

Examining relationship between personality characteristics and exercise dependence

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The main purpose of this study was to examine the relation between personality traits, based on the five factor model, and exercise dependence symptomatology. There were 423 voluntary participants (216 male and 201 female) who exercised regularly over a year selected for this study. By using Eating Disorder Inventory-2 questionnaire, participants who scored in the at-risk range were excluded from analysis. All athletes completed the Exercise Dependence Scale and the Big Five Questionnaire. The results seem to confirm the relation between exercise dependence and certain personality characteristics (Hausenblas & Giacobbi, 2004) suggesting that extraversion, neuroticism, and agreeableness may potentially be underlying factors in exercise dependence symptomatology. This finding aims to contribute to understanding the role that personality can play in the etiology of exercise dependence. This could be relevant for potentially identifying individuals who may be at risk for dysfunctional dependence behaviors.

Key words: physical exercise, exercise dependence, personality, eating disorders, risk behaviors

Consistent relationship has been demonstrated between physical activity and psychological well-being. A number of studies have established that exercise seems to reduce the risk associated with cardiovascular disease and obesity and helps to control anxiety and depression (Brosse, Sheets, Lett, & Blumenthal, 2002), leading to greater self-esteem and a better response to stress (Warburton, Nicol, & Bredin, 2006). Research has also shown that exercise may lead to dependence for some people and may be dangerous to health (Hausenblas & Symons Downs, 2002a). Exercise dependence may have negative consequences, such as injury, menstrual irregularity, anxiety, depression, illness, or exercising while injured or ill (Hall, Kerr, Kozub, & Finnie, 2004; Hausenblas & Symons Downs, 2002a).

Hausenblas and Symons Downs (2002a) used the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria for substance dependence (American Psychiatric Association [APA], 1994) to describe exercise dependence as a form of exercise that creates clinically significant distress. Dependence was manifested in three or more of the following areas: *tolerance*, the need to increase

duration, frequency, and intensity in order to receive the desired benefits; *withdrawal*, manifested by various symptoms (anxiety, fatigue) in the absence of exercise, with the continuation of exercise to relieve or avoid these symptoms; *intended effects*, when the duration or amount of exercise is greater than expected; *loss of control*, the inability to reduce or manage the operation, despite the desire to do so; *time*, excessive time to perform or prepare the exercise; and *reductions in other activities*, when elimination or reduction of social, occupational, or recreational activities occur because of the continued physical exercise, in which the subject persists in exercising in spite of recurring physical or psychological problems caused by the exercise.

Exercise dependence can be related to other dependence behaviors, such as eating disorders. For this reason, De Coverley Veale (1987) distinguishes between primary exercise dependence and exercise dependence that is secondary to an eating disorder. In general, exercise dependence is a relatively recent phenomenon which requires more research to understand the characteristics, antecedents, and consequences of this form of dependency (Adams, Miller, & Kraus, 2003).

Hausenblas and Symons Downs (2002a) illustrate the need to examine the role that personality plays in the etiology of exercise dependence. This could also be relevant for identifying important psychological mechanisms that underlie the relationships between personality aspects and sport dependence behaviors. Researchers examining the cor-

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relation between personality and exercise dependence have found higher scores in individuals with primary exercise dependence than controls on harm avoidance, persistence, and self-directness and lower scores on mature temperament (Grandi, Clementi, Guidi, Benassi, & Tossani, 2011). Other studies have shown higher scores in perfectionism in at-risk exercise dependence subjects (Coen & Ogles, 1993; Hall, Kerr, Kozub, & Finnie, 2007; Hausenblas & Symons Downs, 2002b) and a positive relationship between exercise dependence symptoms and obsessive compulsiveness (Cook, 1996; Davis, Brewer, & Ratusny, 1993; Davis et al., 1995; Spano, 2001). In contrast, an inconsistent association of exercise dependence with narcissism, extraversion, and neuroticism was revealed (Davis & Fox, 1993; Flynn, 1987; Jibaja-Rusth, 1989; Mathers & Walker, 1999). For this reason, Hausenblas and Giacobbi (2004) proposed the examination of this relationship by using the five factor model of personality. Within this theoretical construct, factors such as Neuroticism, Extraversion, and Conscientiousness have already been consistently linked to physical activity involvement (Bogg & Roberts, 2004; Saklofske, Austin, Rohr, & Andrews, 2007).

The five factor model is regarded as the most comprehensive taxonomy of personality traits (Costa & McCrae, 1995). The five traits are *extraversion*, which implies an energetic approach to the world and includes traits such as assertiveness, activity, talkativeness, and sociability; *agreeableness*, which refers to a pro-social and communal orientation toward others and includes traits such as altruism, sympathy, trust, and modesty; *conscientiousness*, which implies a focus on responsibilities and is characterized by thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and self-discipline; *openness to experience*, which describes the originality, and complexity of an individual's mental and experiential life and is characterized by activity, imagination, aesthetics, and sensitivity; and *neuroticism*, emotional instability characterized by negative emotionality, such as anxiety, sadness, and impulsiveness.

Therefore, individuals exhibiting extraversion, neuroticism, and agreeableness traits would be more at risk for developing exercise dependence symptoms (Hausenblas & Giacobbi, 2004). On a deeper level, openness to experience and emotional stability or openness to experience and agreeableness are factors which explain the greatest variance of exercise dependence (Kern, 2010). These unhealthy associations are probably more frequent among individuals with combinations of negative personality traits (e.g., high neuroticism, low extraversion, and low agreeableness; Vollrath & Torgersen, 2008).

However, although a number of studies have now established that certain personality aspects are a risk factor for higher levels of dependence symptoms and unhealthy lifestyles (Tolea et al., 2012), there is considerably less known about the relationship between exercise dependence

and other risk factors associated with excessive exercise and eating behavior patterns. Furthermore, the majority of the research that examines the relationship between personality and exercise dependence does not distinguish between primary (independent disorder) and secondary (secondary to an eating disorder) exercise dependence. This research perspective will be relevant for potentially identifying individuals who may be at risk for primary exercise dependence symptoms and to identify factors that can be predictive for the onset of exercise dependence. For this reason, the aim of this study is to examine the relationship between personality, based on the five factor model, and exercise dependence symptoms in a more heterogeneous population of athletes with different age levels.

METHOD

Participants

Participants for this study were 455 voluntary gym users that were steady members for at least a year. After the exclusion of 32 subjects (15 male and 17 female) who scored in the at-risk range for eating disorders, the final sample for this study was composed of 423 subjects, where 216 were male (age: $M = 34.27$, $SD = 11.68$) and 207 were female (age: $M = 35.68$, $SD = 11.84$). They were at the upper end of the normal weight category of the body mass index (BMI; male: $M = 24.43$, $SD = 2.31$; female: $M = 22.20$, $SD = 2.90$). All participants were Italian and Italian-speaking. They were recruited in several gyms in Sicily and Calabria.

Procedures and measures

Participants were found in different gyms and, after signing the informed consent, voluntarily agreed to compile a number of questionnaires to measure personality, exercise dependence, and eating behavior. To eliminate the potential confounding effects of secondary dependence, in accordance with the indications of the Garner manual of Eating Disorder Inventory-2 (EDI-2; 1991), 32 subject (15 male and 17 female) who scored in the at-risk range on Drive for Thinness subscale (i.e., 14 or greater; Garner, 1991) of the EDI-2 instruments were excluded from analysis.

Personality. Personality traits were measured using the Big Five Questionnaire (BFQ; Caprara, Barbaranelli, & Borgogni, 1993). The BFQ contains five domain scales: Energy/Extraversion, Agreeableness/Friendliness, Conscientiousness, Emotional stability (vs. Neuroticism), and Openness. For each of the 132 items, respondents indicated the extent to which they assign personal relevance to it on a 5-point scale ranging from 1 (*very false for me*) to 5 (*very true for me*). Construct validity of the BFQ scales has been demonstrated by high correlations with analogous scales, such as the NEO-PI, on both Italian and American samples

Table 1
Descriptive statistics for Big Five personality subscales and exercise dependence scales

	α	Observed range	Possible range	M	SD	Skew	Kurtosis
Energy/Extraversion	.74	43-112	24-120	79.71	25.15	0.367	0.484
Agreeableness/Friendliness	.69	25-120	24-120	79.82	25.49	0.305	1.074
Conscientiousness	.71	40-120	24-120	84.87	25.28	0.408	1.014
Emotional stability	.70	27-112	24-120	69.67	26.08	0.144	0.844
Openness	.64	24-120	24-120	80.87	25.24	0.481	0.934
Withdrawal	.77	0-18	0-18	7.02	4.39	0.669	0.184
Continuance	.72	0-18	0-18	5.69	4.18	0.859	0.286
Tolerance	.82	0-18	0-18	10.81	4.78	0.282	-0.363
Lack of control	.84	0-18	0-18	6.75	4.53	0.701	0.063
Reduction in other activities	.68	0-18	0-18	5.15	3.72	0.939	0.946
Time	.80	0-18	0-18	9.46	4.43	0.507	0.046
Intention effects	.85	0-18	0-18	7.66	4.53	0.527	-0.201
Total dependence	.91	0-119	0-126	49.05	24.89	0.200	0.235

(Barbaranelli & Caprara, 2000). Alpha coefficients for the present study are presented in Table 1.

Exercise dependence. Exercise dependence was measured using the Exercise Dependence Scale (EDS-21; Hausenblas & Symons Downs, 2002b). This instrument is based on the DSM-IV (APA, 1994) criteria for substance dependence and comprises 21 items scored on a 6-point scale ranging from 1 (*never*) to 6 (*always*). Higher scores indicate more symptoms of exercise dependence. The instrument has seven subscales (three items for each) based on the DSM-IV criteria for substance dependence and a total score. The subscales are: (a) Withdrawal (e.g., "I exercise to avoid feeling anxious"); (b) Continuance (e.g., "I exercise despite recurring physical problems"); (c) Tolerance (e.g., "I continually increase my exercise intensity to achieve the desired effect/benefits"); (d) Lack of control (e.g., "I am unable to reduce how long I exercise"); (e) Reduction in other activities (e.g., "I would rather exercise than spend time with family/friends"); (f) Time (e.g., "I spend most of my free time exercising"); and (g) Intention effects (e.g., "I exercise longer than I intend"). For the present study α coefficients were good, as can be seen in Table 1.

Eating Disorders. Eating disorders were measured with the EDI-2 (Garner, 1991). This 91-item self-report tool measures various symptoms of eating disorders and is made up of 11 subscales: Drive for thinness, Bulimia, Body dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal distrust, Interoceptive awareness, Maturity fears, Asceticism, Impulse regulation, and Social insecurity. The EDI-2 was administered in this study, but only Drive for thinness subscale was used to assess weight preoccupation, which is the main feature of an eating disorder according to Garner indications (Garner, 1991). Individuals with a score equal to 14 or more on this subscale (in accordance with the EDI-2 manual) were considered to be at risk for an eating disorder and were excluded from the study.

RESULTS

Descriptive analysis of exercise dependence questionnaire scales and Big Five personality subscales are presented in Table 1 and acceptable skewness ($< |1|$) and kurtosis ($< |1.1|$) were demonstrated. Results on the exercise dependence scale were similar to those observed in previous studies utilizing the EDS-21 (e.g., Hausenblas & Symons Downs, 2002b).

Correlational analysis (Pearson's r) shows significant correlations between exercise dependence and the personality traits (Table 2). Specifically, Energy/Extraversion is positively correlated to Tolerance, Time, Intention effects, and Total dependence. Agreeableness/Friendliness is negatively correlated with Continuance, Reductions in other activities, Time, Intention effects, and Total dependence. There is also a negative correlation between Conscientiousness and Continuance, Loss of control, Reductions in other activities, and Total dependence. Emotional stability shows negative correlation with Withdrawal, Continuance, Loss of control, Reduction in other activities, and Total dependence. Finally, Openness is correlated negatively with Intention effects. All of the correlations between personality and exercise symptoms seem to have a small effect size and only the negative correlation between Emotional stability and Withdrawal seems to have a moderate effect size.

Hierarchical multiple regression analysis with forced block entry was used to examine the relationship between personality and exercise dependence (Table 3). In Block 1, to control for demographic data, the results on EDS-21 (dependent variable) were regressed on gender, age, and BMI. In Block 2 the BFQ subscales were entered in the regression. Results show that demographic variables seem to be relevant for exercise dependence explaining 3% of the exercise dependence ($R^2_{adj} = .035$, $F(3, 419) = 6.167$, $p < .001$). Specifically, exercise dependence seems to be negatively

Table 2
Correlations between personality traits and exercise dependence scales

	1	2	3	4	5	6	7	8	9	10	11	12
Energy/Extraversion												
Agreeableness/Friendliness	.135**											
Conscientiousness	.386**	.189**										
Emotional stability	.105*	.199**	.102*									
Openness	.297**	.343**	.348**	.216**								
Withdrawal	-.034	-.082	-.063	-.308**	-.028							
Continuance	.093	-.107*	-.141**	-.131**	.011	.307**						
Tolerance	.234**	-.061	-.003	-.090	-.005	.156**	.287**					
Loss of control	.053	-.074	-.127**	-.107*	-.059	.202**	.281**	.342**				
Reductions in other activities	.059	-.204**	-.142**	-.125*	-.073	.255**	.395**	.295**	.336**			
Time	.206**	-.115*	-.007	-.069	-.033	.268**	.320**	.517**	.354**	.508**		
Intention effects	.113*	-.125*	-.083	-.093	-.105*	.263**	.234**	.471**	.399**	.420**	.702**	
Total dependence	.180**	-.162**	-.102*	-.199**	-.064	.510**	.574**	.694**	.624**	.641**	.802**	.750**

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

predicted by age and BMI, while gender doesn't seem to be a significant predictor. When the personality subscales were entered in the second block after demographic variables, there was a significant change in R^2 ($R^2_{adj} = .138$, $F_{change}(5,414) = 10.98$, $p < .001$). The final model seems to predict exercise dependence in a relevant way by explaining 14% of its variability ($R^2_{adj} = .138$, $F(8,414) = 9.50$, $p < .001$). Specifically, after the introduction of personality factors, exercise dependence is predicted by Energy/Extraversion and negatively predicted by Conscientiousness and Emotional stability. Age also retains its unique contribution and predicts negative exercise dependence.

Table 3

Hierarchical multiple regression analysis predicting total exercise dependence from demographic data and personality traits

Predictor	Total exercise dependence			
	R^2_{adj}	β	t	p
Step 1	.035			
Age		-.196	-3.665	.000
Gender		-.041	-0.768	.443
BMI		-.132	-2.299	.022
Step 2	.138			
Age		-.189	-3.509	.000
Gender		-.008	-0.157	.876
BMI		-.105	-1.906	.057
Energy/Extraversion		.247	4.862	.000
Agreeableness/Friendliness		-.082	-1.630	.104
Conscientiousness		-.159	-3.113	.002
Emotional stability		-.220	-4.522	.000
Openness		-.009	-0.172	.864

DISCUSSION

This study investigated whether personality characteristics, based on the five factor model, were associated with exercise dependence behavior. Results show that personality seems to be relevant for exercise dependence, and that agreeableness/friendliness, conscientiousness, and emotional stability negatively predict exercise dependence while energy/extraversion predicts it positively. This finding confirms previous research that individuals reporting low primary exercise dependence symptoms may be less extraverted, less neurotic, and more agreeable than individuals with high exercise dependence symptoms (Hausenblas & Giacobbi, 2004). Specifically, this study shows that energy/extraversion predicts exercise dependence symptoms. People high in energy (or extraversion) tend to be active, assertive, talkative, and energetic. This personality characteristic is very relevant in exercise dependence symptoms development because it is present in excessive exercisers.

In fact, correlation analysis indicates that extraversion is positively related to tolerance (the need to increase exercise in order to achieve the desired effect), time (a great deal of time spent exercising), and intended effects (exercising more and longer than was intended). These are symptoms that represent exercise dependence behaviors that require more energy and vitality.

Agreeableness (or friendliness) also correlates with exercise dependence. People who score high on agreeableness tend to be cooperative, helpful, and friendly, and this personality trait could be a protective factor for exercise dependence. Agreeableness is negatively related to the reduction of other activities (that is, the tendency to reduce or give up social, occupational, or recreational activities to exercise) and the need to spend a great deal of time in exer-

cise activities. For this reason, probably, unfriendly people could be at risk for exercise dependence. Agreeableness is also negatively correlated with intended effects and continuity symptoms. This result could confirm the Hausenblas and Giacobbi (2004) explanation of the relationship between agreeableness and exercise dependence. Specifically, researchers say that it is possible that disagreeable people may engage in excessive exercise behavior to satisfy their competitive nature. In effect, people low in agreeableness tend to be egocentric, unfriendly, and competitive and for this reason the competitive need of people with low scores in agreeableness could induce them to try to exceed limits and have more exercise or over a longer period than was intended (intended effects) and continue to exercise despite awareness of a persistent or recurrent physical or psychological problem (continuance symptoms). However in this study, even if agreeableness was negatively correlated with exercise dependence, it doesn't seem to explain more variance than the demographical variables.

Data also shows that emotional stability (on the opposite end of neuroticism) predicts exercise dependence negatively. This seems to confirm previous research that showed a positive prediction of neuroticism on exercise dependence (Hausenblas & Giacobbi, 2004). Neurotic people (low score in emotional stability) tend to experience negative emotions and are vulnerable to stress. Hausenblas and Giacobbi (2004) hypothesize that neurotic people maybe tend to exercise in an excessive way to reduce their stress and negative emotions as a maladaptive coping strategy. In fact, emotional stability in this study is negatively related to withdrawal that is manifested by various symptoms (anxiety, fatigue, irritability, depression, etc.) and, in accordance to Hausenblas and Giacobbi (2004), neurotic exercise dependent individuals may use exercise as a maladaptive coping strategy to avoid or relieve withdrawal symptoms.

Furthermore, results show that emotional stability is also negatively related to continuance (to continue to exercise despite knowledge of having a persistent or recurrent physical or psychological problem), reduction of other activities (the tendencies to reduce or give up social, occupational or recreational activities to exercise), and loss of control (the inability to reduce or manage the exercise, despite the desire to do so) symptoms. These associations indicate that neurotic people tend to have difficulties stopping exercise and continue to exercise at the expense of their health in order to reduce and control the negative emotions that they experience.

Finally, conscientiousness appears negatively related to exercise dependence. Conscientiousness is a tendency to show self-discipline and responsibility and to think before acting and its negative relationship with exercise dependence can be explained through the negative correlation with continuance (to continue to exercise despite knowledge of having a persistent or recurrent physical or psychological problem), reduction of other activities (the tendencies to re-

duce or give up social, occupational, or recreational activities to exercise), and loss of control (the inability to reduce or manage the exercise, despite the desire to do so). These negative relationships reveal, in fact, that conscientious people tend to have more self-control and self-discipline and demonstrate greater forethought before acting. Thus they do not lose control, they avoid exercising when having physical or psychological problems, and do not neglect work, family, and social commitments.

On the other hand, conscientiousness according to the Hausenblas and Giacobbi (2004) study is not a predictive variable for exercise dependence. This could be explained by the fact that excessive conscientiousness can become a perfectionist trait that different research showed to be related to exercise dependence behavior. For this reason, probably this relationship is not totally clear and needs further investigation.

Although this study attempts to contribute to the further understanding of the relationship between personality and exercise dependence symptoms, it cannot be exhaustive and complete. In fact, even if it provides information on a typical group of subjects who exercise, more heterogeneous for age and activity level than those in the previous researches, the study is limited to fitness practice. Future research needs to consider other types of sport. Furthermore, the correlational analyses, as presented here and in most of the other research, cannot inform us on the causal relationship between exercise dependence and personality traits. So, it could be interesting and useful to examine this relationship by using different research designs to identify possible subtypes or additional mechanisms of excessive exercise development (Hausenblas & Symons Downs, 2002a). Such information would be extremely valuable and would provide additional insight into the studied phenomenon. Also, the incidental nature of the present sample represents a serious limitation. Furthermore, our sample included volunteer exercisers with substantial variability in the frequency and duration of their exercise behaviors. Subsequent studies are needed to assess these aspects more appropriately, with consideration to the role of competitive sports.

In this regard, the role of competition needs more attention, as suggested by Hausenblas and Giacobbi (2004), an opinion shared by the authors of this study. The negative relationship between agreeableness and exercise dependence can be explained by the need that disagreeable people have to engage in excessive exercise to satisfy their competitive nature. Unfortunately in this study it is not possible to understand the role of competition in the development of exercise dependence and, for this reason, it would be important to evaluate this aspect in more depth.

In conclusion, compared to previous studies, this research generalized results to a larger sample, confirming the significant role of age for exercise addiction. In this regard, young athletes seem to be at greater risk for exercise symptoms and consequences than other groups. This rela-

tionship persists even when personality traits are taken into account.

In line with Hausenblas and Giacobbi findings (2004), neuroticism (emotional stability) and energy/extraversion seem to be relevant personality traits in sport dependence, while the agreeableness/friendliness appears not to have a significant impact on dysfunctional sport behavior development. This is in contrast to the study by Hausenblas and Giacobbi (2004) who reported significant interaction effects of agreeableness/friendliness on excessive exercise habits and the obsessive drive for a muscular physique.

This suggests that neuroticism and energy may exert a generalized negative impact on athletes' psychological well-being, of which they may have not been aware. These traits are predictive of dysfunctional patterns that may hinder performance and athletes' mental well-being.

Other significant associations between different personality variables and excessive exercise emerged in this study, but not in consonance with previously published research. These results are likely due to the effects of specific sample characteristics, even though demographic characteristics such as age, gender, and BMI were controlled in this research, which had not been examined previously to the best of our knowledge. In contrast with the previous research, this study uses a more heterogeneous group of athletes (they are not only college students) and this novelty seems to affect the relevance of agreeableness/friendliness and conscientiousness in the analysis model.

This suggests that to gain a clearer picture of personality factors and situations that may be relevant to identify athletes at risk, demographic variables and environmental conditions should be controlled (e.g., work, family, and social network stressors, stressors related to training practices, and social interaction). What also needs to be examined is the role of motivation mechanisms (Deci & Ryan, 1985; Markland & Tobin, 2004), a key variable that can provide crucial information on effective strategies for the behavioral regulation in exercise and physical activity (Costa & Oliva, 2011). So to maximize the practical value of such research, future studies need to identify situational and emotional determinants of individual differences in exercise dependence phenomena in general.

In summary, the risk of the development and persistence of problematic exercise may be greater in individuals whose personalities are immature or at risk to develop a personality disorder. Therefore, this study attempts to contribute to the understanding of the role that personality can play in the etiology of exercise dependence. This could be relevant for identifying important psychological mechanisms that underlie the relationship between personality dimensions and exercise dependence behavior. Furthermore, the information from this study will be relevant for potentially identifying individuals who may be at risk for exercise dependence, and to understand factors that can prevent the onset of exercise dependence.

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