arising from some specific medical advice or specific medical condition), Ill-health Avoidance (i.e. avoidance of health problems in general), Nimbleness, Positive Health (i.e. promotion of well-being), Revitalization (i.e. feeling good after exercising), Social Recognition, Strength and Endurance, Stress Management, and Weight Management. The alpha reliability coefficients ranged from .69 (Health Pressures) upwards (see Table 2). The items making up these scales are listed in Markland & Ingledew (1997).

Next, participants were asked their age and gender. Finally, they were asked to write their name and office address if they were prepared to complete a follow-up questionnaire. This follow-up questionnaire was sent 3 months later. It contained exactly the same questions as the baseline questionnaire.

Analytical procedures

The baseline data were analysed using linear discriminant function analysis to determine whether exercise motives (EMI-2 scales), age and gender

could collectively discriminate between baseline stages of change. All variables were forcibly entered into the discriminant analysis.

The follow-up data were analysed as follows. Each individual was categorized, at baseline and at follow-up, as either *inactive* (that is to say in precontemplation, contemplation, or preparation) or *active* (that is to say in action or maintenance). Note that by *active* we mean exercising regularly. Four groups were then created: those who were inactive at baseline and also at follow-up (labelled *stayed inactive*); those who were active at baseline and also at follow-up (labelled *stayed active*); those who were inactive at baseline but active at follow-up (labelled *became active*); and those who were active at baseline but inactive at follow-up (labelled *became inactive*). MANOVA and discriminant analysis were used to compare the four groups (which we will call *transition groups*) over time (baseline, follow-up) on the exercise motivation scales.

An alpha level of .05 was used for statistical tests. In multiple tests of significance, Bonferroni adjustment of the alpha level was used (for each test alpha was set at .05 divided by the number of tests).

Results

Baseline

Descriptive statistics and associations between predictor variables The 425 participants comprised 282 men (66 percent) and 143 women (34 percent). Of the 425 participants, 82 (19 percent) were in precontemplation, 57 (13 percent) in contemplation, 48 (11 percent) in preparation, 35 (8 percent) in action, and 203 (48 percent) in maintenance. A more detailed breakdown by gender and stage of change is given in Table 1. The mean age was 37.81, SD 9.90 years.

The men as a group were significantly older than the women: men M age 38.66 years, SD 9.95; women M 36.14, SD 9.62; $t(423) = 2.49$, $p = .01$. The correlations between exercise motives were predominantly positive (Table 2), the highest being that between Enjoyment and Revitalization ($r = .84$, $N = 424$, $p < .001$). There was a significant overall gender difference on exercise motives: Hotelling's $T^2 = 0.36$, $F(14, 409) = 10.47$, $p < .001$. This was elucidated using t-tests, with Bonferroni adjustment of the alpha level. These suggested that women were significantly higher than men on Appearance [$t(422) = -5.81$, $p < .001$] and Weight Management [$t(422) = -4.03$, $p < .001$], and men were higher than women on Competition [$t(360.64) = 6.33$, $p < .001$]. Age did not correlate highly with any motive (Table 2), the highest correlation being with Strength and Endurance ($r = -.27$, $N = 424$, $p < .001$).

Discriminant analysis In the discriminant analysis where exercise motives, age and gender were used to explain baseline stage of change (Table 3), three functions together explained 95 percent of the between-groups variability; the fourth did not add significantly to the between-groups separation. The first function explained 63 percent of the between-groups variability. As judged by the correlations between the discriminating variables and the discriminant function, the function was dominated by Enjoyment and Revitalization. It also incorporated (correlations above .30) Affiliation, Competition, Challenge, Nimbleness, Positive Health, Social Recognition, Strength and Endurance, Stress Management, and being younger. The second function explained 24 percent of the between-groups variability. It was dominated by Appearance and Weight Management. It also incorporated Competition (negatively), Positive Health, Strength and Endurance, being younger, and being female. Note that certain motives (Competition, Positive Health, and Strength and Endurance) appeared in both the first and the second functions. The third function explained 8 percent of the variance. It was distinguished by Health Pressures. Henceforth in this article, the functions are labelled according to their most prominent scales: Enjoyment/Revitalization, Appearance/Weight Management, and Health Pressures.

The values of the discriminant functions at the group centroids were examined (Table 3 and Figure 1). The value of a discriminant function at a group centroid is the value of the discriminant function when the group is at its mean on each discriminating variable. Precontemplation was characterized by low Enjoyment/Revitalization. Contemplation was characterized by somewhat higher motivational levels overall, but with Enjoyment/Revitalization still relatively

Table 1. Frequencies of gender and stage of change at baseline

	Stage of change					
Gender	*Precontemplation*	*Contemplation*	*Preparation*	*Action*	*Maintenance*	*Total*
Male	54 (19%)	38 (13%)	28 (10%)	15 (5%)	147 (52%)	282 (100%)
Female	28 (20%)	19 (13%)	20 (14%)	20 (14%)	56 (39%)	143 (100%)
Total	82 (19%)	57 (13%)	48 (11%)	35 (8%)	203 (48%)	425 (100%)

The percentages are within-row percentages

low. Preparation was characterized by still higher motivational levels overall, but now Enjoyment/Revitalization was almost on a par with Appearance/Weight Management and Health Pressures. Action was characterized by the dominance of Appearance/Weight Management over Enjoyment/Revitalization, with Health Pressures low. Finally, maintenance was characterized by the dominance of Enjoyment/Revitalization over Appearance/Weight Management. The F tests for Mahalanobis distances between groups (with Bonferroni adjustment of the alpha level) indicated that each group was significantly separate from every other group, except for a non-significant distance between Preparation and Action.

In this discriminant analysis, Box's M was significant [Box's M = 797.66, approximate $F(544, 75216.4) = 1.29$, $p < .001$]. Therefore, we had to reject the null hypothesis of equality of covariance matrices across groups. However, Box's M is a conservative test. Discriminant analysis procedures are fairly robust against departures from the assumptions of multivariate normality within groups and equality of covariance matrices across groups (see Duarte Silva & Stam, 1995; Stevens, 1996, chs 6 and 7). Moreover, most evidence suggests that linear discriminant analysis will perform reasonably well if dichotomous variables (such as gender in our study) are included as explanatory variables (Gilbert, 1968; Moore, 1973).

Follow-up

Sample at follow-up Of the original 425 participants, 323 consented (at baseline) to receive the follow-up questionnaire, and 102 did not. These two groups, those who consented and those who did not, differed significantly on baseline stage of change: Pearson $\chi^2(4, N = 425) = 11.57$, $p = .02$. To elucidate this effect, pairwise comparisons were conducted using Fisher's exact test (with Bonferroni adjustment of the alpha level). These were all non-significant. However, the comparison of action with precontemplation and the comparison of maintenance with precontemplation were both very close to significance (Fisher's exact test $p = .007$ in both cases). When action and maintenance were combined and compared with precontemplation, Fisher's exact test p was .002. Those who consented were more likely than those who did not to be in action/maintenance and less likely to be in precontemplation.

Of the 323 who consented to the follow-up questionnaire, 247 actually returned it, and 76 did not. These two groups did not differ significantly on baseline stage of change: Pearson χ^2 (4, N = 323) = 3.45, $p = .48$. Finally, of the original 425 participants, the 247 who returned the follow-up questionnaire could be compared with the remaining 178. These two groups did not differ significantly on baseline stage of change: Pearson χ^2 (4, $N = 425$) = 7.11, $p = .13$.

Analyses over time Correlations between baseline and follow-up motives were all positive and significant, the lowest being for Positive Health ($r = .64$, $N = 247$, $p < .001$) and the highest for Competition ($r = .91$, $N = 247$, $p < .001$). Of the individuals who returned the follow-up questionnaire, 34 percent had changed stage of change (84/246; one individual had missing data for follow-up stage of change). The actual changes in stage of change are enumerated in Table 4. As can be seen, there are small numbers in many of the cells. Even if, for each baseline stage of change, respondents were divided into three groups (those who regressed to an earlier stage of change, those who

Table 2. Descriptive statistics, internal consistencies, and correlations for motivations and age at baseline

					Correlations													
Variable	*M*	*SD*	*Skewness*	*Cronbach's alpha*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1. Affiliation	1.88	1.43	0.18	.91	—													
2. Appearance	1.98	1.35	0.15	.86	.10*	—												
3. Competition	1.58	1.63	0.69	.95	.59**	.09	—											
4. Enjoyment	2.35	1.45	−0.07	.90	.40**	.38**	.55**	—										
5. Challenge	1.74	1.32	0.32	.86	.44**	.42**	.59**	.66**	—									
6. Health Pressures	1.03	1.21	1.36	.69	−.01	.14**	−.07	−.13**	.05	—								
7. Ill-health Avoidance	2.92	1.37	−0.38	.90	.04	.35**	.01	.21**	.28**	.39**	—							
8. Nimbleness	2.67	1.36	−0.33	.90	.25**	.55**	.20**	.51**	.49**	.18**	.50**	—						
9. Positive Health	3.47	1.19	−1.00	.88	.13**	.56**	.17**	.49**	.40**	.10*	.61**	.65**	—					
10. Revitalization	2.64	1.34	−0.32	.83	.34**	.42**	.39**	.84**	.59**	−.02	.31**	.56**	.58**	—				
11. Social Recognition	0.90	1.06	1.06	.88	.50**	.32**	.69**	.49**	.70**	.08	.11*	.34**	.20**	.40**	—			
12. Strength and Endurance	2.40	1.33	−0.07	.86	.15**	.58**	.31**	.53**	.62**	.11*	.34**	.62**	.58**	.50**	.43**	—		
13. Stress Management	2.44	1.43	−0.16	.92	.23**	.38**	.21**	.53**	.47**	.20**	.34**	.50**	.45**	.68**	.33**	.43**	—	
14. Weight Management	2.83	1.59	−0.31	.91	−.04	.61**	.03	.18**	.21**	.19**	.34**	.36**	.45**	.26**	.10*	.37**	.29**	—
15. Age	37.81	9.90	0.43	—	−.13**	−.20**	−.16**	−.17**	−.19**	.11*	.13**	−.09	−.08	−.14**	−.19**	−.27**	−.09	−.12*

N = 424–425 for descriptives, 418–424 for Cronbach's alpha, 424 for correlations

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

Table 3. Discriminant analysis using baseline motivations, age and gender to explain baseline stage of change

	Discriminant function		
	1	*2*[a]	*3*[a]
Discriminating variable	Correlation between discriminating variable and discriminant function		
Affiliation	.37	−.21	.07
Appearance	.25	.58	−.07
Competition	.53	−.38	.21
Enjoyment	.75	−.24	−.08
Challenge	.60	.16	.09
Health Pressures	−.27	.19	.44
Ill-health Avoidance	.19	.16	.06
Nimbleness	.44	.17	.24
Positive Health	.53	.35	.12
Revitalization	.74	−.01	−.07
Social Recognition	.36	−.07	.05
Strength and Endurance	.48	.32	−.10
Stress Management	.41	.07	.27
Weight Management	.26	.52	.25
Age	−.34	−.35	−.13
Gender[b]	−.04	.37	−.26
Stage of change	Value of discriminant function at group centroid		
Precontemplation (n = 81)	−1.28	−0.19	−0.03
Contemplation (n = 57)	−0.44	0.29	0.22
Preparation (n = 48)	0.47	0.68	0.44
Action (n = 35)	0.15	0.90	−0.67
Maintenance (n = 203)	0.50	−0.32	−0.04

N = 424: males 281; females 143. F (16, 404) tests for the Mahalanobis distances between groups: Precontemplation and Contemplation $F = 2.68$, $p < .001$; Precontemplation and Preparation $F = 7.38$, $p < .001$; Precontemplation and Action, $F = 5.39$, $p < .001$; Precontemplation and Maintenance, $F = 11.25$, $p < .001$; Contemplation and Preparation, $F = 2.36$, $p = .002$; Contemplation and Action, $F = 2.20$, $p = .005$; Contemplation and Maintenance, $F = 4.00$, $p < .001$; Preparation and Action, $F = 1.76$, $p = .03$; Preparation and Maintenance, $F = 3.03$, $p < .001$; Action and Maintenance, $F = 3.60$, $p < .001$. Function 1 explained 63% of the between-groups variability; function 2 explained 24%; function 3 explained 8%. The percentage of cases correctly classified was 48%. Box's $M = 797.66$, approximate $F(544, 75216.4) = 1.29$, $p < .001$

[a] To aid interpretation, all the signs in this column have been reversed. The overall direction of these signs is arbitrary in the first place

[b] Gender was coded as 1 for male and 2 for female

Table 4. Frequencies of changes in stage of change from baseline to follow-up

	Follow-up stage				
Baseline stage	*Precontemplation*	*Contemplation*	*Preparation*	*Action*	*Maintenance*
Precontemplation	26	9	0	4	3
Contemplation	7	10	5	5	1
Preparation	1	6	7	12	1
Action	2	8	3	6	6
Maintenance	3	2	5	1	113

247 individuals returned the follow-up questionnaire, but one of these had missing data for stage of change

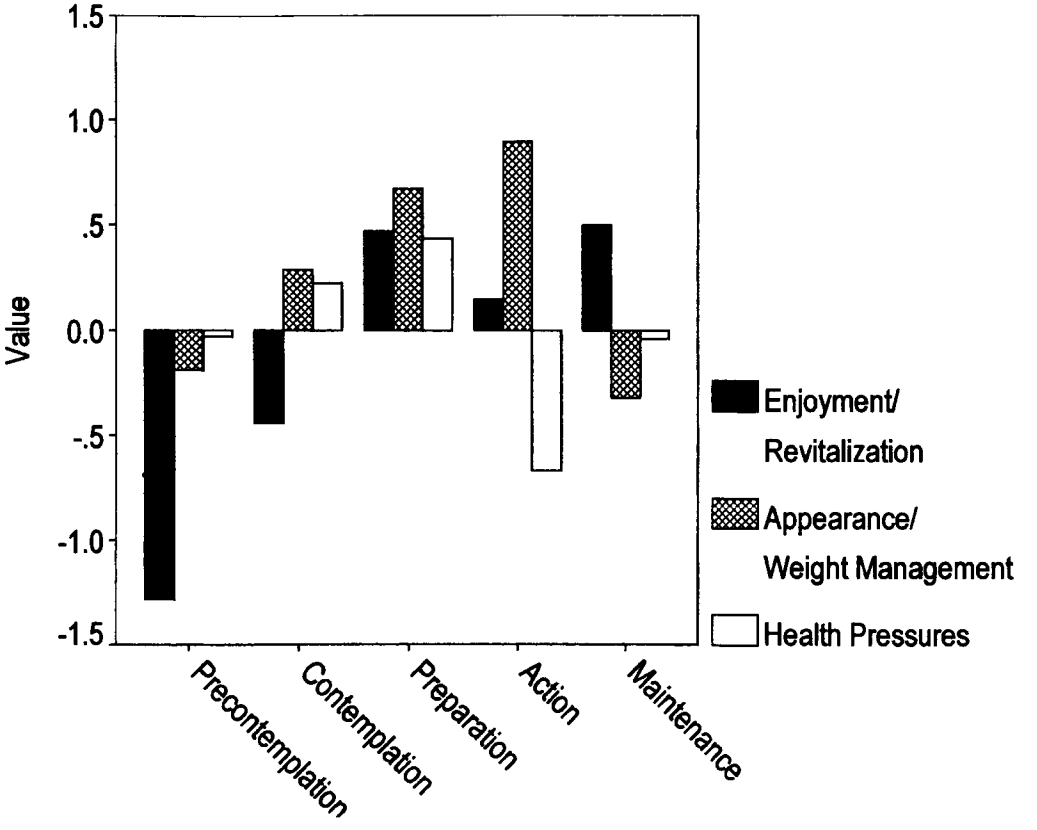

Figure 1. Values of discriminant functions at group centroids in discriminant analysis of baseline data.

remained in the same stage of change, and those who progressed to a higher stage of change), there would still be small numbers in some of the cells. This was why we created the four transition groups: stayed inactive (n = 71); stayed active (n = 126); became active (n = 26); and became inactive (n = 23).

In Table 4 it is apparent that 5 individuals who classified themselves as being in precontemplation, contemplation or preparation at baseline went on to classify themselves as being in maintenance at follow-up. This is clearly aberrant, since maintenance was defined as regular exercise for more than 6 months, whereas follow-up was at 3 months. This highlights the problems inherent in measuring stage of change by self-report. Self-report cannot be avoided, since measuring stage of change involves an assessment of intention. Marcus and Simkin (1993) have validated their stage of change measure against a detailed physical activity questionnaire, but we know of no studies that have incorporated objective behavioural measures such as pedometry. As regards the 5 individuals, we decided that it was, on balance, more sensible to include them in the became active group than to omit them completely.

In the MANOVA comparing the four transition groups over time on exercise motives, there was a significant main effect of group [approximate $F(42, 683) = 3.32$, $p < .001$], but no significant interactive effect of group by time [approximate $F(42, 683)$, $p = .23$] and no significant main effect of time [$F(14, 229) = 1.17$, $p = .30$]. The main effect of group was elucidated with discriminant analysis (Table 5). This produced one function that explained 76 percent of the between-groups variability; the other functions did not add significantly to the

Table 5. Discriminant analysis using motivations[a] to explain transitions from baseline to follow-up

Discriminating variable	Correlation between discriminating variable and discriminant function
Affiliation	.33
Appearance	.21
Challenge	.47
Competition	.57
Enjoyment	.76
Health Pressures	−.44
Ill-health Avoidance	.14
Nimbleness	.30
Positive Health	.42
Revitalization	.69
Social Recognition	.40
Strength and Endurance	.45
Stress Management	.33
Weight Management	.04
Transition	**Value of discriminant function at group centroid**
Stayed inactive (n = 71)	−0.97
Stayed active (n = 126)	0.59
Became active (n = 26)	0.14
Became inactive (n = 23)	−0.38

N = 246. $F(14, 229)$ tests for the Mahalanobis distances between groups: stayed inactive and stayed active $F = 7.43$, $p < .001$; stayed inactive and became active $F = 2.73$, $p = .001$; stayed inactive and became inactive $F = 1.39$, $p = .16$; stayed active and became active $F = 1.60$, $p = .08$; stayed active and became inactive, $F = 2.13$, $p = .01$; became active and became inactive $F = .99$, $p = .47$. The function explained 76% of the between-groups variability. The percentage of cases correctly classified was 56%.
Box's $M = 520.25$, approximate $F(315, 17953.7) = 1.35$, $p < .001$
[a] We computed, for each motivation and for each individual, the mean of the baseline and follow-up scores. We used these computed variables in the discriminant analysis

between-groups separation. The function was dominated by Enjoyment and Revitalization. It also incorporated (correlations above .30) Affiliation, Challenge, Competition, Health Pressures (negatively), Nimbleness, Positive Health, Social Recognition, Strength and Endurance, and Stress Management. The group who stayed inactive was lowest on this function, and the group who stayed active was highest. The F tests for Mahalanobis distances between groups (with Bonferroni adjustment of the alpha level) indicated that the group who stayed inactive was significantly separate from the group who stayed active and the group who became active, but otherwise the groups were not significantly separate from each other. For completeness, the discriminant analysis was repeated, this time including age and gender alongside the exercise motives. The overall pattern of results was very similar. Age correlated −.34 and gender correlated −.15 with the discriminant function.

Discussion

At baseline, almost half of the sample (48 percent) fell into the maintenance category. In any study, the proportions of participants falling into the different stages of change will depend to some extent upon what definition of regular exercise is provided for the participants. Our definition of regular exercise was adapted from Loughlan and Mutrie (1995). Using their questionnaire, Mutrie, Loughlan, Campbell, Marsden, & McCarron (1997) reported the percentage who were maintainers as 41 percent in a sample of health service staff, 33 percent in a separate sample of nurses, 28 percent in a sample of diabetic patients, and 32 percent in a sample of students. Therefore, the percentage falling into the maintenance category in our sample was relatively high. This may be because the sample was drawn from a white-collar workforce, or a self-selection effect, or both. We had no means of comparing those who entered

the study with those who did not. However, having entered the study, those who consented to follow-up were more likely than those who did not to be in action/maintenance and less likely to be in precontemplation. On the other hand, having consented to follow-up, those who subsequently responded to follow-up and those who did not respond were not significantly different on baseline stages of change.

In interpreting the baseline discriminant analysis results, our preference is to see Enjoyment/Revitalization as representing predominantly intrinsic motivation, and Appearance/Weight Management as representing predominantly extrinsic motivation (see e.g. Frederick & Ryan, 1993, 1995). One way of viewing the pattern of results (Figure 1) is to look at which motives are dominant at each stage of change. In precontemplation, the more extrinsic motives (Appearance/Weight Management) dominate over the more intrinsic (Enjoyment/Revitalization). In contemplation, this dominance is less marked and in preparation it has disappeared. In action, however, the more extrinsic motives again dominate over the more intrinsic. Finally, in maintenance, the situation is reversed, and the more intrinsic motives dominate over the more extrinsic. Another way of viewing the pattern is to look at how particular motives vary across the stages. The more intrinsic motives (Enjoyment/Revitalization) start at a low level in precontemplation, increase up to preparation, drop in action, and are restored in maintenance. The more extrinsic motives (Appearance/Weight Management) start at a moderate level in precontemplation, increase up to action, and drop in maintenance. These are, of course, cross-sectional results, so no causal directionality can be inferred.

The follow-up discriminant analysis results indicate that actual progress from inactivity to activity is associated with a higher level of the more intrinsic motives, but not the more extrinsic. Since baseline motives have predicted change in activity status, we are one step closer to being able to infer causality.

Taken as a whole, the results suggest that extrinsic motives dominate during the early stages of exercise adoption, but that intrinsic motives are important for progression to and maintenance of actual activity. This would be consistent with Deci and Ryan's (1985) self-determination theory. However, it is necessary to qualify this generalization in four main ways.

First, one can question the stages of change construct. Sutton (1996) questions whether in reality there are stages (as distinct from a continuum) of change, and whether progression is at all orderly. We think that even if our stages are an arbitrary imposition upon a continuum of change, they provide more useful information than a simple distinction between exercisers and non-exercisers. In the baseline results, the trend in motives from precontemplation to preparation was fairly orderly, but the contrasts between preparation, action and maintenance stages were marked.

Second, in the baseline results, the action stage was characterized by a middling level of Enjoyment/Revitalization when compared with the preceding (preparation) and the following (maintenance) stages. The explanation may be simple: for many previously inactive individuals, the initial experience of exercising is actually not very enjoyable (Parfitt, Markland, & Holmes, 1994).

Third, in the baseline results, the action stage was characterized by relatively high Appearance/Weight Management, but relatively low Health Pressures. Both Appearance/Weight Management and Health Pressures were thought to be extrinsic rather than intrinsic motives, so the fact that they not only formed separate functions but also diverged in the action stage seems anomalous. Moreover, in the follow-up results, Health Pressures correlated negatively with the same function that Enjoyment and Revitalization correlated positively with, consistent with the idea that *lack* of health pressures contributes to *intrinsic* motivation.

Fourth, one can question whether specific motives can ever be described decisively as either predominantly intrinsic or predominantly extrinsic. In the baseline results, certain of the motives (Competition, Positive Health, and Strength and Endurance) formed part of both the Enjoyment/Revitalization and the Appearance/Weight Management functions. Health Pressures formed a function on its own. Ill-health Avoidance did not form part of any function. Social Recognition formed part of the Enjoyment/Revitalization function whereas we had thought of it as extrinsic (which leads us to wonder whether this scale contains enough of the notion

of peer pressure). Our preference is to persist with the intrinsic versus extrinsic distinction, because then our results can be accommodated within an overarching theory (Deci & Ryan, 1985). However, we recognize the limitations of the distinction. Markland and Ingledew (1997) discuss this issue in more detail.

If one rejects the intrinsic versus extrinsic distinction, then our results indicate simply a distinction between enjoyment, bodily, and health pressure motives for exercise. However, such a distinction is still important at a theoretical level. Most contemporary health behaviour models have their roots in expectancy-value theories (Conner & Norman, 1996). If one uses the expectancy-value approach to predict a particular behaviour, one needs to know the perceived probability (expectancy) that the behaviour will achieve a particular outcome and the perceived importance (value) of that outcome. However, one first needs to know what the relevant outcomes are. It is little use focusing on health as the outcome when the behaviour is being conducted for non-health reasons. As mentioned in the Introduction, many health-related behaviours (behaviours that affect health) are undertaken for non-health reasons (Janz & Becker, 1984). The EMI-2 measures a range of possible reasons (motives) and the present study suggests that enjoyment, bodily and health pressure reasons are all pertinent to varying degrees depending upon stage of change.

Our specific findings have implications for the promotion of exercise. In the early stages of exercise adoption there would be merit in emphasizing both the extrinsic (bodily) and the intrinsic (enjoyment) benefits of exercising. The intrinsic benefits are important for progress towards and maintenance of actual activity. However, the extrinsic (bodily) benefits are still important for individuals in the action stage. Individuals about to embark on an exercise programme should be forewarned that the anticipated enjoyment benefits may not materialize in the short-term, and reassured that, meanwhile, a reliance on the more bodily benefits is quite legitimate. With time (a matter of months), the enjoyment benefits should materialize.

Our specific findings for the health-related scales also have implications for the promotion of exercise. At baseline, Health Pressures as a motive was particularly low in the action stage. At follow-up, lack of Health Pressures was part of the predominantly intrinsic function that was associated with progress to actual activity. This raises doubt about the likely efficacy of 'exercise on prescription' (see Iliffe, Tai, Gould, Thorogood, & Hillsdon, 1994), if this is done in an overly directive manner. At baseline and at follow-up, Ill-health Avoidance was not a notable part of any function. This raises doubt about the likely efficacy of any intervention that focuses primarily on the avoidance of health problems. In the baseline and the follow-up results, Positive Health was part of a predominantly intrinsic function. This bodes well for the likely efficacy of interventions that focus upon exercise as a means of enhancing well-being rather than avoiding disease. However, we must restrict such conclusions to the sort of population that we studied. It can be presumed that these individuals were predominantly in good health. For less healthy individuals, where the health benefits of physical activity could be rehabilitative rather than preventive, other considerations might apply.

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