

PRELIMINARY EVIDENCE FOR RELATIONS BETWEEN MOTIVATION AND BELIEFS RELATED TO EXERCISE DEPENDENCE

AAVE HANNUS

*Institute of Sport Pedagogy and Coaching Science, University of Tartu, Tartu, Estonia
ELIKO Competence Centre in Electronics-, Info- and Communication Technologies,
Tallinn, Estonia*

ABSTRACT

Individuals engage in physical activity for a variety of reasons which are described by motivational determinants of behaviour. However, very little is known about the motivational antecedents of excessive exercise and exercise dependence. This study aimed to investigate the relationships between various motivating factors and specific beliefs characteristic for exercise dependence. Data were collected from a cross-sectional survey in a sample of volunteer recreational athletes (31 males aged 19–23 years and 54 females aged 18–34 years). Participants completed three questionnaires: Estonian 2 × 2 Achievement Goals in Sport Questionnaire was used to measure tendency to emphasize mastery and performance goals; Modified Estonian Exercise Motivation Questionnaire-2 to measure specific exercise motives; and an original Exercise Belief Scale was designed to estimate behavioural and control beliefs characteristic for exercise dependence. Results indicated that motivational orientation was a significant predictor of beliefs related to exercise dependence. Specifically, multiple regression analysis showed that perceived importance of exercise was significantly predicted by mastery approach and performance approach goals. Withdrawal effects, a hallmark for exercise dependence, could be predicted by mastery approach goals and competitive motive. Low control beliefs indicative for exercise tolerance appeared to be related with performance approach goals and competition motive. However, mastery approach also significantly predicted intentional avoidance of overtraining. Results suggest that beliefs related to exercise dependence are strongly related to various motivational aspects. Further investigation is needed to develop psychological assessment instruments to differentiate between normal and healthy exercise motivation and markers of overtraining and exercise dependence potential.

Keywords: *exercise beliefs, achievement goals, exercise motivation, recreational athletes*

INTRODUCTION

Over the past few decades, there has been an increasing interest in the role of exercise in promoting health and wellbeing. The health benefits of exercise and regular physical activity are well described [31, 33, 39, 41]. Specifically, exercise is characterized by planned, structured and repetitive bodily movement done to improve or maintain physical fitness [8]. This definition emphasizes favourable physical and biological changes that happen as a result of intentional movements. However, previous research also demonstrates that excessive exercise may yield harmful consequences for both physical and mental health [16, 26, 32, 42]. Although the concept of exercise addiction had a rather positive connotation in earlier literature [17], exercise dependence has been defined as a pathological condition [1, 29]. Clinical exercise dependence includes three or more of the following symptoms within a 12-month period: (a) tolerance (need of increasing exercise dosages for the same desired effect); (b) withdrawal (psychophysiological disturbance when deprived of exercise); (c) intention effects (engage in more exercise than intended); (d) perceived loss of control (unable to minimize or control exercise behaviour); (e) time (relatively big amount of time devoted to exercise-related activities); (f) conflict (exercise takes precedent over other aspects of life such as social, occupational, or recreational); and (g) continuance (continued exercise despite exercise-related physical or psychological problems) [2, 23]. This condition may occur as primary exercise dependence, where the physical activity is an end in itself, or as secondary exercise dependence manifested as a symptom of an eating disorder [40]. It has been estimated that exercise dependence may affect from 2 to 3% up to even 30% of the exercising population [4, 34, 36, 37].

The underlying mechanisms of exercise dependence reveal both psychological and biological antecedents of this pathological condition [19, 20]. In this study potential motivational precursors are investigated. Specifically, the aim of this study is to investigate relations between general motivational variables and more specific behavioural beliefs related to physical activity and excessive exercising.

Engagement in physical activity is widely described in the framework on the theory of planned behaviour (TPB; [10]). The TPB suggests that the motivation for physical activity is based on behavioural, normative, and control beliefs associated with physical activity [3]. Behavioural beliefs reflect individual's ideas about consequences of particular behaviour (e.g. physical activity

helps me to control my body weight). Normative beliefs consist of individual's perceptions about the judgment of significant others (e.g. my family would approve my physical activity). Control beliefs indicate individual's beliefs about facilitating or inhibiting conditions (e.g. I could not find enough time to exercise). These types of beliefs comprise individual's attitudes toward physical activity, subjective norms about physical activity, and perceived control of engaging in physical activity, which, in turn, affect the initiation of physical activity via behavioural intention.

Based on previous research, a questionnaire was developed for assessment of explicit behavioural beliefs related to excessive exercise, exercise dependence, and overtraining risks for this study. Although behavioural beliefs related to exercise dependence are quite well documented [5, 18, 22, 30, 34] not much is known about more general motivational basis of exercise dependence. Research in competitive endurance athletes has shown that exercise dependence can be predicted by introjected regulation and identified regulation, but not by external regulation or intrinsic motivation [20]. Thus, internal rewards such as pride or shame, and perceived importance of physical activity might trigger excessive and obsessive exercising. Motivational variables have also been found to be related to burnout in elite athletes [27]. In this study hierarchical model of achievement motivation was applied for assessment of motivational characteristics [13, 14]. Achievement goals reflect desired competence-based aims that individuals target in evaluative settings. Originally, two distinctive achievement goals were identified based on the definition of personal competence: mastery and performance goals [11, 12]. Specifically, mastery goals reflect perceived competence in terms of absolute evaluative standards while performance goals reflect competence perception relative to the performance of others. Mastery oriented goals rely on comparisons with requirements of the task and intrapersonal comparisons with one's past attainment or potential attainment. Differently, individuals oriented towards performance goals define their competence in terms of interpersonal comparisons. In general, developing mastery goals is regarded as more adaptive than performance goals. Specifically, mastery orientation is related to selection of challenging tasks, effective study strategies, positive attitudes toward learning, and positive affect, whereas performance goals are associated with selection of easier tasks, trivial learning strategies, concern for social status, and thoughts of escape and behavioural withdrawal when difficulties arise [6, 7, 12, 21, 25]. However, if high perceived competence is combined with performance goals, then they are expected to support positive achievement outcomes [15, 35, 43]. In addition to more general achievement goals, intensity of specific exercise motives was related to behavioural beliefs related to excessive exercise and exercise dependence.

Accordingly, the aim of the present study was to assess relationships between features of general motivational orientation and specific exercise motives, and explicit beliefs related to excessive exercise and exercise dependence.

MATERIALS AND METHODS

Instruments

To measure characteristics of motivational orientation, individual exercise motives and beliefs related to exercise, three questionnaires were used:

1. *Estonian 2 x 2 Achievement Goals in Sport Questionnaire* (Est-AGQ-S [38]; original [9]). Est-AGQ-S is a sport-specific questionnaire designed to assess 4 distinctive dimensions for achievement goal motivation: mastery approach (e.g. *It is important to me to perform as well as I possibly can*), mastery avoidance (e.g. *I worry that I may not perform as well as I possibly can*), performance approach (*It is important for me to perform better than others*), and performance avoidance (*I just want to avoid performing worse than others*). The response format extended from 1 (*not at all like me*) to 7 (*completely like me*).
2. *Modified Estonian Exercise Motivation Questionnaire-2*, (EMQ-2EM [28]; original [24]). EMQ-2EM is a questionnaire developed for assessment of exercise motivation. Subscale scores were computed for 7 different exercise motives: Competition (e.g. *I exercise to compare my abilities with other peoples'*), Health (*I exercise because I want to maintain good health*), Appearance (*I exercise to improve my appearance*), Social Recognition (*I exercise to have fun being active with other people*), Fun and Relaxation (*I exercise because I find exercising satisfying in and of itself*), Physical Fitness (*I exercise to build up my strength*), and Flexibility (*I exercise to stay/become flexible*). The response format was to indicate how much each statement is true for the participant from *not at all true for me* (0) to *very true for me* (5).
3. *Exercise Belief Scale* (EBS) was developed for this study. Firstly, literature was reviewed to identify surveys that assess psychological risks for excessive exercise and exercise dependence. Secondly, interviews were conducted to explore recreational athletes' and coaches' perceptions of psychological foundations of excessive exercise. Individual interviews were conducted with recreational athletes and a focus group interview with 4 coaches from endurance sports, who had at least three years working experience with athletes. Based on information gathered from those interviews, a 23-item list was developed describing behavioural beliefs about consequences of exercise, control beliefs related to withdrawal and tolerance effects characteristic

for exercise dependence, and self-reported prevention of overtraining. In a pilot study, 222 recreational athletes and undergraduate students of sport sciences completed this working version of the questionnaire. A principal components method of factor extraction with orthogonal rotation was performed on the 23 items. To determine the number of factors to extract, scree plots and eigenvalues were examined. Using the eigenvalue of one criterion, seven factors were extracted (eigenvalues of 5.21, 2.69, 1.84, 1.61, 1.50, 1.35, and 1.06), accounting for 66.4% of the variance of EBS. Analysis of five, six and seven potential factors indicated that the seven-factor solution was a more interpretable factorial configuration. This solution clearly identified seven domains of Perceived Importance, Mood Regulation, Withdrawal Effects, Tolerance, Behaviour Compensation, Stress Avoidance, and Overtraining Prevention, with factor loadings above .50. Only two items loaded less than .50 on any factor and were discarded from further analysis. The factor structure is presented in Table 1. The total variance accounted for by the seven factors (21 items) was 68.0%.

Table 1. Factor structure of the Exercise Belief Scale

	F1	F2	F3	F4	F5	F6	F7
When I miss a scheduled exercise session I feel nervous or depressed	0.82	0.00	0.21	0.20	0.05	0.01	-0.09
When I have to skip an exercise session I feel guilty	0.80	-0.09	0.03	-0.04	0.13	-0.04	0.22
I might feel somehow guilty if I have to cancel a planned exercise session	0.80	0.08	0.13	0.14	-0.14	0.08	0.02
When I have to miss a scheduled workout I feel moody and irritable	0.56	0.23	0.28	0.35	-0.04	0.28	0.21
I try not to train too much as it could be deleterious	0.09	0.88	-0.02	-0.03	0.01	-0.11	0.03
I restrict my training load to prevent overtraining	0.07	0.88	-0.05	0.01	-0.07	0.02	0.23
I regulate my training load to prevent injuries	-0.17	0.76	0.11	0.19	0.08	-0.05	-0.18
I have to increase the duration of my exercise sessions constantly to get the desired benefits	0.11	-0.06	0.74	0.05	0.22	0.13	0.05
I just feel that I cannot decrease intensity of my exercise sessions	0.36	-0.04	0.74	-0.02	-0.07	-0.01	0.17

	F1	F2	F3	F4	F5	F6	F7
I just cannot limit the frequency of my exercise sessions	0.17	-0.03	0.59	0.23	-0.07	0.24	0.29
I continually increase the intensity of my exercise sessions to get the effects that I want	0.13	0.09	0.58	-0.11	0.13	-0.28	0.27
My exercising helps me to change my mood (feel "high". escape from everyday life etc.)	0.23	0.06	0.03	0.77	-0.06	0.06	0.31
My exercising improves my mood	0.10	0.01	0.01	0.84	0.10	-0.09	0.02
When I have been eating too much. I try to balance it out by increased my training load	0.00	0.00	0.06	-0.04	0.73	0.10	-0.21
My exercising helps me to stick to a healthy diet	-0.20	0.10	0.18	0.22	0.67	0.04	0.17
I feel proud when I exercise even more than I planned to	0.29	-0.23	-0.13	-0.06	0.62	-0.23	0.18
My workouts give me an opportunity to withdraw from other people	0.06	-0.13	-0.07	-0.04	-0.09	0.82	0.08
To be honest. I exercise so that I can get out of spending time with my family/friends	-0.01	0.11	0.32	-0.34	0.23	0.60	0.09
I exercise to avoid feeling tense	0.22	-0.33	0.16	0.32	0.27	0.50	-0.21
My exercising is the most important thing in my life	0.10	0.03	0.41	0.18	-0.08	0.23	0.68
My exercising provides me physical challenges	0.06	0.31	0.18	0.31	0.15	-0.22	0.59
I feel nervous when I have to have a break in my exercise sessions	0.42	0.24	0.18	0.09	0.40	0.13	0.46
My exercising helps me to meet new people	0.03	0.19	0.50	0.50	0.07	-0.14	-0.08

Note: F1 – Withdrawal Effects, F2 – Overtraining Prevention, F3 – Tolerance, F4 – Mood Regulation, F5 – Behavioural Compensation, F6 – Stress Avoidance, F7 – Perceived Importance. Factor loadings above 0.50 are marked in boldface

Participants and procedure

Data were collected from cross-sectional survey in 2 exercise clubs and from undergraduate and master students of sport and exercise science. Inclusion criterion for volunteers was regular recreational exercising and participation in amateur competitions. The author of this study distributed the questionnaires personally to each participant and explained the general purpose of the study. Participants returned the completed questionnaires within 2 weeks. Out of 122 delivered questionnaires 85 (69.6%) were returned. Therefore, data from 54 female recreational athletes (aged between 18 and 34 years, mean age 20.8 ± 2.8 years) and 31 males (aged between 19 and 31 years, mean age 21.6 ± 3.5 years) were included in the study.

Statistical analysis

The data were analysed using the Statistical Package for the Social Sciences (IBM SPSS Statistics 20; IBM Corp). Reliability analyses were carried out using Cronbach's alpha. Most variables demonstrated acceptable levels of internal consistency. The Pearson product-moment correlation was used to determine associations between all motivational variables. A stepwise regression analysis was conducted to evaluate the relationship between the achievement goals, exercise motives, and exercise beliefs. An alpha level of 0.05 was used for all statistical tests.

RESULTS

The descriptive values for all questionnaires are presented in Table 2.

Correlations among measured variables are presented in Table 3. As this pattern of significant relations between motivational variables and exercise beliefs was rather complex, stepwise multiple regression analysis was performed in order to estimate multiple correlations (Table 4). This method is useful for a longer list of independent variables, some of which may be useful predictors, but some of which can be redundant. In such cases stepwise multiple regression searches for best subsets of predictors.

Perceived importance of exercise was significantly predicted by both mastery and performance approach goals. However, independently from those two, competition motive was also a strong predictor of perceived importance of exercise.

For mood regulation, three prediction models were generated. Both performance and mastery approach, together with fun and relaxation motive predicted the belief that exercise is useful for mood regulation, only the last one

being significant individual predictor. Next, mastery avoidance goal had a negative predictive effect on mood regulation, together with high fun and relaxation motive. The best predictive model for mood regulation beliefs involved higher fun and relaxation and social relatedness motives with lower mastery avoidance goals.

Table 2. Summary descriptive statistics and internal reliability for all variables (n=85)

Variable	Mean±SD	Range	Cronbach α
Est-AGQ-S			
Mastery Approach	5.67±1.06	1.00–7.00	0.75
Mastery Avoidance	4.63±1.28	1.00–7.00	0.79
Performance Approach	4.64±1.47	1.00–7.00	0.84
Performance Avoidance	4.27±1.57	1.00–7.00	0.88
EMQ-2EM			
Appearance	16.56±8.33	0.00–30.00	0.92
Competition	26.28±11.59	0.00–45.00	0.93
Health	20.76±6.44	0.00–32.00	0.90
Social Relatedness	8.98±4.57	0.00–15.00	0.96
Fun & Relaxation	22.18±5.12	8.00–30.00	0.78
Physical Fitness	20.15±4.94	0.00–25.00	0.81
Flexibility	5.72±2.87	0.00–10.00	0.92
EBS			
Perceived Importance	3.65±0.83	1.50–5.00	0.57
Mood Regulation	4.45±0.62	2.00–5.00	0.78
Withdrawal Effects	3.24±0.91	1.00–5.00	0.83
Tolerance	2.62±0.75	1.25–4.25	0.73
Behavioural Compensation	3.17±0.79	1.00–5.00	0.51
Stress Avoidance	2.19±0.67	1.00–3.67	0.53
Overtraining Prevention	3.16±0.98	1.00–5.00	0.85

EST-AGQ-S – Estonian 2 × 2 Achievement Goals in Sport Questionnaire, EMQ-2EM – Modified Estonian Exercise Motivation Questionnaire-2, EBS – Exercise Belief Scale

Table 3. Summary of correlational analysis between all variables

EBS	Perceived Importance	Mood Regulation	Withdrawal Effects	Tolerance	Behaviour Compensation	Stress Avoidance	Overtraining Prevention
Est-AGQ-S							
Mastery Approach	0.43	0.07	0.31	0.32	-0.04	0.00	0.29
Mastery Avoidance	0.09	-0.15	0.16	0.12	0.16	0.04	0.08
Performance Approach	0.41	0.09	0.24	0.38	0.20	-0.07	0.09
Performance Avoidance	0.10	0.16	0.26	0.27	0.23	0.14	0.09
EMQ-2EM							
Appearance	-0.05	0.02	-0.13	-0.08	0.61	0.10	0.04
Competition	0.71	0.37	0.39	0.48	.00	0.09	0.27
Health	0.14	0.17	0.14	0.05	0.18	0.16	0.19
Social Relatedness	0.27	0.38	0.21	0.32	-0.08	0.02	0.26
Fun & Relaxation	0.32	0.60	0.27	0.20	0.15	0.46	0.10
Physical Fitness	0.44	0.19	0.35	0.28	0.11	0.06	0.36
Flexibility	0.07	0.16	0.10	-0.02	0.03	-0.11	0.17

Note: N = 85 (casewise deletion of missing data). $P < .05$ is marked in boldface.

Table 4. Stepwise regression analysis of exercise beliefs as a function of achievement goals and exercise motives

Dependent Variable	Predictor	Model 1			Model 2			Model 3		
		B	SE B	β	B	SE B	β	B	SE B	β
Perceived importance	Performance Approach	0.150	0.063	0.263	0.003	0.054	-0.006			
	Mastery Approach	0.245	0.086	0.313*	0.072	0.073	0.092			
	Competition				0.429	0.063	0.681**			
	Adjusted R ²	0.224			0.513					
	F		12.825**		29.750**					
Mood Regulation	Performance Approach	0.015	0.042	0.036	0.058	0.043	0.141	0.051	0.042	0.121
	Mastery Approach	0.023	0.056	-0.003	0.023	0.057	0.040	0.002	0.054	-0.004
	Fun & Relaxation	0.421	0.063	0.603**	0.423	0.060	0.605**	0.364	0.062	0.521**
	Mastery Avoidance				0.125	0.046	-0.265*	0.132	0.045	-0.280*
	Social Relatedness							0.098	0.036	0.248*
	Adjusted R ²	0.345			0.392				0.438	
	F		15.387**		14.244**			13.776**		
Withdrawal effects	Mastery Approach	0.263	0.091	0.307*	0.129	0.102	0.150			
	Competition				0.217	0.083	0.309	0.271	0.072	0.385**
	Adjusted R ²		0.083			0.144			0.138	
	F		8.416*			7.913*			14.118**	
Tolerance	Performance Approach	0.195	0.053	0.377**	0.086	0.060	0.167			
	Competition				0.225	0.068	0.385*	0.278	0.057	0.476**
	Adjusted R ²		0.131			.227			0.217	
	F		13.414**			13.074**			23.744**	

Dependent Variable	Predictor	Model 1			Model 2			Model 3		
		B	SE B	β	B	SE B	β	B	SE B	β
Behavioural Compensation	Performance Approach	0.151	0.066	0.227	0.108	0.059	0.198	0.097	0.047	0.178
	Mastery Approach	0.127	0.092	-0.170						
	Appearance							0.344	0.050	0.601**
	Adjusted R^2		0.039			0.027			0.385	
F		2.647			3.317			26.630**		
Stress Avoidance	Fun & Relaxation	0.365	0.078	0.462**	0.394	0.078	0.499**			
	Flexibility				-0.095	0.047	-0.200			
	Adjusted R^2		0.204			0.234				
	F		21.99**			13.495**				
Avoiding Overtraining	Mastery Approach	0.273	0.099	0.293*	0.145	0.109	0.156			
	Physical Fitness				0.291	0.116	0.292	0.364	0.103	0.365*
	Adjusted R^2		.074			0.131			0.122	
	F		7.580*			7.166*			12.430*	

Note: Statistically significant parameters are printed in bold $p < .05$, * $p < .01$, ** $p < .001$

Interestingly, the best independent predictor of behavioural beliefs related to withdrawal effects and tolerance was the competition motive. Stress avoidance beliefs were best predicted by fun and relaxation motive.

A clear result emerged among potential predictors of behavioural beliefs related to compensatory effects of exercising. The strongest predictor of behavioural compensation beliefs was appearance motive, accounting for 38.5% of the total variance together with performance approach goals.

Finally, beliefs related to deliberate avoidance of overtraining were independently predicted either by mastery approach goals or motives related to physical fitness.

DISCUSSION

In this study I examined correlation and regression between the motivational variables, and explicit behavioural beliefs and control beliefs related to excessive exercise and exercise dependence. Overall, the results demonstrated that achievement goal orientation and exercise motives could predict specific beliefs that are known as characteristic for exercise dependence.

The most unspecific predictors of exercise beliefs appear to be mastery approach goals. Specifically, mastery approach goals are independent predictors of both withdrawal effects and deliberate avoidance of overtraining. Together with performance approach goals mastery approach goals account for perceived importance of exercise which reflects personal value placed on one's exercising. Thus, both personal and interpersonal goals with positive valence increase the personal worth of exercise. However, it is important to keep the overall balance of different aspects of life in mind. Recently, Kim et al. [26] have demonstrated an inverted-U relationship between physical activity and mental health. In their study of general population they have shown that the optimal amount of exercise is between 2.5 and 7.5 hours per week. Although they did not establish causal relationships, the most plausible explanation is that crossing of this limit may cause imbalance between different aspects of life such as social relationships, family life, and academic/occupational functioning. In addition, mastery approach goals have also a weak predictive value for behavioural beliefs about the potential of exercise in mood regulation.

Further, when predicting overtraining avoidance, specific fitness motive is of big value. Thus, independently from motivational orientation, individuals with improved fitness in mind most likely take care of reasonable balance between training and recovery. Differently, beliefs about potential compensatory effects of exercising are best predicted by appearance motive, together with performance approach goals. Thus, people who exercise in order to

achieve/maintain aesthetic physical appearance might hope to even out their excessive eating by excessive exercising. Alternatively, this relationship may also reflect behavioural beliefs about excessive exercising as a feature of disturbed eating behaviour.

Another clear relationship emerged between the fun and relaxation motive and behavioural beliefs about potential stress avoidance due to exercising. This motive independently explains stress avoidance beliefs by 20%. However, it is important to note that in this study stress avoidance was operationalized as avoidance of stressful situations (avoiding tension, but also avoiding social encounters). Thus, people with relaxation motives could also exhibit escaping from social relations.

Finally, the need for higher amounts of exercise load – indicative for exercise tolerance – can be explained independently by competition motivation and by performance approach goals. Thus, the warning sign of exercise dependence, manifested in beliefs of low control over training load and intensity occurs in individuals with interpersonal comparison in mind. Appropriate training instructions for competitive exercisers might be of great relevance in prevention of exercise pathology.

Taken as a whole, this study further supports that specific beliefs about the benefits and consequences of exercising – but also about personal control over exercising are related to different achievement goals and exercise motives [4, 20, 27]. While motivation in exercise participants is an important asset in achieving health benefits and personal accomplishment, high motivation may also be related to adopting maladaptive beliefs that could promote unhealthy patterns of exercise behaviour. However, this study has significant limitations. The EBS needs further development and validation. Specific items of the EBS need further refinement, as three of EBS subscales showed poor internal consistency. In addition, the criterion and predictive validity of EBS should be determined. Further research could evaluate if motivational profile of exercise participants could discriminate between pathological and healthy exercisers.

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Correspondence to:

Aave Hannus

Institute of Sport Pedagogy and Coaching Science

Faculty of Exercise and Sport Sciences

University of Tartu

Ravila 14a, 50411 Tartu

Estonia

E-mail: aave.hannus@ut.ee