Discrepancies between implicit and explicit self-concepts of intelligence: relations to modesty, narcissism, and achievement motivation

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Previous research has shown that different configurations of the implicit self-concept of intelligence (iSCI) and the explicit self-concept of intelligence (eSCI) are consistently related to individuals’ performance on different intelligence tests (Dislich et al., 2012). The results indicated that any discrepant configuration between the iSCI and the eSCI impairs performance. In the present study, we examined how correspondence between the iSCI and the eSCI is related to intelligence test performance as well as personality traits of modesty (low eSCI, high iSCI), narcissism (high eSCI, low iSCI), and achievement motivation was investigated. Furthermore, a moderated mediation analysis showed that the relation between the iSCI–eSCI configurations and intelligence test performance was mediated by achievement motivation for modest individuals.

Keywords: intelligence self-concept, implicit association test, intelligence, modesty, narcissism, achievement motivation

INTRODUCTION

Previous research by Dislich et al. (2012) has provided evidence that the interplay of the explicit self-concept of intelligence (eSCI) and the implicit self-concept of intelligence (iSCI) is systematically related to actual performance on well-established intelligence tests. High eSCI was generally related to higher performance, but this relation was moderated by the iSCI. Whenever the implicit association contradicted the eSCI, subsequent performance was impaired [a pattern, fully replicated more recently by Gerstenberg et al. (2013)]. More specifically, a fragile SCI (i.e., an explicit claim of being intelligent that was accompanied by a weak automatic association of the self with intelligence; high eSCI, low iSCI) was associated with reduced performance on intelligence tests compared to a consistently high SCI (high eSCI, high iSCI). Participants who self-reported not being very intelligent (low eSCI) performed generally worse on the IQ test, but this was specifically pronounced for those with an accompanying automatic association as intelligent (i.e., for modest SCI; low eSCI, high iSCI). The latter finding in particular invites speculation about why holding an iSCI as intelligent would impair test performance. In the present paper as a first goal we sought to explore the relation between SCI configurations and personality variables. As a second goal, we tested whether different levels of achievement motivation could explain the obtained performance pattern by Dislich et al. (2012).

To empirically test the validity of the descriptive labels used by Dislich et al. (2012), we examined the relation between the modest type in the four-category SCI framework and the trait of modesty. It was assumed that individuals with the combination of high iSCI and low eSCI would have positive internal self-views but would not express them. Thus, individuals with a modest SCI pattern were expected to score higher on an assessment of the trait modesty. Overall, we expected individuals with a low eSCI and high iSCI to be more modest than all other combination of SCI individuals (Hypothesis 1).

In contrast to this modest type, individuals with a fragile SCI overestimate rather than underestimate their intelligence. Their bold explicit claim of intelligence is not accompanied by an identical automatic association of the self with intelligence. Whereas Dislich et al. (2012) have relied on the term fragile to label this SCI configuration, others have used the term narcissistic to characterize a positive explicit self-evaluation that is accompanied by a negative automatic implicit self-evaluation (e.g., Bosson et al., 2003; Golec de Zavala et al., 2009). In line with this label and the mask-model of narcissism (Bosson et al., 2003), some authors have found that individuals with discrepant self-evaluations (low implicit, high explicit) did indeed score high on self-reported measures of narcissism (e.g., Golec de Zavala et al., 2009; but see Gregg and Sedikides, 2010). In other words, narcissists are thought to simultaneously hold positive conscious self-views and harbor significant self-doubts at less conscious levels. Thus, the iSCI may contradict the positive eSCI due to its less conscious nature or due to a different susceptibility to self-presentational concerns. Independent of the exact mechanism, the cited theories suggest the prediction that, in the domain of SCI as well, individuals with a fragile (or narcissistic) configuration will have the highest scores on a narcissism questionnaire (Hypothesis 2).

A second goal of the present study was to test the mediating role of achievement motivation to account for the effects shown by modest individuals. Across all three studies by Dislich et al. (2012), individuals with a modest SCI performed similarly to
or more poorly than individuals with a consistently low SCI. This result is particularly intriguing given that a positive iSCI is commonly assumed to be derived from repeated exposure to experiences (DeHart et al., 2006) and feedback that characterize the self as intelligent. If this plausible assumption is true, it is all the more surprising that modest individuals perform poorly on performance-based assessments of intelligence, as the effect could not be attributed to actual performance potential. Importantly, potential does not automatically translate into performance but an individual needs to have sufficient motivation to display and realize one’s potential. Otherwise, underachievement will be the inevitable result. Thus, to better understand and possibly explain the results found by Dislich et al. (2012), we propose a mediating effect of low achievement motivation. For individuals with a modest SCI, being intelligent might not be of central importance, which might lead to downplaying their intellectual abilities (low eSCI). At the same time, their lack of interest in intellectually outperforming their peers should be reflected by a low achievement motivation.

The present study was designed to test the assumption that modest individuals perform worse on intelligence tests and have the lowest achievement motivation (Hypothesis 3). Furthermore, we postulated that achievement motivation would mediate the relation between SCI and performance scores on an intelligence test (Hypothesis 4).

**MATERIALS AND METHODS**

**PARTICIPANTS AND PROCEDURE**

A total of 84 students (60 women, 24 men) enrolled in different majors at two German universities, with a mean age of 22.56 (SD = 3.6) participated in this study. The study was conducted in the laboratory in group sessions of up to six individuals. Upon arrival, participants were seated at individual computer stations where they completed the measure of iSCI (SCI-IAT) followed by the questionnaire measure of eSCI. Participants then responded to the modesty scale, the narcissism questionnaire, and the achievement motivation scale. Finally, they were asked to complete the performance-based assessment of intelligence, a multiple-choice vocabulary test, and then they were fully debriefed and thanked.

**MEASURES**

**Implicit self-concept of intelligence**

For the SCI-IAT, we used the same stimuli as proposed by Dislich et al. (2012). That is, for the target categories, we used the labels “me” versus “not me,” whereas for the attribute categories, we used “intelligent” versus “stupid.” For the target categories, we used the stimuli “me,” “my,” “mine,” “self,” “not me,” “you,” “yours,” “theirs,” and “it.” For the attribute categories we used the stimuli “intelligent,” “bright,” “clever,” “able,” “wise,” “stupid,” “dumb,” “foolish,” “silly,” and “dense.” We applied the standard IAT procedure (Greenwald et al., 1998) and calculated the IAT effects using the improved scoring algorithm proposed by Greenwald et al. (2003). We estimated the internal consistency of the SCI-IAT by computing two standardized difference scores for the odd trials in both critical blocks and the even trials in both critical blocks. These two d-scores were then used to estimate a Spearman–Brown-corrected split-half correlation.

**Explicit self-concept of intelligence**

An eight-item short version of the standardized inventory for measuring self-estimated intelligence (Rammstedt and Ramm-sayer, 2002) was used to assess participants’ eSCI. The items reflect seven primary mental abilities postulated by Thurstone (1938). An eighth item reflected general intelligence (e.g., Spearman, 1904). For each type of intelligence, a short description was provided (e.g., word fluency: “efficient and adequate expression of words”). Participants responded to the items by using a visual analog scale (scaled from 0 to 100) to indicate how well each type of intelligence characterized them.

**Intelligence test**

Intelligence was assessed using a multiple-choice vocabulary test (MWT A; Mehrfachwahl–Wortschatztest Form A; Lehrl et al., 1991). This test measures crystallized intelligence, which is the ability to use skill, knowledge, and experience and which relies on information from long-term memory. Its concurrent validity with other standard measures of crystallized intelligence has been provided by Lehrl et al. (1991). We decided to use the MWT A as it was also used in the studies by Dislich et al. (2012) and Gerstenberg et al. (2013). The MWT A consists of 37 items of increasing difficulty. Scores on the MWT A can range from 0 to 37 and are then recalculated into typical IQ scores with a mean of 100 and a SD of 15. For each trial, examinees were shown a list of five words (one real word and four non-words) and were asked to choose the real word from the list.

**Modesty**

Modesty was measured using a subscale of the German version of the NEO Personality Inventory-Revised [NEO PI-R; Costa and McCrae (1992); German version: Ostendorf and Angleitner (2004)]. Modesty is a facet of the major factor agreeableness. Modesty as measured by the NEO PI-R is the tendency to play down one’s own achievements and to be humble. The subscale consists of eight items that are rated on six-point scales.

**Narcissism**

Narcissism was measured using the German version of the Narcis-sistic Personality Inventory [NPI; Raskin and Hall (1979); German version: NPI 40; Schütz et al. (2004)]. This instrument measures narcissism as a personality trait relating to a love of self and self-absorption. It is typically used to study sub-clinical narcissism. The NPI 40 contains 40 true-false statements (e.g., “I will be a success.” vs. “I am not too concerned about success.”).

**Achievement motivation**

Achievement motivation was measured using the German version of the Achievement Motives Scale [AMS; Gjesme and Nygard (1970); German version: Lang and Fries (2006)]. The AMS contains 10 items that are rated on four-point scales.

**RESULTS**

All indicators were scaled such that higher scores indicated higher levels of the respective construct. Descriptive statistics, internal consistencies (Cronbach’s alpha), and intercorrelations for all measures are presented in Table 1. Similar to the
Table 1 | Descriptive statistics and correlations for all variables.

<table>
<thead>
<tr>
<th></th>
<th>(1) iSCI (IAT, D measure)</th>
<th>(2) eSCI</th>
<th>(3) Crystallized intelligence (MWTA)</th>
<th>(4) Modesty</th>
<th>(5) Narcissism</th>
<th>(6) Achievement motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td>0.39**</td>
<td>0.17</td>
<td>0.29*</td>
<td>−0.14</td>
<td>−0.14</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
<td></td>
<td>0.49**</td>
<td>−0.11</td>
<td>0.33**</td>
<td>0.44**</td>
</tr>
<tr>
<td>(3)</td>
<td></td>
<td></td>
<td></td>
<td>−0.10</td>
<td>0.07</td>
<td>0.45**</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>−0.20</td>
<td>−0.20</td>
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<tr>
<td>(5)</td>
<td></td>
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<td>0.03</td>
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Table 2 | Regression analyses predicting intelligence test performance, modesty, narcissism, and achievement motivation.

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>$\beta$</th>
</tr>
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<tbody>
<tr>
<td>Intelligence test</td>
<td>0.29**</td>
<td>0.15</td>
</tr>
<tr>
<td>iSCI</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>eSCI</td>
<td>0.48**</td>
<td></td>
</tr>
<tr>
<td>iSCI $\times$ eSCI</td>
<td>0.23*</td>
<td></td>
</tr>
<tr>
<td>Modesty scale</td>
<td>0.08*</td>
<td></td>
</tr>
<tr>
<td>iSCI</td>
<td>0.23*</td>
<td></td>
</tr>
<tr>
<td>eSCI</td>
<td>−0.12</td>
<td></td>
</tr>
<tr>
<td>iSCI $\times$ eSCI</td>
<td>−0.21*</td>
<td></td>
</tr>
<tr>
<td>Narcissism scale</td>
<td>0.18**</td>
<td></td>
</tr>
<tr>
<td>iSCI</td>
<td>−0.16</td>
<td></td>
</tr>
<tr>
<td>eSCI</td>
<td>0.34**</td>
<td></td>
</tr>
<tr>
<td>iSCI $\times$ eSCI</td>
<td>−0.27**</td>
<td></td>
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<tr>
<td>Achievement motivation</td>
<td>0.24**</td>
<td></td>
</tr>
<tr>
<td>iSCI</td>
<td>−0.15</td>
<td></td>
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<tr>
<td>eSCI</td>
<td>0.44**</td>
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<tr>
<td>iSCI $\times$ eSCI</td>
<td>0.23*</td>
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results of Dislich et al. (2012) and Gerstenberg et al. (2013), the SCI-IAT and the eSCI were not found to be significantly correlated.

MULTIPLE REGRESSION ANALYSES

To determine whether the iSCI and eSCI were related to scores on the intelligence test, the modesty scale, the narcissism questionnaire, and the achievement motivation scale, multiple regression analyses were used. The dependent variables were regressed onto centered eSCI scores, centered iSCI scores, and their interaction term. Results of the regression analyses are displayed in Table 2. The regression analyses were followed by simple slope tests.

Intelligence test

Individuals with a high eSCI performed better than individuals with a low eSCI (see Table 2). The examination of simple slopes replicated the pattern of results found by Dislich et al. (2012), Studies 1–3 (Figure 1A). That is, individuals with a high eSCI (+1 SD) showed a significant positive relation between the iSCI and performance on the intelligence assessment, $B = 3.55$, $t(81) = 7.26$, $p < 0.01$. Individuals high on both types of SCI achieved significantly higher scores on the intelligence test than participants with a fragile SCI. The relation between the iSCI and scores on the intelligence test among individuals with a low eSCI ($−1$ SD) was also significant, indicating that modest individuals performed worse than persons with a consistently low SCI, $B = −0.77$, $t(81) = 1.96$, $p < 0.05$, supporting Hypothesis 3.

Modesty scale

Concerning the main effect of the iSCI (see Table 2), individuals with a low iSCI showed higher scores on the modesty scale than individuals with a high iSCI. Figure 1B shows a significant positive relation between modesty scores and the iSCI for individuals with a low eSCI, $B = 1.42$, $t(81) = 3.61$, $p < 0.01$, also supporting Hypothesis 1, which stated that individuals with a combination of a low eSCI and high iSCI are more modest than individuals with a congruently low SCI.

Narcissism scale

In general, individuals with a high eSCI scored higher on the narcissism scale than did individuals with a low eSCI (see Table 2). As can be seen in Figure 1C, there was a significant negative relation between NPI scores and the iSCI for individuals with a high eSCI,
$B = -0.96$, $t(81) = 1.96, p < 0.05$. Thus, consistent with Hypothesis 3, individuals with a high eSCI and low iSCI scored higher on the narcissism questionnaire than individuals with a consistently high SCI.

**Achievement motivation**

The main effect of the eSCI indicated that individuals with a high eSCI achieved higher scores on achievement motivation than individuals with a low eSCI (see Table 2). The direction of the predicted interaction on the achievement motivation scale was positive, indicating that as the eSCI increased, the relation between a high iSCI and achievement motivation became stronger (see Figure 1D). Testing simple slopes above and below the mean of the eSCI, no significant positive relation was found between achievement motivation and the iSCI for individuals with a high eSCI, $B = 0.32$, $t(81) = 0.65, p = 0.52$. This finding supports Hypothesis 3, which stated that individuals with a fragile SCI would not differ in achievement motivation from individuals with a consistently high SCI. Furthermore, a significant negative relation was found between achievement motivation and the iSCI for individuals with a low iSCI, $B = -1.46$, $t(81) = 3.71, p < 0.01$. This relation is in line with Hypothesis 3, which predicted that individuals with a modest SCI would have lower achievement motivation than individuals with a consistently low SCI.
MODERATED MEDIATION ANALYSIS

To test Hypothesis 4, which stated that achievement motivation would mediate the interaction effects of the iSCI and eSCI on intelligence test performance, additional analyses were performed. As previous analyses had already found a correlation between achievement motivation and intelligence test performance, and an effect from the two-way interaction of the iSCI and eSCI on the dependent variable as well as on the mediator, mediation would be demonstrated if simultaneously regressing the dependent variable on the predictors and the mediator resulted in a significant main effect of the mediator on the dependent variable and a reduced or zero effect on the two-way interaction. Intelligence test performance was regressed on the iSCI, eSCI, their interaction terms, and achievement motivation. The analysis, $R^2 = 0.34$, revealed a significant main effect of achievement motivation, $\beta = 0.29$, $t(80) = 2.77$, $p < 0.01$, a significant main effect of the iSCI, $\beta = 0.19$, $t(80) = 2.18$, $p < 0.05$, and a significant main effect of the eSCI, $\beta = 0.35$, $t(80) = 3.54$, $p < 0.01$. In support of the assumed mediation, the two-way interaction between the iSCI and eSCI was no longer significant, $\beta = 0.16$, $t(81) = 2.77$, $p = 0.08$.

As we were specifically interested to test which configurations of the iSCI and eSCI produced indirect effects on intelligence test performance, we conducted bootstrapping analyses at specific values ($M$ and $M \pm 1 SD$) of the moderators (see Preacher and Hayes, 2004, 2008). For the resulting nine configurations, significance tests were conducted to test the hypothesis that the conditional indirect effect equals zero. Results revealed that of all possible combinations of the iSCI and eSCI, there was an indirect effect only for the modest combination (iSCI: +1 SD; eSCI: −1 SD), indicated by the fact that zero was outside the 95% confidence interval. Specifically, the region of significance had its lower bound at $−1.122$ and its upper bound at $−0.086$ with a mean conditional indirect effect of $\beta = −0.47$, $p < 0.05$. No other conditional indirect effect was significant.

DISCUSSION

In the present study, the consistency of the iSCI and eSCI predicted the outcome of performance-based assessments of intelligence. Individuals with a fragile SCI performed worse on an intelligence test than individuals with a consistently high SCI, and individuals with a modest SCI performed worse than individuals with a consistently low SCI.

The hypotheses (Hypotheses 1 and 2) regarding the relation between the SCI and the personality traits of modesty and narcissism were also supported. Individuals with a high eSCI and low iSCI were expected to, and did, score higher on the narcissism scale. Individuals with a low eSCI and high iSCI were expected to, and did, score higher on the modesty scale. Somewhat surprisingly, the expected negative relation between modesty and narcissism was not significant. Although it is beyond the focus of the present paper, this finding calls for some attention. While the lack of a strong negative relation between narcissism and modesty may lead skeptics to doubt the validity of the scales, we would argue otherwise. As narcissists are highly motivated to present a favorable image of themselves, they may overestimate not only their performance but also the degree to which they hold desirable social attributes. If some narcissists choose to present themselves as grandiose modest, this may undermine the theoretically expected negative correlation between the two. Future research may explore this finding and make use of techniques like the bogus pipeline to elucidate the relation.

Consistent with Hypothesis 3, achievement motivation was significantly predicted by the SCI. The obtained effects supported the hypothesis that individuals with a modest SCI have lower achievement motivation scores. Furthermore, the results supported the prediction that the relation between SCI and performance on the intelligence test would be mediated by achievement motivation for modest individuals (Hypothesis 4).

In line with the assumption that the iSCI reflects internalized experiences and feedback regarding intellectual abilities, narcissists’ impaired performance may also be a symptom of their intellectual abilities. The experience of repeated underperformance may lead to an implicit association of the self with low intelligence, an association that might be contradicted by strong claims of intelligence. Considering this idea that a low iSCI is the result of previous negative feedback, individuals with a narcissistic SCI performed surprisingly well compared to modest individuals on the intelligence test. It may be the case that narcissists’ explicit claim of being intelligent is indicative of an achievement-motivated coping mechanism in which narcissists counter their feelings of failure by working harder on a task. This assumption was somewhat supported by the fact that narcissists indeed showed a (at least descriptively) higher degree of achievement motivation than either consistently low or modest participants.

In the present study, a relation between modesty and lack of achievement motivation was found. These results can be explained by a mediating effect of achievement motivation, which can account for the relation between implicit–explicit SCI consistency and performance on intelligence tests. Thus, achievement motivation leads to increased performance on the intelligence test as a function of the underlying SCI structure. A similar effect has been obtained in the stereotype threat domain. Women’s mathematical performance was influenced by a reduced motivation to improve (Fogliati and Bussey, 2013). Obviously, as is true for any correlational study, any interpretation of causality warrants sufficient caution. Clearly, it is also conceivable that a low self-reported achievement motivation in modest participants is a defensive reaction to the anticipated bad performance in a sense of self-handicapping (“I only performed bad because I didn’t want to excel”). Although we have no data on which causal chain is accurate, we believe that the second suggestion has some greater problems. First, achievement motivation was measured before the IQ test and participants were not informed about a following IQ test. Thus, modest participants must have anticipated a performance test and negative performance and defensively self-handicapped prophylactically. Second, it is unclear why consistently low SCI would not lead to a similar reaction or, more specifically, why a high iSCI would lead to particularly strong defensive reactions. Third, research on the impact of negative feedback shows an exactly opposite pattern as individual with a modest SCI react with a boost in achievement motivation (labeled achievement-related reactance) to the information that they did
not do well on an IQ test (Gerstenberg et al., 2013). Thus, although no claims of causality can be based on the current cross-sectional data, we believe that the proposed causal order stands out as the more plausible one.

The results of the present research also yielded important insights into the underlying motivational nature of the consistency of the iSCI and eSCI and its effects on intelligence test performance. The mediation results for achievement motivation allowed for a more nuanced understanding of the underlying mechanisms that drive the relation between implicit–explicit consistency than the mere identification of direct relations with outcome variables. The performance pattern on the intelligence test and the pattern of achievement motivation were very similar. Individuals with a modest SCI achieved the lowest intelligence test performance and achievement motivation scores.

In summary, the present work contributes to our understanding of the relation between self-concept consistency and performance on intelligence tests by demonstrating that the association of discrepant and consistent self-associations with performance differs systematically as a function of achievement motivation.

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Research Article

Unraveling Exercise Addiction: The Role of Narcissism and Self-Esteem

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The aim of this study was to assess the risk of exercise addiction (EA) in fitness clubs and to identify possible factors in the development of the disorder. The Exercise Addiction Inventory (EAI), the Narcissistic Personality Inventory (NPI), and the Coopersmith Self-Esteem Inventory (SEI) were administered to a sample of 150 consecutive gym attenders recruited in fitness centers. Based on EAI total score, high EA risk group (HEA \( n = 51 \)) and a low EA risk group (LEA \( n = 69 \)) were identified. HEA reported significantly higher total score (mean = 20.2 versus 14.6) on the NPI scale and lower total score (mean = 32.2 versus 36.4) on the SEI scale than LEA. A stepwise regression analysis indicated that only narcissism and self-esteem total scores \( F = 5.66; \ d f = 2; \ P = 0.006 \) were good predictors of days per week exercise. The present study confirms the direct and combined role of both labile self-esteem and high narcissism in the development of exercise addiction as predictive factors towards the risk of addiction. Multidisciplinary trained health care providers (physiatrists, psychologists, and psychiatrists) should carefully identify potential overexercise conditions in order to prevent the potential risk of exercise addiction.

1. Introduction

In the Substance-Related Disorders section, the Diagnostic and Statistical Manual of Mental Disorders, fifth edition, DSM-5 [1], includes only gambling disorder as form of addiction that does not involve ingestion of substance, reflecting evidence that this repetitive behavior activates reward systems as well as drugs of abuse [2, 3].

It is noteworthy that in clinical practice we observe a clustering of different excessive and repetitive behaviors, with symptoms that appear comparable to those produced by gambling, involving hedonistic (e.g., “sex addiction”) or nurturant motives (e.g., “exercise addiction,” “shopping addiction,” and “internet addiction”) [4]. Actually, these addictive behaviors, although showing strong neural similarities to substance addiction, are not included in any official recognized medical or psychological frameworks because there is not enough peer-reviewed evidence to establish diagnostic criteria [5].

Regular and moderate physical activity plays a lead role in the maintenance of health and in disease prevention. For instance, it can reduce the risk of cardiovascular diseases [6], diabetes [7], colon and breast cancer [8–10], and depression and anxiety [11, 12]. Moreover, adequate levels of physical activity will decrease the risk of a hip or vertebral fracture and help in weight control [13].

Exercise is a subcategory of physical activity that is planned, structured, and repetitive with the aim of improving or maintaining one or more components of physical fitness. Habitual exercise shows significant benefits for both physical and mental well-being in adults, children, and teenagers.

Even in mental disorders, future modern therapeutic approaches should include physical exercise as part of multimodal intervention programs aimed to improve psychopathology and cognitive symptoms [14]. Exercise may also be a novel treatment for drug addiction [15].

The term “exercise addiction” was first used to underlie the beneficial aspects of habitual exercise in contrast to drug or alcohol abuse or other self-destructive behaviors [16]. Exercise addiction was considered a “positive” addiction because of its beneficial effects on well-being, until it was
clear that, in many cases, overtraining and overexercise were associated with increased susceptibility to injuries or with sociooccupational dysfunctioning. Morgan [17] labeled cases of extreme overuse of exercise as new forms of “negative” addiction. Exercise addiction could turn the positive psychosocial effects of regular physical activity into a detrimental activity when affected subjects experience overpowering drives. This conceptualization is in line with the theory of the long-term negative effect of any type of addiction [18], since addictions may alter the subjective experience of the self and are often seen as a failure of self-regulation.

Szabo reported that addicted exercisers could experience deprivation symptoms with strong adverse effects on subjective states and well-being [19].

It is almost well known that addictive behaviors do not develop abruptly; rather they evolve through a process made up of several stages. According to the theoretical model of behavioral addictions [20, 21], exercise addiction should include the following components: salience, when exercise becomes the most important thing, mood modification, occurring when people adopt a coping strategy to regulate emotions, tolerance, a physiological increase of the amount of exercise required to reduce craving, withdrawal, as manifested by anhedonia and anxiety when gym activity is suddenly reduced, conflicts between the addicted person and others, and relapse, the tendency to repeated reversions to earlier patterns of the activity.

Another important aspect to consider is the distinction between primary exercise addiction when the exercise itself is the main aim and secondary exercise addiction that is generally a consequence of an eating disorder and serves the purpose of weight control. Some authors argue that exercise addiction does not exist in absence of an eating disorder [22], whereas others suggest the hypothesis that exercise addiction is separate from eating disorders, although it may share some of concerns about body and performance [23]. Research about the association between exercise addiction and eating disorders has definitely shown conflicting results [24].

As other addictive behaviors, exercise addiction should also be differentiated from compulsions and impulse control disorders. Addicted subjects are egosyntonic and enjoy what they are doing, whereas obsessive-compulsive subjects are egodystonic and dislike their obsessions although they feel compelled by them [25, 26].

The prevalence of exercise addicted in general population is about 3% [27]. Among Italian adolescents a rate of prevalence of 8.5% of exercise addiction was found [28]. In French fitness room a prevalence rate of 42% was found [29].

The overall negative consequences of exercise addiction suggest the need to identify possible risk factors for the development of the disorder; among these factors, self-esteem in behavioral addictions was explored in cross-sectional and longitudinal studies that have shown an association between internet addiction and low self-esteem [30] but its direct role in development of exercise addiction has never been investigated [31].

Carter et al. suggested that trait anxiety and obsessive-compulsiveness were associated with a higher commitment to exercise and narcissism with greater physical activity. Narcissistic traits have been also found in substance-addicted adolescents [32], and high cooccurrence rates of substance and alcohol abuse and dependence have been found in adults with Narcissistic Personality Disorder [33]. Moreover, longitudinal studies have shown that Narcissistic Personality Disorder in adolescents could be a predictor of subsequent substance use disorder [34].

The aim of this study was to expand on these previous findings assessing narcissistic traits and self-esteem in a sample of gym attenders. We hypothesized that self-esteem and narcissism may have a role in the development of exercise addiction.

2. Method

2.1. Participants. 150 consecutive gym attenders, recruited in fitness centers, were asked to participate in the study. Each participant was informed about the study design and provided a signed informed consent. The study was introduced to the participants as an investigation into attitudes and beliefs about exercise activity and personality. Subjects were asked to answer self-report questionnaires anonymously.

2.2. Measures. Data were collected using a sociodemographic questionnaire; we evaluated the frequency of physical activity assessing the number of the days in the week with more of 3 hours of exercise in the fitness center.

The Exercise Addiction Inventory (EAI) [35] was used to identify subjects at risk for exercise addiction. EAI is a self-report, six-item questionnaire with a five-point Likert response option ranging from 1 “strongly disagree” to 5 “strongly agree.” The measure is based upon the six components of exercise addiction according to Griffiths et al. [36]. EAI scores were used to categorize gym attenders in “high EA risk” and “low EA risk” groups.

The Narcissistic Personality Inventory (NPI) [37, 38] was used to estimate narcissistic components. NPI is a 40-item self-report questionnaire based on DSM-IV-TR criteria for Narcissistic Personality Disorder. It identifies seven factors (Authority, Exhibitionism, Superiority, Entitlement, Exploitativeness, Self-sufficiency, and Vanity) associated with narcissistic traits.

The Coopersmith Self-Esteem Inventory (SEI) [39] was used to assess self-esteem on the basis of attitudes toward oneself and others and personal interests. Respondents are asked to state whether 50 favorable or unfavorable aspects of a person are “like me” or “not like me.”

2.3. Statistical Analysis. Data obtained from the study underwent check and quality control and, subsequently, descriptive and inferential statistical analysis. Continuous data were expressed as mean ± S.D. t-test was used to compare age, numbers of days per week of exercise activity, self-esteem, and narcissistic components between groups; noncontinuous data were expressed as percentages and chi-square analysis was used to test gender distribution. Effect size was provided by using Cohen’s d statistic and was considered small when
being lower than 0.50, moderate when ranging from 0.50 to 0.79, and large when being equal to or greater than 0.80. All the variables that reached statistical significance underwent correlational analyses; a linear regression analysis was further performed in order to evaluate the association between narcissistic features, self-esteem, and exercises' characteristics. A stepwise method was used to select the explanatory variables based on analysis of variance. Statistical analyses were performed using Statistical Package for the Social Sciences—SPSS 21.0 software (SPSS Inc., Chicago, IL, USA).

### 3. Results

From a total sample of 150 gym attenders, 120 subjects completed the study. Based on EAI total score, a high EA risk group (HEA: \( n = 51 \), mean age = 29.7) was identified. Low EA risk group (LEA) was formed by 69 subjects (mean age = 32.2). The prevalence rate of EA risk in gym attenders was 42.5%; no gender differences in the rate of risk for exercise addiction were found (Table 1).

![Table 1: Demographic characteristics and frequency of exercise activity.](image)

<table>
<thead>
<tr>
<th></th>
<th>High EA risk group ( n = 51 )</th>
<th>Low EA risk group ( n = 69 )</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29.7 (S.D. 7.1)</td>
<td>32.2 (S.D. 10.1)</td>
<td>.007</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>33</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>18</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Days per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>4.71 (0.7)</td>
<td>2.79 (0.4)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Number of years of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exercise</td>
<td>10.19 (10)</td>
<td>10.76 (6.9)</td>
<td></td>
</tr>
</tbody>
</table>

The role of narcissism in development of addiction has been addressed since Freud [41], who considered substance use as a narcissistic object choice in which substance itself represents an oral extension of the ego. In general, narcissism seems to be a core factor of addiction. The fulfilling of narcissistic drives is mediated by repetitive behaviors that assure omnipotence and provide protection against the potential lack of gratification or admission.

The association between narcissism and addiction raises the following question: which is the object, the substance, or the activity to which the narcissistic subject should become addicted? According to Morf and Rhodewalt [42], in narcissistic persons, the focus of addiction might be on the grandiose view of self, not on the approval from others. If the admiration of other people is not the goal in itself, narcissism may be characterized by cognitive distortions that exaggerate the importance of the self, even without receiving confirmation from others. Within this context, narcissistic drives may lead to pursuing intrapsychic rather than interpersonal satisfactions. This attitude has been defined as “narcissistic myopia” [43], a condition in which social skills and interpersonal judgment are neglected, whereas only the desire for admiration is cognitively processed. In such context, narcissistic features (Superiority, Authority, and Exploitativeness) may become themselves addictive craving behaviors. Narcissistic subjects also seem highly susceptible to tolerance, since they continuously need to increase the search for claims and triumphs, and to withdrawal, since they show emotional symptoms when receiving something different from the admiration they seek.

Murray et al. [44] have explored the relationship between exercise identity and exercise dependence, according to the assumption that exercise identity promotes behaviors consistent with the perceived role of the exerciser. They found that “exercise beliefs,” a component of exercise identity, were significantly associated with the odds of experiencing dependence symptoms, whereby “exercise role identity,” the other component of exercise identity, was not significantly associated with the same odds. Moreover, the authors suggested the need for further research examining other factors possibly related to exercise addiction, such as identity, affect, self-esteem, and self-efficacy.
Table 2: Coopersmith Self-Esteem Inventory (SEI) and Narcissistic Personality Inventory (NPI) scores in high EA risk and low EA risk groups.

<table>
<thead>
<tr>
<th></th>
<th>High EA risk group (N = 51)</th>
<th>Low EA risk group (N = 69)</th>
<th>S.D.</th>
<th>S.D.</th>
<th>P value</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEI total score</td>
<td>32.2</td>
<td>36.4</td>
<td>10.7</td>
<td>8.8</td>
<td>&lt;.0001</td>
<td>0.4</td>
</tr>
<tr>
<td>NPI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narcissism</td>
<td>20.2</td>
<td>14.6</td>
<td>7.5</td>
<td>7.5</td>
<td>&lt;.0001</td>
<td>0.7</td>
</tr>
<tr>
<td>Authority</td>
<td>4.7</td>
<td>3.1</td>
<td>1.8</td>
<td>2.3</td>
<td>.005</td>
<td>0.8</td>
</tr>
<tr>
<td>Self-sufficiency</td>
<td>3.3</td>
<td>2.5</td>
<td>1.5</td>
<td>1.4</td>
<td>.05</td>
<td>0.5</td>
</tr>
<tr>
<td>Superiority</td>
<td>2.4</td>
<td>1.5</td>
<td>1.3</td>
<td>1.1</td>
<td>.01</td>
<td>0.7</td>
</tr>
<tr>
<td>Exhibitionism</td>
<td>3.1</td>
<td>2.1</td>
<td>1.6</td>
<td>1.7</td>
<td>.051</td>
<td>0.6</td>
</tr>
<tr>
<td>Exploitativeness</td>
<td>3.4</td>
<td>2.3</td>
<td>1.6</td>
<td>1.7</td>
<td>.032</td>
<td>0.7</td>
</tr>
<tr>
<td>Vanity</td>
<td>2.8</td>
<td>1.9</td>
<td>1.4</td>
<td>1.6</td>
<td>.027</td>
<td>0.6</td>
</tr>
<tr>
<td>Entitlement</td>
<td>2.9</td>
<td>1.9</td>
<td>1.2</td>
<td>1.3</td>
<td>.007</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table 3: Linear regression analysis.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unstandardized coefficients</th>
<th>Standardized coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>S.E.</td>
</tr>
<tr>
<td>Days per week a (constant)</td>
<td>4.203</td>
<td>.606</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>-.029</td>
<td>.014</td>
</tr>
<tr>
<td>Narcissism</td>
<td>-.011</td>
<td>.045</td>
</tr>
<tr>
<td>Authority</td>
<td>.096</td>
<td>.124</td>
</tr>
<tr>
<td>Superiority</td>
<td>.090</td>
<td>.158</td>
</tr>
<tr>
<td>Exploitativeness</td>
<td>.138</td>
<td>.137</td>
</tr>
</tbody>
</table>

Note: a R = .39; R² = .193; F = 2.537; P = .039.

5. Conclusions

Our results showed that HEA subjects were characterized by lower self-esteem when compared with LEA subjects. This result extends to exercise addiction previous findings on the role of low self-esteem in the development of other addictions, as internet or online game addiction [45].

Low self-esteem was also found in an Italian sample of subjects affected by exercise dependence [46]. Hall et al. [47] argued that social prescribed perfectionism had a direct positive effect on exercise addiction and, as perfectionism is linked with contingent self-worth, labile self-esteem may mediate the relationship between unconditional self-acceptance and exercise dependence.

There are some limitations in the present study. First of all, the cross-sectional design does not allow considering changes over time. Another limitation is the relatively small sample size. Furthermore, to evaluate concomitant psychopathological symptoms, such as eating disorders or muscle dysmorphia, it would have been more accurate to perform a clinical interview. Finally, although the frequency of exercise may not be directly related to the risk for exercise addiction, since professional athletes exercise more often and longer than subjects at risk for exercise addiction, we selected “days per week” as the dependent variable in the regression analysis. Other models may have a stronger rationale to be tested.

The first aim of this study was the assessment of prevalence of the risk of exercise addiction among clients of fitness centers; congruously to previous data, we found high rates of prevalence: forty-two percent of the regular clients were high risk-exercise addicted according to EAI score. Nevertheless, despite the significant prevalence rates found in research, no specific diagnostic criteria for this condition were established. Since high and intense exercise levels, such as substances of abuse, may display their effect acting on reward pathways, it would be suitable to better understand this condition, taking into account possible vulnerability factors. According to previous studies that have indirectly and separately examined narcissism and self-esteem in behavioral addictions, the present study confirms the direct and combined role of both labile self-esteem and high narcissism in the development of exercise addiction as predictive factors towards addiction, once that regular exercise initiation occurs. Although it is well recognized that regular exercise is associated with a variety of positive outcomes, the early identification of a peculiar personality profile characterized by “addictive orientation” may have a role in discriminating those vulnerable subjects who are at risk for developing exercise addiction. Furthermore, it should be borne in mind that exercise, such as other...
Table 4: Stepwise regression analysis, Model 1. Excluded variables: Authority, Superiority, Exploitativeness, and Self-esteem.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unstandardized coefficients</th>
<th>Standardized coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>S.E.</td>
</tr>
<tr>
<td>Days per week ≤ 5 (constant)</td>
<td>3.141</td>
<td>.373</td>
</tr>
<tr>
<td>Narcissism</td>
<td>-.043</td>
<td>.017</td>
</tr>
</tbody>
</table>

$R^2 = .314; R^2 = .099; F = 6.250; P = .015.$

Table 5: Stepwise regression analysis, Model 2. Excluded variables: Authority, Superiority, and Exploitativeness.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unstandardized coefficients</th>
<th>Standardized coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>S.E.</td>
</tr>
<tr>
<td>Days per week ≤ 5 (constant)</td>
<td>4.102</td>
<td>.574</td>
</tr>
<tr>
<td>Narcissism</td>
<td>.041</td>
<td>.017</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>-.027</td>
<td>.013</td>
</tr>
</tbody>
</table>

$R^2 = .410; R^2 = .168; F = 5.657; P = .006.$

rewarding behaviors, may present a potential misuse/abuse feature beyond physical, psychical, and social benefits. Multidisciplinary trained health care providers (physiatrists, psychologists, and psychiatrists) should carefully identify potential overexercise conditions in order to prevent the potential risk of exercise addiction.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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References


