Motivational processes and well-being in cardiac rehabilitation: A Self-Determination Theory perspective

Abstract

This research examined the processes underpinning changes in psychological well-being and behavioural regulation in Cardiac Rehabilitation (CR) patients using Self-Determination Theory (SDT; Deci & Ryan, 1985). A repeated measures design was used to identify the longitudinal relationships between SDT variables, psychological well-being and exercise behaviour during and following a structured CR programme. Participants were 389 cardiac patients (aged 36-84 years; $M_{age} = 64 \pm 9$ years; 34.3% female) referred to a 12 week supervised CR programme. Psychological need satisfaction, behavioural regulation, health-related quality of life, physical self-worth, anxiety and depression were measured at programme entry, exit and 6 month post-programme. During the programme, increases in autonomy satisfaction predicted positive changes in behavioural regulation, and improvements in competence and relatedness satisfaction predicted improvements in behavioural regulation and well-being. Competence satisfaction also positively predicted habitual physical activity. Decreases in external regulation and, increases in intrinsic motivation, predicted improvements in physical self-worth and physical well-being respectively. Significant longitudinal relationships were identified whereby changes during the programme predicted changes in habitual physical activity and the mental quality of life from exit to 6 month follow-up. Findings provide insight into the factors explaining psychological changes seen during CR. They highlight the importance of increasing patients' perceptions of psychological need satisfaction and self-determined motivation to improve well-being during the structured component of a CR programme and longer-term physical activity.

Key words

Self-Determination Theory; Cardiac rehabilitation; well-being; psychological need satisfaction; behavioural regulation.

Cardiac Rehabilitation (CR) programmes are an essential component of care for patients who have experienced MI, cardiovascular disease and pre/post cardiac surgery (National Institute of Clinical Excellence; NICE, 2013). Typically, programmes involve a multidisciplinary team offering exercise training, education and counselling, with the aim of improving physical functioning, symptoms and quality of life (NICE, 2013).

CR programmes have been found to reduce deaths in cardiac patients by 27% (British Heart Foundation; 2010), improve exercise capacity, lipid, lipoprotein and blood glucose levels, and, reduce body weight, systolic and diastolic blood pressure (Balady, Fletcher, & Froelicher, 1994; Bjarnason-Wehrens et al., 2007). Research has also revealed psychological benefits in the form of improved anxiety, depression and quality of life (Yohannes, Doherty, Bundy, & Yalfani, 2010). This is important given that cardiac patients report elevated levels of anxiety and depression and poor quality of life, contributing to increased risks of secondary cardiac events (Frasure-Smith & Lespérance, 2005, 2008). Despite this, only 40% of MI patients participate in CR programmes, highlighting the need to understand exercise motivation in CR patients (BHF, 2010).

Studies have drawn on psychological theory to understand motivations underpinning exercise behaviour and participation in CR. One theory demonstrating relevant application is Self-Determination Theory (SDT; Deci & Ryan, 1985). SDT is concerned with the processes involved in behavioural regulation and their associated cognitive, affective and behavioural outcomes. According to SDT, individuals' self-determined regulation lies along a continuum of five increasingly internalised regulations. Amotivation signifies a lack of motivation, external regulation refers to a drive as a result of pressure from an external source, introjected regulation refers to feeling moved to engage in a behaviour but not truly accepting its value, and identified regulation refers to feeling motivated through accepting the values of the behaviour in question. Finally, intrinsic motivation signifies the most self-determined form of regulation where individuals engage in behaviour for the inherent pleasure of doing so. According to SDT, self-determined regulation leads to increased persistence, well-being and likelihood to maintain behaviour (Deci & Ryan, 2002).

SDT further proposes that self-determined regulation and well-being result from the satisfaction of three innate psychological needs: autonomy (the need to feel volitional in one's actions), competence (the need to feel able to affect outcomes) and relatedness (the need to have supportive relationships; Wilson, Rodgers, Blanchard, & Gessell, 2003).

SDT has demonstrated relevance in exercise and health care contexts. As such, self-determined regulations lead to better mental health and stronger physical activity intentions (Rouse, Ntoumanis, Duda, Jolly, & Williams, 2011) and improvements in psychological outcomes in exercise referral patients (Rahman, Thøgersen-Ntoumani, Thatcher, & Doust, 2011). These associations have been confirmed by meta-analysis (Ng et al., 2012).

More specifically, in CR, Russell and Bray (2009) used SDT to predict exercise behaviour in a cross-sectional and prospective study of CR outpatients (N = 68, M_{age} = 64.9 years) with competence satisfaction demonstrating a key role as a predictor of self-determined regulation and exercise behaviour up to 6 weeks following CR. Extending these findings, Sweet, Tulloch, Fortier, Pipe, and Reid (2011) demonstrated that self-determined individuals were more likely to maintain exercise behaviour up to 24 months following CR (N = 251, 79% male, M_{age} = 61.4 years).

These studies illustrate the applicability of SDT for predicting short and long term exercise behaviour; however, they did not examine relationships between SDT variables and psychological outcomes in a CR context. The aim of this research was therefore to use SDT to explore if changes in psychological need satisfaction predicted changes in behavioural regulation over the duration of the programme, and, if changes in psychological need satisfaction and behavioural regulation during the programme predicted changes in psychological well-being during the programme, and, from exit to 6-month follow-up.

It was hypothesised that increases in psychological need satisfaction would predict improvements in self-determined regulation and decreases in more controlled regulations during the programme (entry to exit), and, that increases in psychological need satisfaction and self-determined regulation and decreases in controlled forms of regulation during the programme (entry to exit) would predict improvements in psychological well-being and habitual physical activity during the programme (entry to exit) and beyond (exit to 6 month follow-up).

Methods

Participants

577 participants were referred to the CR scheme over 3 years (age range 18-87 years; M_{age} = 64 ± 10 years; 35.3% female). 484 were invited to start classes during the research period and 389 consented (age range 36-84 years; M_{age} = 64 ± 9 years; 34.3% female). No significant differences in age ($t(721) = .78$, $p > .05$) or gender ($Z(1) = -.44$, $p > .05$) were identified between the total referral group and the research participants. Figure 1 presents a flow diagram of participation which illustrates that not all of the 389 consenting participants returned each questionnaire at each time point. 243 completed the programme during the research period. Many did not provide a reason for drop-out (48%), four died during the programme (non-programme related), other reasons included ill-health, family or work commitments, moving and lack of time. Comparisons of programme completers and non-completers using a Mann-Whitney Test demonstrated a significant difference in anxiety ($U(248)=5392.5$, $p<.05$), depression ($U(248)=5294.0$, $p<.05$) and MCS of the SF-36v2 (see

below; $U(245)=5645.0$, $p<.05$) with completers reporting significantly higher levels of well-being.

[*Insert Figure 1 here*]

Measures

Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004a) measured participants' exercise regulation and comprised 19 items [5-point scale ranging from 0 (*Not true for me*) to 4 (*Very true for me*)] with 5 subscales representing the motivational regulations. Reliability analyses show high Cronbach's alphas ranging from .73-.86 for subscales (Markland & Tobin, 2004a).

Psychological Need Satisfaction Scale (PNSS; Markland & Tobin, 2004b) comprises 9 items (3 for each need) measuring psychological need satisfaction in an exercise class context. The response scale matches that of the BREQ-2. Cronbach's alphas range between .59 and .72 (Markland & Tobin, 2004b).

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is a 14-item questionnaire [4-point scale; scores ranging from 0-21] consisting of subscales for anxiety and depression. Both subscales report alpha values exceeding .90 (Moorey et al., 1991).

Short Form-36version2 (SF-36v2; Wade, Snow, Kosinski, & Gandek, 1993, 2002) measured health-related quality of life. The 36 items measure physical and social functioning, role limitations due to physical and emotional problems, mental health, vitality, pain and general health. Response scales vary by question. Scores form 2 summaries: the physical component summary (PCS) and the mental component summary (MCS). Cronbach's alphas for the subscales range from .80-.95 (Jenkinson, Stewart-Brown, Petersen, & Paice, 1999).

Baecke's Questionnaire of Habitual Physical Activity (BeackeHPA ; Baecke, Burema, & Frijters, 1982) comprises 16 items that constitute three subscales: activity at work, sport and leisure. Response format varies by question and responses are combined, producing an overall habitual activity score. Cronbach's alphas for the total score are reported as .77 (Florindo, do Rosario Dias, & Latorre, 2003).

Physical Self-Perception Profile (PSPP; Fox & Corbin, 1989) comprises 5 subscales. The physical self-worth subscale used in this study assesses an individual's general feelings about their physical self. The question format employs a four point forced choice scale in which two alternative statements are provided and individuals select the most representative statement before indicating the degree to which the statement is true for them. Coefficient alphas for the subscale exceed .80 (Fox & Corbin, 1989).

The Cardiac Rehabilitation programme

A 12 week supervised Phase III (structured exercise training and education) and IV (maintenance) CR programme was held in 6 council owned leisure centres across Mid Wales. Adult participants with any heart condition were referred by health professionals, or, could self-refer. They included those who had suffered an MI, were awaiting/recovering from heart surgery, those with heart disease, heart failure, stable angina, or controlled arrhythmias. Anyone with uncontrolled hypertension, unstable angina or uncontrolled arrhythmias was not eligible.

Patients were invited to a consultation where a cardiac nurse assessed their medical history, they were briefed about the research and their participation was requested. Participants provided informed consent and were invited to attend an induction followed by twice weekly 60 minute exercise classes: one gym based and one circuit session. Qualified exercise professionals taught participants how to exercise safely and gradually increase exercise intensity. Both exercise sessions included cardiovascular and strength based exercise with warm up/warm down protocols of approximately 10 minutes within the hour. Participants wore heart rate monitors and were encouraged to work between 60-75% of their maximum heart rate, as determined by the exercise professionals. On completion of the programme participants were offered a 6 month maintenance package, which entitled them to access exercise facilities at reduced cost.

Procedures

Ethical approval for the study was obtained from an NHS ethics Committee. The SF-36v2, PSPP and the HADS were posted for completion prior to commencing classes. Participants met with a researcher during their first class and completed the BaeckeHPA. The BREQ-2, the PNSS, a covering letter and a pre-paid return envelope were sent to participants following their first class. Following their final class, participants met with the researcher to complete the BaeckeHPA and were asked to complete all other measures independently. Those who completed the pogramme were also contacted 6 months later and asked to complete all measures again.

Data analysis

Assumptions for multicollinearity, independence of outcome variables, independent errors homoscedasticity, normally distributed errors and linearity were tested. Data were not normally distributed and remained so following log and root transformations. Thus original raw data were retained. An intent to treat analysis was utilised where baseline data was carried forward to missing time points to provide a conservative effect of changes seen during the programme. Wilcoxon signed rank and Friedman tests were used to examine whether there were significant differences in variables across time points.

In the longitudinal analysis, all variable scores at entry were force entered into a simple linear regression model and used to predict scores of the same variable at exit; standardised residual scores were retained. The same procedure was used when examining if exit predicted 6 month follow-up. Residual scores were used as indicators of change in each variable and were used in subsequent analyses. Change scores (residuals) were force entered into linear regression analyses to explore: 1) change in psychological needs predicting change in behavioural regulations (entry to exit), and, 2) change in psychological needs and behavioural regulations (entry to exit) predicting change in psychological outcomes and habitual activity (entry to exit and exit to follow-up).

Results

Descriptive statistics

Table 1 shows how competence and relatedness satisfaction both significantly increased from entry to exit with levels of competence remaining significantly higher at 6 months than at entry. In contrast, relatedness satisfaction significantly decreased from exit to 6 month follow-up, resulting in significantly lower relatedness satisfaction at 6 months post programme than at entry. No changes were observed in autonomy satisfaction. External regulation significantly decreased from entry to exit and remained significantly different from entry to 6 months; however intrinsic motivation remained unchanged during the programme but then significantly decreased from baseline to 6 months.

All psychological outcomes improved significantly from entry to exit, with improvements in physical self-worth and the PCS of the SF-36v2 maintained at 6 months. Significant increases in habitual physical activity were seen at programme exit and were maintained at 6 month follow-up.

[*Insert Table 1 here*]

Inferential statistics

Table 2 shows the correlation matrix between all residual scores used in subsequent regression models. Table 3 shows how changes in psychological needs predicted changes in outcome variables during the programme. Increases in autonomy satisfaction significantly predicted decreases in amotivation and external regulation, and, increases in intrinsic motivation. Increases in competence satisfaction predicted an increase in intrinsic motivation, physical well-being and habitual physical activity and a decrease in depression. Finally increases in relatedness satisfaction predicted increases in identified regulation and mental well-being.

[*Insert Tables 2 and 3 here*]

Table 4 shows how changes in behavioural regulation (entry to exit) predicted changes seen in psychological well-being (entry to exit). A decrease in external regulation predicted an increase in physical self-worth whilst increases in intrinsic motivation predicted increases in SF-36v2-PCS.

[*Insert Table 4 here*]

The results of analyses exploring whether changes in psychological needs and behavioural regulation that were experienced during the programme predicted psychological well-being and habitual physical activity from exit to follow-up, demonstrated that changes in autonomy satisfaction from entry to exit negatively predicted changes in the mental component of quality of life (Adj $R^2 = .068$, $F(128)=4.122$, $p < .01$; standardised $\beta = -.244$, $p < .01$) whilst changes in intrinsic motivation from entry to exit positively predicted changes in habitual physical activity from exit to 6 months (Adj R^2 = .075, $F(170)=3.774$, $p < .01$; standardised $\beta = -.219$, $p < .05$).

Discussion

This research employed SDT as a framework to explore how psychological need satisfaction and behavioural regulation relate to change in CR patients' psychological well-being and physical activity following an exercise based CR programme. The hypothesis was supported. Specifically, increased autonomy satisfaction during the programme predicted decreased amotivation and external regulation, and, increased intrinsic motivation. It appears that autonomy was central to internalising behavioural regulations for exercise. However, satisfaction of this psychological need had no direct benefit for psychological well-being.

Both competence and relatedness satisfaction predicted behavioural regulation and psychological and behavioural outcomes in the expected direction. Competence satisfaction predicted an increase in intrinsic motivation, physical quality of life and habitual physical activity, as well as a decrease in depression during the supervised CR exercise programme. It appears that following the potential disruption to physical ability and daily functioning resulting from a cardiac event or disease (Hobbs et al., 2002), whether an individual subsequently feels competent to exercise contributes to their enjoyment of CR, their perception of their physical well-being and depression level. It also makes intuitive sense that an individual's perceived ability to exercise is likely to positively influence their levels of activity (Rhodes & Nigg, 2011).

This lends support to findings by Russell and Bray (2009) who identified competence satisfaction as a key predictor of self-determined motivation in CR. Given that competence satisfaction is modifiable, for instance, by providing positive feedback (Ryan, Patrick, Deci, & Williams, 2008) this finding identifies a potential mechanism for reducing depression, considered to be a key contributor to secondary cardiac events (Frasure-Smith & Lespérance, 2005, 2008), as well as encouraging self-determined motivation to engage in CR and physical activity.

Increases in relatedness satisfaction significantly predicted increased identified regulation and mental well-being. Thus, feeling connected to the exercise environment may contribute to the internalisation process whereby individuals begin to identify with the values of exercise. This sense of support is key to enhancing psychological aspects of quality of life.

Becoming less externally regulated from entry to exit predicted increases in physical self-worth. This may stem from increased pride in physical achievements given the opportunity to regain ownership of one's behaviour, feeling less controlled by external sources and actively participating in risk factor modification. This relationship between external regulation and physical self-worth therefore suggests the importance of encouraging CR participants to be more self-determined during programme delivery.

Finally, increasing intrinsic motivation from entry to exit predicted improvements in the quality of life-PCS over this period, supporting the SDT proposal that self-determined motivation is necessary for increased well-being (Deci & Ryan, 2002). A possible explanation for this relationship is that participants who became more self-determined during the programme adhered more and benefitted from the exercise, thus they perceived an improvement in their physical well-being. Alternatively individuals who enjoyed the exercise might have been more likely to acknowledge the benefits accrued.

There were no associations between changes in behavioural regulation from entry to exit and changes in well-being at 6 month follow-up. However, increased intrinsic motivation during the programme predicted subsequent increases in habitual physical activity at 6 month follow-up. As the aim of CR is to encourage long-term behaviour change this finding indicates the importance of helping patients to feel self-determined and enjoy their exercise sessions in achieving this aim. Increased autonomy satisfaction significantly predicted decreases in the mental aspects of quality of life from exit to 6 months. This is an unexpected finding and suggests that those who became more autonomous during the programme were less likely to adapt well psychologically in the sixth months following the structured programme. It may be that those individuals with higher levels of autonomy satisfaction, and who were therefore participating through volitional choice felt despondent when the formal element of the programme ended thus having a negative impact on their mental well-being.

The lack of other significant longitudinal relationships between changes in need satisfaction and psychological outcomes in the 6 months post programme suggests that effects might be context specific. Thus changes experienced could well have little impact after formal delivery of the programme where structured support of need satisfaction is available for participants. In this case, social and environmental factors such as access to facilities and social support from family and friends might better explain subsequent changes in psychological need satisfaction.

However, limitations of the current study could also contribute to these non-significant effects. Some variables were not normally distributed which should be considered when interpreting regression analyses. Although attributable to the clinical sample including a higher proportion of participants with low well-being scores compared with those typically seen in a non-clinical sample (Vickers, 2007) this is likely to have resulted in reduced power.

Despite this, this study has advanced the current literature by demonstrating how changes in components of SDT might help to explain changes in psychological well-being during a CR programme and in physical activity following the programme. Competence satisfaction and self-determined regulation appear to contribute significantly to improved well-being and activity within this context, lending support to previous research in CR.

Although the study demonstrated that the CR programme was effective in improving individuals' psychological need satisfaction, the programme was not designed with this explicit goal in mind. Therefore future research would benefit from examining the effects of an SDT based exercise intervention on psychological and behavioural outcomes in similar clinical populations.

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Figure 1: Flow diagram of participant involvement in research.

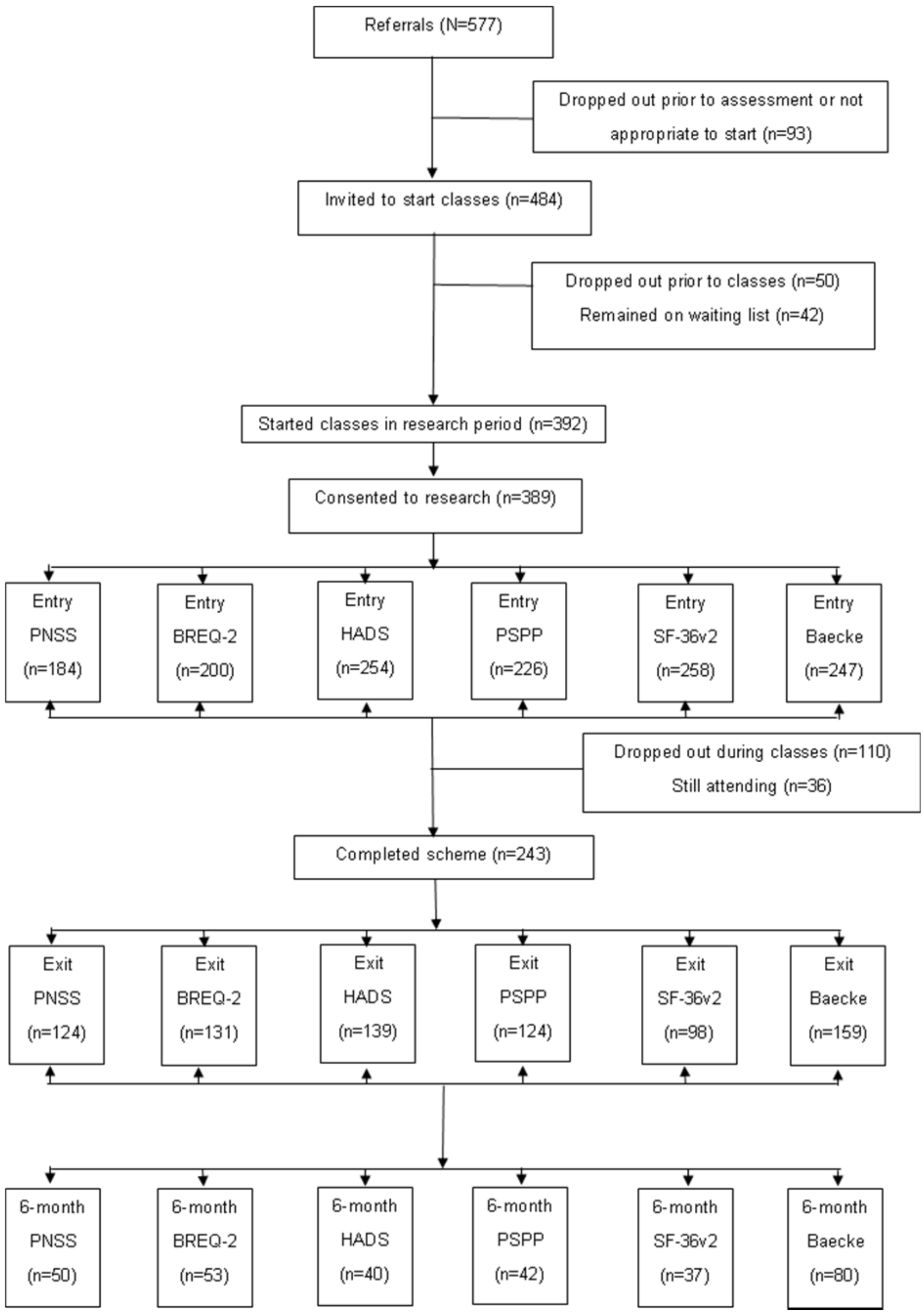
Referrals (N=577)
Dropped out prior to assessment or not appropriate to start (n=93)
Invited to start classes (n=484)
Dropped out prior to classes (n=50)
Remained on waiting list (n=42)
Started classes in research period (n=392)
Consented to research (n=389)
Entry PNSS (n=184)
Entry BREQ-2 (n=200)
Entry HADS (n=254)
Entry PSPP (n=226)
Entry SF-36v2 (n=258)
Entry Baecke (n=247)
Dropped out during classes (n=110)
Still attending (n=36)
Completed scheme (n=243)
Exit PNSS (n=124)
Exit BREQ-2 (n=131)
Exit HADS (n=139)
Exit PSPP (n=124)
Exit SF-36v2 (n=98)
Exit Baecke (n=159)
6-month PNSS (n=50)
6-month BREQ-2 (n=53)
6-month HADS (n=40)
6-month PSPP (n=42)
6-month SF-36v2 (n=37)
6-month Baecke (n=80)

Table 1: Entry, exit and 6 month scores for psychological need satisfaction, behavioural regulation and psychological well-being.

	Score Range	N	Entry Mean ±SD	Exit Mean ±SD	6-month Mean ±SD
Autonomy	0-12	184	8.24 ± 2.66	8.43 ± 2.61	8.23 ± 2.70
Competence	0-12	184	8.90 ± 2.40	9.58^{a} ± 2.25	9.09^{ab} ± 2.41
Relatedness	0-12	184	10.81 ± 1.81	11.01^{a} ± 1.87	10.54^{ab} ± 2.07
Amotivation	0-4	200	0.20 ± 0.54	0.18 ± 0.47	0.21 ± 0.55
External regulation	0-4	200	0.71 ± 0.94	0.58^{a} ± 0.86	0.62^{a} ± 0.91
Introjected regulation	0-4	200	1.56 ± 1.10	1.62 ± 1.11	1.55 ± 1.11
Identified regulation	0-4	200	3.06 ± 0.75	3.08 ± 0.70	3.06 ± 0.75
Intrinsic motivation	0-4	200	3.02 ± 0.85	3.09 ± 0.82	2.97^{b} ± 0.91
Habitual physical activity	2-12	247	5.42 ± 1.51	5.80^{a} ± 1.50	5.58^{ab} ± 1.56
Anxiety	0-21	255	6.91 ± 4.65	6.45^{a} ± 4.39	6.80^{b} ± 4.60
Depression	0-21	254	4.93 ± 3.67	4.61^{a} ± 3.53	4.78^{a} ± 3.71
Physical self-worth	6-24	226	13.58 ± 3.94	14.23^{a} ± 3.77	13.83^{ab} ± 3.84
PCS of SF-36v2	0-100	258	38.67 ± 10.13	40.22^{a} ± 10.34	39.11^{ab} ± 10.24
MCS of SF-36v2	0-100	258	44.74 ± 12.50	46.39^{a} ± 12.41	44.94^{b} ± 12.79

^{a} significant difference from entry $p < .05$; ^{b} significant difference from exit $p < .05$

Table 2: Correlation matrix of residual scores.

		Change scores (residuals) from entry-exit programme							
		Autonomy	Competence	Relatedness	Amotivation	External	Introjected regulation	Identified regulation	Intrinsic motivation
Change scores (residuals) from entry – exit of programme	Amotivation	-.235**	.150*	.017					
	External	-.185*	-.139	.075					
	Intojected	.087	.096	.168*					
	Identified	.085	.142	.204**					
	Intrinsic	.259**	.312**	.154*					
	Anxiety	-.137	-.177*	-.091*	.132	.078	-.187*	-.078	-.008
	Depression	-.017	-.224**	-166	.067	-.021	-.111	-.128	-.092
	Physical SW	-.025	.160	.104	-.009	-.246**	-.005	.156	.191*
	PCS of SF-36v2	.151	.269**	.138	-.041	-.190*	.149	.110	.272**
	MCS of SF-36v2	.208*	.199**	.218**	-.023	-.013	.134	.094	-.094
	Habitual PA	-.001	-.264**	.085**	-.052	-.116	.159*	.113	.122
Change scores (residuals) from exit-6 months post programme	Anxiety	.161*	.095	-.004	-.104	.029	.178*	.046	.011
	Depression	.039	.126	.048	-.053	.047	.053	.116	.120
	Physical SW	-.032	-.032	-.047	-.144	-.050	.105	-.042	-.073
	MCS of SF-36v2	-.261**	-.066	-.167	.027	.029	.135	.057	-.120
	PCS of SF-36v2	-.067	-.138	-.088	-.035	-.045	-.128	-.110	-.154
	Habitual PA	..073	-.023	.048	-.033	.017	.095	.256**	.256**

$^{*}p < .05$; $^{**}p < .01$ Habitual PA = Habitual physical activity; Physical SW = Physical self-worth

Table 3: Changes in psychological need satisfaction from entry to exit predicting changes in behavioural regulation, well-being and habitual physical activity from entry to exit.

	N	Adj. R^2	F	B	SE	β
Amotivation	176	.061	4.777*			
Autonomy				-.212	.070	-.226**
Competence				-.131	.073	-.139
Relatedness				.099	.072	.106
External regulation	175	.049	4.019**			
Autonomy				-.172	.071	-.181*
Competence				-.143	.074	-.151
Relatedness				.141	.073	.149
Introjected regulation	175	.017	1.992			
Identified regulation	175	.034	3.041*			
Autonomy				.042	.074	.044
Competence				.081	.077	.083
Relatedness				.167	.076	.172*
Intrinsic motivation	175	.123	9.098**			
Autonomy				.175	.065	.195**
Competence				.237	.067	.263**
Relatedness				.041	.067	.045
Anxiety	155	.025	2.341			
Depression	155	.033	2.771*			
Autonomy				.044	.078	.046
Competence				-.223	.081	-.230**
Relatedness				.001	.077	.001
Physical self-worth	147	.027	2.365			
PCS of SF-36V2	129	.079	4.641**			
Autonomy				.109	.086	.108
Competence				.259	.086	.249**
Relatedness				.143	.111	.110
MCS of SF-36V2	129	.088	5.127**			
Autonomy				.192	.099	.166
Competence				.188	.099	.163
Relatedness				.286	.128	.190*
Habitual physical activity	154	.054	3.886*			
Autonomy				-.041	.070	-.047
Competence				.225	.069	.269**
Relatedness				.009	.068	.011

[a]$p < .05$; [b]$p < .01$

Table 4: Changes in behavioural regulation from entry to exit predicting changes in well-being and habitual physical activity from entry to exit.

	N	Adj. R^2	F	B	SE	β
Anxiety	174	.035	2.256			
Depression	173	-.003	0.903			
Physical self-worth	159	.059	2.972*			
Amotivation				.101	.082	.102
External regulation				-.247	.089	-.230**
Introjected regulation				-.027	.085	-.027
Identified regulation				-.031	.102	-.031
Intrinsic motivation				.193	.105	.181
PCS of SF-36v2	133	.085	3.459**			
Amotivation				.140	.100	.133
External regulation				-.197	.110	-.157
Introjected regulation				.020	.088	.119
Identified regulation				-.092	.117	-.084
Intrinsic motivation				.398	.139	.319**
MCS of SF-36v2	133	.025	1.670			
Habitual physical activity	171	.034	2.180			

$^{*}p < .05$; $^{**}p < .01$