American Journal of Sports Science and Medicine, 2013, Vol. 1, No. 1, 1-6
Available online at http://pubs.sciepub.com/ajssm/1/1/1

DOI:10.12691/ajssm-1-1-1

Physical Self-Concept and Its Relationship to Exercise Dependence Symptoms in Young Regular Physical Exercisers

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Received December 31, 2012; Revised February 01, 2013; Accepted March 23, 2013

Abstract The study aimed to investigate whether certain physical self-concept predicted exercise dependence among young regular exercisers using a multidimensional prospective. One hundred fifty-two regular gym users, 78 were male and 74 female, completed: Physical Self-Description Questionnaire (PSDQ), Exercise Dependence Scale-21 (EDS-21), and Eating Disorder Inventory–2 (EDI-2). Correlation and regression analyses were calculated to determine the relationship between physical self-concept and exercise dependence behaviors. Significant correlations were found, confirming that exercise dependence symptoms and physical self-concept domains were related each other. In addition, results showed that multidimensional model of self-concept is a strong predictor for exercise dependence both for male and female.

Keywords: *exercise behavior, exercise addiction, gender, physical self-perception*

1. Introduction

The positive role of physical activity in psychological and physical health has been amply demonstrated in literature. Research has shown the relevance of exercise to facilitate cardiovascular fitness, weight control, muscular strength, muscular endurance, flexibility, and healthy bone structure [1,2]. Furthermore several studies showed that a regular and moderate physical activity reduces incidence of cancer, heart disease, diabetes, osteoporosis, obesity and other diseases later in life [3,4,5,6]. At this regard, the association between sport and well-being, social success, positive peer relationships, and leadership skills [7,8,9,10,11], reduction of stress, depression and anxiety [12,13,14] has been well established.

Physical self-perception has been identified as an important correlate of physical activity, and the importance that individuals attribute to different aspects of themselves and their physical self has been highlighted as a relevant factor in exercise behaviour [15,16,17]. Defining and measuring physical self- concept has been a contentious issue within the scientific literature. Several authors have identified different components of physical self-perception within a multidimensional perspective of self-concept [18,19]. In contrast with the previous one-dimensional construct, self-concept has been defined as a person's perception of him or herself. These perceptions are formed through experience with, and interpretations of, one's environment [20]. The Marsh and Shavelson multifaceted, multidimensional, and hierarchical model of physical self-concept (1985) reflects individuals' judgment of their competence, conditioning, and appearance in many different physical domains and sub-domains. From this multidimensional point of view, the model considers the existence of a global component at the top of hierarchy. One of the components of the multifactor structure is the physical component. The physical self-concept consists in an individual's opinion of his or her appearance, strength, body fat, coordination and other related aspects of the physical self [21].

Physical self-concept tends to be positively associated with physical activity participation and exercise behaviours. Cross-cultural studies that include people of different age have shown that more active participants had higher physical self-perception (or self-concept) scores than less active exercisers [22,23], and that participation in physical fitness programmes reported significant improvements in physical self-perception [24]. Additionally, low and negative self-concept has shown to be strong predictor of a range of physical and mental health problems such as depression, obesity, and eating disorders [25,26,27]. Furthermore, a negative association has been reported between exercise dependence, self-esteem [28,29] and body satisfaction [30,31,32]; but this relationship is still unclear and findings are often equivocal [25,33]. At this regard, Murray, McKenzie, Newman, and Brown [34] explored the identity /dependence link, and showed that stronger exercise identities are associated with greater odds of experiencing exercise dependence symptoms. So, exercise identity has been identified as a determinant of exercise behavior, and a significant risk factor for developing exercise dependence.

But there are no considerable evidences supporting the role of self-concept (self-perception or self-identity) and exercise dependence in a multidimensional perspective.

Hausenblas and Fallon [25] affirm the necessity to analyze in future research the relation between body image and exercise dependence using a multidimensional approach. Identifying the underlying mechanisms of exercise dependence represents an important challenge in making progress towards the comprehension of this phenomenon. In general, exercise dependence is a relatively recent phenomenon which requires more research to understand the characteristics, antecedents, and consequences of this form of behavioural addiction [35]. Exercise is generally a healthy behaviour, however, some individuals become addicted to physical activity and engage in compulsive and excessive exercise, in order to control their body weight or shape. Exercise addicts exercisers even though they are sick or injured, in the end affecting more physical complications for themselves [36,37]. The signs of exercise dependence include: working out for longer periods of time, constantly thinking about exercise, renouncing work/family/social responsibilities to exercise, disregarding injuries in order to exercise, experiencing more anxiety, stress, and depression when not able to exercise (withdrawal effects) [37]. Currently, exercise addiction is not recognized in the Diagnostic Manual, the DSM-IV-TR [38] as a primary disorder, rather it is known to be a symptom of bulimia and/or anorexia nervosa. Patients with an eating disorder may engage in excessive exercise in order to lose weight or to compensate for a binge eating episode. At this regard, many researchers [39] have concluded that exercise addiction may occurs in the presence of an eating disorder (secondary dependence), and it is also possible in individuals who did not suffer from disordered eating behaviors (primary dependence). At this time, there are conflicting ideas about the cause of exercise addiction, this is because so little is actually known about this behavioral disorder. Therefore, there are not universally testing parameters and measure to classify possibly dependent and non-dependent individuals, producing conflicting results in research field. Future research should also take into account the influences of age and gender in the development and maintenance of exercise abuse. The prevalence for exercise dependence declines with age and younger are significantly higher in total exercise dependence scores [40,41]. Also gender differences are evident among excessive physical exercisers. At this regard, recent studies have shown that men are more exercise-dependent than women, even if women athletes may excessively exercise for weight control and for health reasons [25,37,40,42].

In addition, Hausenblas and Symons-Downs [33] affirm the necessity to examine the correlates of exercise dependence and, given the strong value of self-perception in physical activity, can be extremely useful investigate the relationship of self-perception with the exercise dependence symptoms. For this reason, the aim of this study is to verify the relation between physical self-perception and exercise dependence in a sample of young gym regular exercisers in the normal weight category of the body mass index. Further, the present study will also examine which physical self-concept aspects predict a maladaptive exercise engagement.

2. Methods

2.1. Participants

Participants for this study were 152 (78 male and 74 female), aged from 18 to 29 (Male: M = 23.05, SD = 3.01; Female: M = 23.18, SD = 3.46). All the subjects had a history of regular exercise over a year and they are gym users (hour for week: M = 6.05, SD = 3.00). All of them within the normal weight category of the body mass index (Male: M = 22.80, SD = 1.35; Female: M = 20.53, SD = 1.91).

2.2. Procedure

Participants were found in different gyms of south Italian regions and after signing the informed consent decided voluntary to compile questionnaires. To eliminate the potential confounding effects of secondary dependence, subjects who scored in the at-risk range on the EDI-2 instruments were excluded from analysis.

2.3. Measures

Demographic survey - Participants were asked several questions about age, gender, weight, height and two questions about their exercise duration: the first question was “Generally how many days a week do you train?” and the second was “Generally how many hours a day do you train?”. To produce a score for overall extent of exercise frequency, the number of days was multiplied for the number of hours.

Self-Concept - To assess self-concept specific to the physical domains the Italian validation of Physical Self-Description Questionnaire (PSDQ) [43] was used. The PSDQ is composed by 70 items scored on a six-point Likert scale to assess 9 specific components of physical self-concept and 2 global components. The nine specific components are: Appearance (6 item: Own and others’ perceptions of own physical attractiveness), Body Fat (6 item: Perceptions of ‘fatness’), Co-ordination (6 item: Perceptions of level of coordination), Endurance (6 item: Perceptions of capacity for ongoing physical activity), Flexibility (6 item: Perceptions of physical flexibility), Health (8 item: Overall perceptions of own health/sickness), Physical Activity (6 item: Perceived frequency of engagement in physical activity), Strength (6 item: Perceptions of physical strength and muscularity), and Sports Competence (6 item: Own and others’ perceptions of own physical skill and capability). The two global components are: Esteem (8 item: Overall self perceptions, not limited to physical self perception) and Global Physical (6 item: Global physical self perception).

Exercise Dependence - In this study was used the Italian version of Exercise Dependence Scale-21 (EDS-21) [44]. The instrument comprises 21 items scored on a six-point Likert scale, ranging from 1 (never) to 6 (always). Higher scores indicate more symptoms of exercise dependence. The instruments has seven subscales (three items for each) based on the DSM-IV criteria for substance dependence and a total score. The subscales are: Tolerance, Withdrawal, Continuance, Lack of Control, Reduction in Other Activities, Time, and Intention Effects.

Eating Disorders - Eating disorders were measured with the Eating Disorder Inventory–2 (EDI-2) [45]. This 91-item self-report tool measures various symptoms of eating disorders and comprises 11 subscales. In this study

was used the drive for thinness subscale to assess weight preoccupation, which is the cardinal feature of an eating disorder. Individuals with score equal to 14 or more on this subscale was considered to be at-risk for an eating disorder and was excluded from the study.

2.4. Data Analysis

The Statistical Package for the Social Science 15.0 (SPSS) was used to conduct the bivariate correlations and the regression analysis to determine the relationship between self-concept and exercise dependence. Two separate multiple linear regressions were conducted, in the first the nine specific components of physical self-concept (Appearance, Body Fat, Coordination, Endurance, Flexibility, Health, Physical Activity, Strength, and Sports Competence) were entered simultaneously such as predictor variables and the total score of exercise dependence as criterion variable. In the second multiple regression, instead, the two global components of physical self-concept (Esteem and Global Physical) were entered simultaneously such as predictor variables and the total score of exercise dependence as criterion variable.

3. Results

3.1. Descriptive Statistics

In Table 1 are synthesized descriptive statistics of the exercise dependence symptoms and of the components of physical self-concept.

Table 1. Descriptive statistics

	M ± SD	α
Withdrawal	6.95 ± 3.94	.77
Continuance	6.98 ± 3.97	.76
Tolerance	11.01 ± 4.34	.82
Lack of control	6.48 ± 4.32	.88
Reduction in other activities	5.41 ± 3.24	.73
Time	9.07 ± 4.30	.86
Intention	6.67 ± 4.31	.89
Total Exercise Dependence	50.56 ± 21.18	.92
Strength	3.92 ± 1.27	.72
Body Fat	4.66 ± 1.30	.87
Physical Activity	3.95 ± 0.92	.89
Endurance	3.86 ± 1.31	.81
Sports Competence	3.94 ± 0.97	.74
Coordination	4.38 ± 0.97	.76
Health	4.69 ± 0.94	.77
Appearance	4.49 ± 0.96	.77
Flexibility	3.87 ± 1.30	.78
Global Physical	4.46 ± 1.26	.90
Esteem	4.54 ± 0.48	.84

3.2. Correlation for Male Exercisers

In male (Table 2), there is a negative relationship between withdrawal symptoms and strength, sport competence, appearance and esteem.

There is also a negative relation between continuance symptoms and appearance and esteem. Tolerance symptoms show positive correlation with physical activity, endurance and sports competence. Lack of control symptoms have a positive relation with the physical activity perception and a negative relationship with appearance. High scores in reduction in other activities symptoms are related to less health perception, less appearance, less flexibility and less self-esteem. Furthermore, there is a significant positive correlation between time symptoms for exercise dependence and endurance perception. The intention symptoms are positively connected with physical activity, endurance. Finally, the total score of exercise dependence is positively related with physical activity and negatively related with appearance and self-esteem.

3.3. Correlation for Female Exercisers

Table 3, synthesized the correlation analysis between self-concept and exercise dependence for female. Results show a positive relation between continuance symptoms and perception of physical activity. Higher score on tolerance symptoms are related to more physical activity perception and more perception of flexibility. There is also a positive relationship between the lack of control symptoms and the perception of physical activity and between the symptoms of reduction in other activities and the sport competence .The symptoms of time are, instead, positively related with strength, physical activity, endurance, sports competence, coordination, flexibility and the global physical perception. Furthermore, intention symptoms are positively related with strength, physical activity, sports competence and flexibility perception. Finally, the total score of exercise dependence is positively related to the physical activity perception, the perception of sports competence and the perception of flexibility.

3.4. Regression Analysis

Regression analysis is used to examine the predictive relationship of physical self-concept for exercise dependence. Analyses were conducted separately by gender and by global and specific components of self-concept.

The first analysis examined the predictive relationship of specific components of physical self-concept (Appearance, Body Fat, Coordination, Endurance, Flexibility, Health, Physical Activity, Strength, and Sports Competence) for exercise dependence (Table 4). Results show that physical self-concept seems to be relevant for exercise dependence both for male, $F(9, 68) = 3.71$, $p = .001$, $R^2adj = .241$, $SEE = .141$ and female $F(9, 68) = 3.66$, $p = .001$, $R^2adj = .247$, $SEE = .166$. Specifically, for male exercise dependence seems to be positively predicted from perception of physical activity, $t = 3.67$, $p < .001$, $\beta = .39$ and negatively predicted by health perception, $t = -2.53$, $p = .014$, $\beta = -.29$.

The second regression analysis examined the predictive relationship of global components of physical self-concept (Esteem and Global Physical) for exercise dependence (Table 5). Results seem to show that global components do not predict exercise dependence for both male, $F(2, 75) = 2.25$, $p = .112$, $R^2adj = .032$, $SEE = .160$ and female $F(2, 75) = .733$, $p = .484$, $R^2adj = -.007$, $SEE = .192$. While for female, esteem seems to be a negative predictor for exercise dependence.

Table 2. Correlation in male

Male	Withdrawal	Continuance	Tolerance	Lack of control	Reduction other activities	Time	Intention	Total Dependence
Esteem	-.261(*)	-.226(*)	-.090	-.172	-.339(**)	-.035	-.022	-.233(*)
Global Physical	-.194	-.161	.066	-.133	-.174	.172	.097	-.041
Flexibility	-.053	-.129	.120	-.003	-.239(*)	.071	.118	.004
Appearance	-.267(*)	-.270(*)	-.051	-.295(**)	-.295(**)	.013	-.021	-.257(*)
Health	-.165	-.130	.055	-.168	-.284(*)	-.010	-.004	-.166
Coordination	-.128	-.199	.097	-095	-.188	.012	-.032	-.114
Sports Competence	-.236(*)	-.127	.238(*)	-.080	-.142	.134	.051	-.033
Endurance	-.066	-.140	.273(*)	.132	-.191	.386(**)	.255(*)	.158
Physical Activity	.141	.201	.324(**)	.449(**)	.116	.183	.227(*)	.408(**)
Body Fat	-.081	-.100	.082	.066	-.023	.104	.073	.041
Strength	-.245(*)	-.197	.126	.037	-.064	.174	.147	-.012

Note: ** p < 0.01 level; * p < 0.05 level

Table 3. Correlation for female

Female	Withdrawal	Continuance	Tolerance	Lack of control	Reduction in other activities	Time	Intention	Total Exercise Dependence
Esteem	-.183	-.076	.019	.063	-.112	.069	-.002	-.041
Global Physical	-.116	-.025	.163	-.046	.066	.307(**)	.201	.115
Flexibility	-.029	.093	.310(**)	.065	.097	.451(**)	.269(*)	.304(**)
Appearance	-.158	-.093	.137	.037	.018	.208	.159	.091
Health	-.205	-.007	.074	-.163	-.119	-.025	-.208	-.153
Coordination	-.011	.074	.219	.092	.019	.372(**)	.140	.210
Sports Competence	-.051	-.015	.129	.190	.247(*)	.288(*)	.258(*)	.252(*)
Endurance	-.127	-.039	.090	.026	.004	.330(**)	.152	.107
Physical Activity	.223	.239(*)	.332(**)	.237(*)	.067	.553(**)	.434(**)	.491(**)
Body Fat	-.120	-.203	.054	-.087	-.189	.104	.019	-.061
Strength	-.156	-.106	.068	.084	.160	.303(**)	.261(*)	.152

Note: ** p < 0.01 level; * p < 0.05 level

Table 4. Regression analysis predicting exercise dependence by specific components of self-concept for male and female

	Male		Female	
	β	t	β	t
Strength	-.08	-.58	.03	.18
Body Fat	.19	1.67	-.12	-.97
Physical Activity	.39	3.67 (**)	.51	4.05(**)
Endurance	.28	1.98	-.09	-.64
Sports Competence	.07	.47	.14	1.00
Coordination	-.08	-.58	-.23	-1.46
Health	-.29	-2.53(*)	-.13	-1.14
Appearance	-.24	-1.89	.07	.51
Flexibility	-.02	-.16	.26	1.90

Note: ** p < 0.01 level; * p < 0.05 level

Table 5. Regression analyses predicting exercise dependence by global components of self-concept for male and female

	Male		Female	
	β	t	β	t
Global Physical	.054	.447	.145	1.160
Esteem	-.253	-2.093	-.090	-.718(**)

Note: ** p < 0.01 level; * p < 0.05 level

4. Discussion

The main purpose of the current study is to examine relation between self-concept and exercise dependence using a multidimensional model to asses these constructs. Previous researches have demonstrated equivocal findings in this field [25,33,34]. This may be due in part to the heterogeneous methods used to assess the physical self-perception and the exercise dependence. Although many studies often have used one-dimensional model to assess self-concept and exercise dependence, more recently there is a large body of contributes supporting a hierarchical, multidimensional model of self-concept and a multidimensional construct of exercise dependence [25,33]. In this perspective, the EDS-R and PSDQ instruments were used for this study. Other important aspects that can explain the inconsistent previous findings are: age, gender, body composition and exercise behavior [25]. This research uses a sample of gym users, ranging aged from 18 to 29 years, with a history of regular exercise over a year, in the normal weight category of the body mass index. Furthermore, to eliminate the potential confounding effects of secondary dependence [46], participants who scored in the at-risk category for an eating disorder were excluded from the study.

It has been noted that adolescent males are more physically active and tend to have higher perception of their motor skills and sport competence than females [47]. While female athletes, obese individuals, and children with low levels of perceived sport competence are less active than their peers [48]. So there is evidence for a strong relationship between the physical self-perception and the level of physical activity engagement. But when the exercise behavior becomes more frequent and ritualized, it can function both to produce individual pleasure and to provide escape from internal discomfort. Despite negative consequences of the behavior may occur, the individual persists and intensifies it, usually as a way to coping stress, so as to develop a behavioral dependence.

In this study, results have confirmed a strict correlation between examined factors, in particular, with reference to physical self components and exercise dependence symptoms. Specifically, our finding revealed strong connection, in male group, of the physical activity levels, appearance and esteem with many of dependence symptoms. In fact, how is visible by the beta value, physical activity provides the biggest contribution; also the perception of health offers a negative significant contribution but explaining less variance. It was shown that the higher levels of perception of physical activity in which one has engaged, more negative perceptions of own physical appearance and poor global esteem are factors

contributing to more severe onset and progression of exercise dependence symptomatology.

On the other hand, in female athletes, the perceived physical flexibility and the physical activity levels are related to dependence symptoms. In particular, it is likely that the increased physical activity in which they have engaged and the perception of a greater physical agility may be most important and may represent the underlying aspects in exercise dependence development for women. However, how is visible by the beta value, physical activity provides the biggest contribution.

So results showed that the multidimensional model of self-concept is a strong predictor for exercise dependence both for men and women. In fact the R^2 is higher in the multidimensional model than the global model, while the SEE value between the two models are very similar. Furthermore there is evidence that for both groups the strongest predictor is the perception of physical activity that explains more variance. Instead, global domain analyses do not seem to be a significant predictor for exercise dependence both for men and women. Specifically the correlation analyses can give a strong contribution to understand the equivocal nature of previous findings [25,33]. Using a multidimensional model, in fact, is possible to understand that exercise dependence symptoms and physical self-concept domains relate each other in different way. For example, for men, the lack of control symptoms related positively with perception of physical activity and negatively with perception of endurance. These different correlations do not allow to understand the relationship through a one-dimensional model. This finding confirms the necessity, in future research, to study the relation between these constructs using multi-dimensional prospective. In fact, this study tries to give a contribution in order to understand the relationship between physical self-concept and exercise dependence symptoms but it can't be exhaustive and complete. For these reasons, as the impact of the self-concept is so pervasive, it might be useful to analyze also the emotional and motivational aspects that can predict exercise participation and have clear relevance for the understanding of the physical self concept, such as noted by the self-determination perspective [49].

Finally, this study aimed to deepen the relationship between the physical self-perception and exercise dependence, focusing, in particular, on the predictive role that self-perception can have on the exercise dependence symptomatology. In this sense, data showed that athletes with an inadequate physical perception tend to have a greater tendency to become addicted. While those who perceive themselves adequately tend to demonstrate greater psychological well-being and reduced dysfunctional behaviors. Particularly, results suggested that the global component of self-concept, specifically the Esteem factor, seems to have a significant role in predicting the dependence symptoms for both gender groups; therefore, it can represent a risk factor to be taken into account in order to prevent the maintaining of these dysfunctional behavioral patterns.

Despite these findings, this study has some limitations. First, the sample is not very heterogeneous because of the elimination of the potential confounding variables; for what concerns the sample size, even if it is sufficient for analyses, it is not enough to provide certain information so larger data generalization is not possible. Second, further research needs to pay more attention to other types of sport and different ranges of age in which the dysfunctional behavioral patterns could be reinforced and maintained by other psychological mechanisms. Lastly, the correlational design of this study can not infer causal relationship and, unfortunately, researches examining mechanisms of exercise dependence are correlational in most cases. For these reasons, in future investigations, it would be necessary to examine these mechanisms by using different and more appropriate research designs [33].

Further, while much is known regarding the relation between physical self-concept and regular exercise, the relation with exercise dependence remains to be established. This study tries to give a contribution to understand the role that physical self-concept can plays in the etiology of exercise dependence. This could be relevant in order to identify important psychological mechanisms and exercise dependence symptoms development.

Particularly, as the robust scientific evidence that links exercise to general well-being and positive self-perception, it seems evident that physical activity has a lot to offer to health practitioners as an important tool in the prevention of mental illness, or promotion of quality of life. From a clinical perspective, considering the impact of physical self-perception on dependence symptoms, it has helped to define more clearly what it is that makes people engaged in more frequent exercise. Specifically, it would be useful for health professionals, who can recommend exercise to patients, understand the effects and mechanisms of physical exercise on mental well-being and have correct information about appropriate modes and types of activities as well as levels of intensity, frequency and duration of the exercise activity.

Understanding the mechanisms which underly exercise dependence development can facilitate an early detection of clinical cases most at risk, emphasizing only the benefits of a regular physical activity.

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