The bifactor structure and the "dark nomological network" of the State Self-Esteem Scale ☆

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ABSTRACT

The State Self-Esteem Scale (SSES) measures transient feelings of self-worth. The SSES has been hypothesized to possess a number of latent structures, ranging from one to three factors. The present study compared these putative structures along with a newly hypothesized bifactor structure (i.e., one global factor, three subfactors). Results offered greatest support for the bifactor model. A secondary goal was to further assess the nomological network surrounding state self-esteem by examining correlations involving an expanded measure of basic personality (i.e., the HEXACO), Dark Triad traits, and sexual attitudes and behaviors. In general, these correlations were consistent with the theoretical portrait of state self-esteem and were also consistent with correlations involving trait-level self-esteem. Most notably, however, scores on the SSES consistently correlated negatively with measures of the Dark Triad traits, suggesting a possible theoretical distinction between state- and trait-level self-esteem.

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1. Introduction

Self-esteem refers to the positive or negative attitude toward the self (Rosenberg, 1965). Individuals with high self-esteem have a positive evaluation of themselves. Self-esteem is typically conceptualized as a trait, or stable individual difference, but also can be conceptualized as a state. State self-esteem is assessed most commonly with the State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991), which was developed to measure momentary fluctuations in self-esteem in three specific domains: *performance*, *appearance*, and *social*. In other words, while trait self-esteem is typically conceptualized as having a global factor, state self-esteem is seen as multifactorial.

In the present study we extend research on the SSES in two ways. First, we propose and test an alternate, bifactor structure of the SSES. Our goal is to determine if state self-esteem can be conceptualized best as having both a global factor and subfactors relative to nested and one-dimensional models. Second, we explore the relationships between state self-esteem and some of the "darker" aspects of personality. We examine how the SESS scales relate to socially undesirable personality traits like those found in the Honesty/Humility trait of the HEXACO model of personality and the Dark Triad traits, as well as sociosexuality, a behavior with known associations to dark traits.

There are valid theoretical reasons for both a one-factor and a three-factor approach to state self-esteem. The global, one-factor model of self-esteem is the guiding approach to trait self-esteem literature, and it is reasonable to expect state self-esteem to contain the same structure. At the same time, as a function of natural selection, humans may have developed different forms of self-esteem to guide their performance in different domains (e.g., Hill & Buss, 2006; Kirkpatrick & Ellis, 2001). This would be consistent with a multi-factor model of state self-esteem.

Prior research on the SSES has supported both a three-dimensional model that reflects the specific domains the SSES measures (i.e., appearance, performance, social; Heatherton & Polivy, 1991) and a second-order hierarchical model in which these three dimensions are treated as subfactors of a higher order global (or general) state self-esteem factor (Bagozzi & Heatherton, 1994). This second-order model captures both the abstract and domain-specific aspects of the SSES. However, the three subscales are treated as indicators of the underlying state self-esteem factor, rather than factors distinct from global self-esteem. We propose another approach, a bifactor model, which captures both the one-factor and three-factor models. Essentially, state self-esteem would be

conceptualized as subfactors nested within a global factor. Specifically, a bifactor model (Jonason & Luévano, 2013; Reise, Morizot, & Hays, 2007) would allow the items on the SSES to load on (a) latent factors associated with its subscales and (b) a latent factor of the global self-esteem. Because of the bifactor nature of this model, the latent global factor is, in a sense, a measure of the residual self-esteem after the variance attributable to the latent factors is removed. Similarly, the three latent factors reflect their respective measures after removing the variance attributed to the latent global self-esteem factor. This model has two advantages over the second order model listed above (Chen, West, & Sousa, 2006). By allowing the scale items to load directly on the global state self-esteem factor, we can examine the properties of individual scale items when using the SSES as a univariate measure of state self-esteem. In addition, the bifactor model may be more consistent with the presence of multiple forms of self-esteem, as theorized by evolutionary psychologists (e.g., Hill & Buss, 2006). We compare the bifactor model to the global and subfactor models in the present research.

One limitation of the state self-esteem literature with regards to personality is that it tends to be overly reliant on the Big Five (i.e., extraversion, agreeableness, neuroticism, conscientiousness, and openness) as a means of understanding individual differences in self-esteem. While the Big Five traits show different associations with state self-esteem, the Big Five is limited in at least one important way. The Big Five, especially when measured with the Big Five Inventory (John & Srivastava, 1999), does not adequately capture darker aspects of human nature (Ashton et al., 2004; Jonason & McCain, 2012). One solution to this has been to expand measurement beyond the Big Five. For example, the HEXACO model of personality (Ashton et al., 2004) includes five factors resembling the Big Five plus the honesty/humility factor (reverse scored as dishonesty/immodesty), which taps into this darker side. Another approach has been to examine dark traits directly. The Dark Triad traits (i.e., psychopathy, narcissism, and Machiavellianism; Paulhus & Williams, 2002) tap the dark side of human nature with their associations to callousness, arrogance, and lack of empathy. A final approach might be to examine how different aspects of self-esteem might relate to short-term mating behavior and attitudes. That is, we examine the possibility that self-esteem might facilitate short-term mating.

Given the limited research in this area, we offer only speculative predictions regarding the specific relationships between the SSES aspects and the honesty/humility aspect of the HEXACO. We expect to replicate previously observed relationships with the Big Five. Self-esteem appears to be related positively to extraversion, openness, conscientiousness, and agreeableness, and to be negatively related to neuroticism (i.e., Robins, Tracy, Trzesniewski, Potter, & Gosling, 2001). However, past research does suggest some differences in these relationships as a function of the sex of the participant. For instance, in research with the California Self-Esteem Scales (CSES; Phinney & Gough, 1984), which has equivalent subscales to the SSES, physical self-esteem was related to extraversion and agreeableness only in females, while it was related to openness only in males; social self-esteem was related to emotional stability only in females; and intellectual self-esteem was related to agreeableness and emotional stability only in females (Shackelford & Michalski, 2011). Therefore, we examine sex-specific and sex-neutral relationships with the SESS.

The Dark Triad traits have an inconsistent relationship with trait self-esteem. The relationships between the Dark Triad traits and self-esteem have been positive through their shared variance with narcissism when using full scale measures of each (Jonason, Li, & Teicher, 2010), uncorrelated when measured with the Single Item Self-Esteem Scale and the Labile Self-Esteem Scale, and slightly negative in relation to the Rosenberg Self-Esteem Scale,

again through narcissism (Jonason & Webster, 2010). The adoption of global, trait measures of self-esteem may have artificially handicapped researchers in detecting links between the Dark Triad and self-esteem. Therefore, we examine the relationship between the Dark Triad traits and the aspects of the SSES.

Finally, research on the SSES scale has not examined its relationship to sociosexuality, most likely because sociosexuality tends to be a construct predominantly researched by evolutionary psychologists (Jonason, Li, Webster, & Schmitt, 2009; Simpson & Gangestad, 1991). However, there is good reason to believe that state self-esteem should be related to various measures of human sexuality. Some theorists propose that short-term mating (e.g., hookups, one-night stands) is a maladaptive behavior stemming from poor attachment (and by extension, low self-esteem; Bogaert & Sadava, 2002; Kruger & Fisher, 2008). Others believe short-term mating may be part of the normal range of human sexuality (Jonason, Valentine, & Li, 2012; Schmitt, 2005). In this case, self-esteem is not the cause of mating behavior but is instead a self-evaluation based on one's success in the mating game. Given the mixed findings in this area, we propose no predictions about the specific links between the dimensions associated with each of these constructs.

While self-esteem has been a popular topic for social-personality psychologists for years, more work is needed to understand (1) the latent structure of people's self-esteem and (2) the manner by which self-esteem is related to darker aspects of people's personality. Research to date has treated self-esteem as a positive force in peoples' lives, leading to a tendency to examine it in relation to socially desirable constructs. Instead, we examine the manner by which is linked to the HEXACO, Dark Triad traits, and sociosexuality, all of which, in their own way, tap socially undesirable aspects of people's personality. Concurrently, we examine the structure of state self-esteem to see if the predicted bifactor structure offers a good fit for the data.

2. Method

2.1. Participants and procedure

Five hundred and forty-four predominantly European American (64%) students (69% female) aged 17–50 ($M = 20.25$, $SD = 4.70$) completed an online survey as part of a different study. They were informed of the nature of the study and were asked if they consented to participate. If they said "yes", they proceeded through a number of personality measures. Upon completion, participants were thanked and debriefed.

2.2. Measures

The State Self-Esteem Scale (Heatherton & Polivy, 1991) is a 20-item questionnaire containing three subscales: academic performance (Cronbach's $\alpha = .78$), social evaluation ($\alpha = .80$), and appearance ($\alpha = .82$). Participants were asked their agreement (1 = not at all; 5 = extremely) to the statements reflecting performance (e.g., "I feel confident about my abilities"), social (e.g., "I am worried about whether I am regarded as a success or failure"), and appearance (e.g., "I feel satisfied with the way my body looks right now") self-esteem. Performance self-esteem was correlated with social self-esteem ($r(540) = .54$, $p < .01$) and appearance self-esteem ($r(540) = .55$, $p < .01$), and social and appearance self-esteem were correlated ($r(540) = .52$, $p < .01$).

To measure the Dark Triad traits, the Dark Triad Dirty Dozen (Jonason & Webster, 2010) was used. Participants were asked how much they agreed (1 = completely disagree; 5 = completely agree) with statements reflecting narcissism (e.g., "I tend to want

others to admire me"), psychopathy (e.g., "I tend to lack remorse"), and Machiavellianism (e.g., "I have used deceit or lied to get my way"). Items were averaged together to create an index of narcissism (α = .80), Machiavellianism (α = .79), and psychopathy (α = .74). Consistent with prior research, psychopathy was correlated with Machiavellianism ($r(542)$ = .61, $p < .01$) and narcissism ($r(542)$ = .56, $p < .01$), which was correlated with Machiavellianism ($r(542)$ = .40, $p < .01$).

The Tripartite Sociosexual Orientation Inventory (Jackson & Kirkpatrick, 2007) is a revised version of the original (Simpson & Gangestad, 1991) in which the items are divided into three subscales: short-term mating orientation (α = .93), long-term mating orientation (α = .75), and previous mating behavior (α = .87). It measures participants' attitudes toward casual sex (e.g., "I can easily imagine myself being comfortable and enjoying "casual" sex with different partners"), and long-term relationships (e.g., "I am interested in maintaining a long-term romantic relationship with someone special"), as well as their previous sexual behavior (e.g., "With how many partners of the opposite sex have you had sex on one and only one occasion?"). Participants were asked their agreement (1 = strongly disagree; 7 = strongly agree) with 20 statements, with the exception of the previous mating behavior items, to which they respond with a number.

The 60-item HEXACO-PI-R (Ashton & Lee, 2009) measure of personality was used. It measures six different factors of personality including honesty/humility, emotionality, extraversion, agreeableness, conscientiousness, and openness along with four facets of each factor. Participants were asked their agreement (1 = strongly disagree; 5 = strongly agree) with the statements. For instance, as an indicator of the honesty/humility factor participants reported agreement with the item: "I'd be tempted to use counterfeit money, if I were sure I could get away with it." The corresponding items were averaged to create indexes of the 6 factors of honesty/humility (α = .71), emotionality (α = .78), extraversion (α = .82), agreeableness (α = .72), conscientiousness (α = .79), and openness (α = .69). The HEXACO traits were positively correlated (rs = .11 to .34, $ps < .01$).

3. Results

We tested the factor structure of the SSES using confirmatory factor analysis. Both the single-factor (Fig. 1) model ($\chi^2(170)$ = 1641.39, $p < .001$, χ^2/df = 9.66, CFI = .65, NFI = .63, RMSEA = .13) and the three-factor (Fig. 2) model ($\chi^2(167)$ = 1294.94, $p < .001$, χ^2/df = 7.75, CFI = .73, NFI = .71, RMSEA = .11) fit the data poorly, although the three factor model fit significantly better ($\Delta\chi^2(3)$ = 346.45, $p < .001$). The bifactor model (Fig. 3) fit the data tolerably well ($\chi^2(150)$ = 709.25, $p < .001$, χ^2/df = 4.73, CFI = .87, NFI = .84, RMSEA = .08) and significantly better than the one dimensional ($\Delta\chi^2(20)$ = 932.45, $p < .001$) and three dimensional ($\Delta\chi^2(17)$ = 585.69, $p < .001$) models. Overall we found reasonable fit given the complexity of the model (West, Taylor, & Wu, 2012).

Next we assessed the dark nomological network surrounding the SSES (Table 1), but used a more conservative p-value of .01 given the large number of tests.

First, the SSES showed relationships with four of the traits corresponding to Big Five personality that are consistent with known relationships between the Big Five and trait self-esteem (i.e., Robins et al., 2001). The exception was openness, with which only performance self-esteem correlated. The appearance and performance subscales failed to show significant relationships to Honesty/Humility. However, honesty/humility and agreeableness only significantly differed in their relationships to appearance self-esteem (Fisher's z = 2.33, $p < .01$). Many of these relationships (i.e., those for agreeableness and conscientiousness) disappeared

$\chi^2(170)$ = 1641.39, $p < .001$, χ^2/df = 9.66,
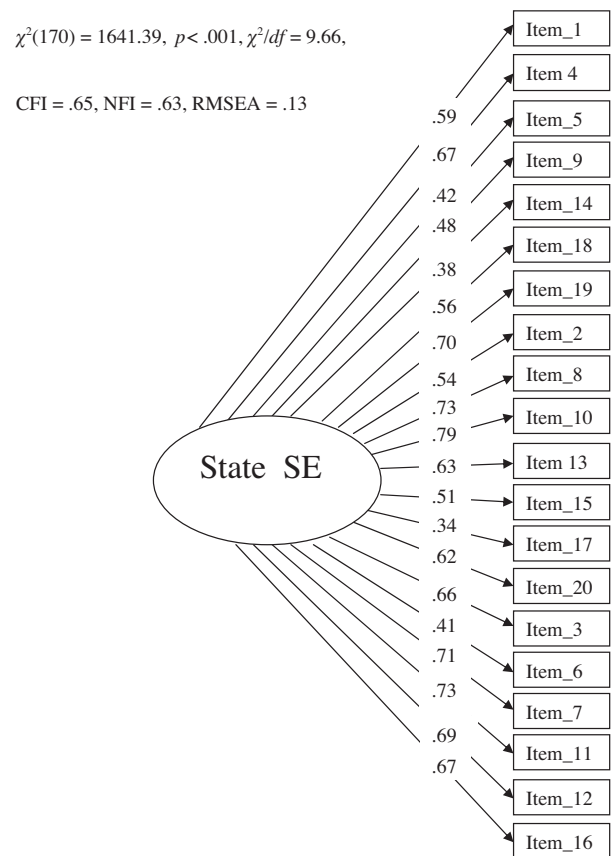
CFI = .65, NFI = .63, RMSEA = .13

Fig. 1. Single factor model of state self-esteem.

when controlling for shared variance between all six traits in a regression equation. Sex moderated only one of these relationships, in that performance self-esteem correlated with openness only for men ($r(166)$ = .31, $p < .01$; z = 2.35, $p < .01$).

Second, we examined the relationship between the SSES and the Dark Triad traits (Table 2). The full scale state self-esteem was negatively linked to all three Dark Triad traits. Machiavellianism and psychopathy were negatively correlated with all three subscales. Narcissism, however, was only negatively related to social self-esteem. After controlling for shared variance between all three traits, social self-esteem was related to Machiavellianism, whereas appearance self-esteem was related to Machiavellianism and narcissism, and full scale state self-esteem was related to psychopathy and narcissism.

Third, we examined sociosexuality (Table 3). The full scale state self-esteem and appearance self-esteem were positively related only with long-term mating orientation. Performance self-esteem was negatively related to both short-term mating orientation and previous mating behavior. After controlling for shared variance within the SOI, performance self-esteem was associated with long-term mating orientation. Sex moderated the relationship between full scale state self-esteem and long-term mating orientation. This relationship was significant only for men ($r(166)$ = .30, $p < .01$; z = 3.09, $p < .01$).

4. Discussion

The SSES shows promise as a measure of short-lived self-esteem but we feel more work is warranted. The current study had two goals: (1) to test an alternative factor structure to the SSES and (2) to extend our knowledge of the nomological network surround-

$\chi^2(167) = 1294.94,\ p < .001,\ \chi^2/df = 7.75,$
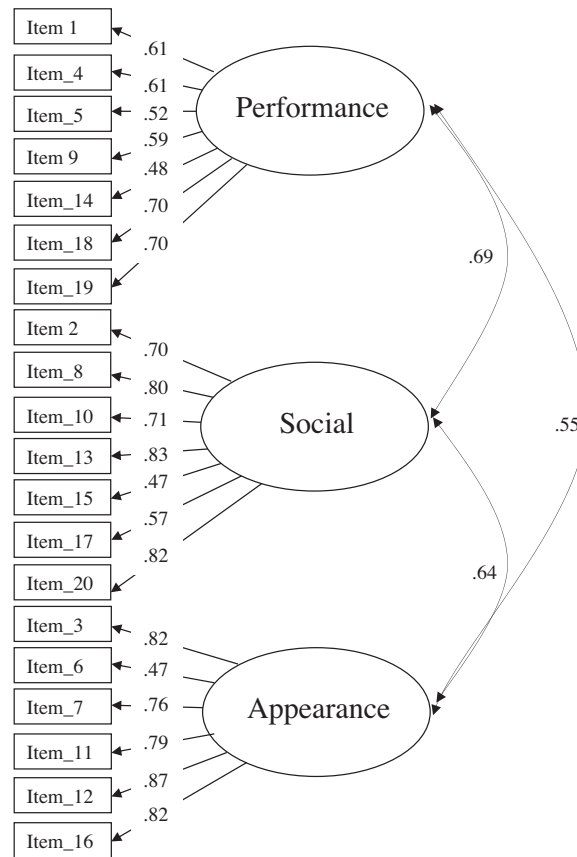
$CFI = .73,\ NFI = .71,\ RMSEA = .11$

Fig. 2. Three-dimensional model of state self-esteem.

ing state self-esteem by examining associations with dark traits. By doing so, we hope to improve the psychometric properties associated with this scale and to better understand the nomological network surrounding self-esteem.

The SSES has shown utility as both a three-factor measure (i.e., utilizing the subscale scores; Heatherton & Polivy, 1991) and a one-factor measure (i.e., using the full scale score; Linton & Richard, 1996). Given the reasonably high correlations between the factors and its utility as both dimensional and global measures of self-esteem, we felt the scale, along with self-esteem, might be better understood using a model that allows for both to be true. However, even the bifactor model proved only a satisfactory fit despite the sample size and communality (MacCallum, Widaman, Zhang, & Hong, 1999). More work is necessary to determine the cause for this imperfect fit and to better understand the factor structure of the SSES and state self-esteem.

We sought to further validate the SSES by exploring its relationships to individual differences in aspects of personality that could be considered socially undesirable or "dark". The SSES and its subscales behaved in ways consistent with the trait self-esteem literature with regards to the HEXACO and sociosexuality, providing further evidence for its validity as a measure of self-esteem; however, it also showed a strong negative relationship with the Dark Triad traits, potentially providing discriminant validity between global self-esteem, as has been used in past studies, and state self-esteem.

State self-esteem correlated with five of the HEXACO personality traits in ways similar to trait self-esteem, with the exception of

openness, which is commonly known to be the least reliable factor of the Big Five (i.e., Viswesvaran & Ones, 2000). Only social self-esteem was related to honesty/humility. This is consistent with the conception of honesty/humility as a tendency not to exploit others—as confidence in one's social standing increases, the tendency to resort to the risky strategy of exploiting others may decrease. However, honesty/humility only differed significantly from agreeableness in its relationship to appearance self-esteem. This provides little support for honesty/humility as a construct distinct from agreeableness in regards to self-concept. Future research should explore whether this result exists for trait self-esteem measures, or whether it is unique to state self-esteem.

Previous studies have shown an inconsistent relationship between self-esteem and the Dirty Dozen measure of the Dark Triad (Jonason & Webster, 2010). We found negative relationships between the full scale SSES and all three Dark Triad traits, as well as between all three subscales and Machiavellianism and psychopathy. This pattern of relationships suggests one of two things— either the true relationship between the Dirty Dozen and self-esteem has not previously been discovered because of limited power (viz., small samples or limited content breadth in the Dirty Dozen scale) or state self-esteem has a stronger relationship to the Dirty Dozen than trait self-esteem. Either way, this relationship appears to be negative, contrary to findings with full scale trait measures of the Dark Triad (Jonason et al., 2010). One potential explanation for this difference is the complicated relationship between narcissism and self-esteem. There is ample evidence of heterogeneity within narcissism (Dickinson & Pincus, 2003) and
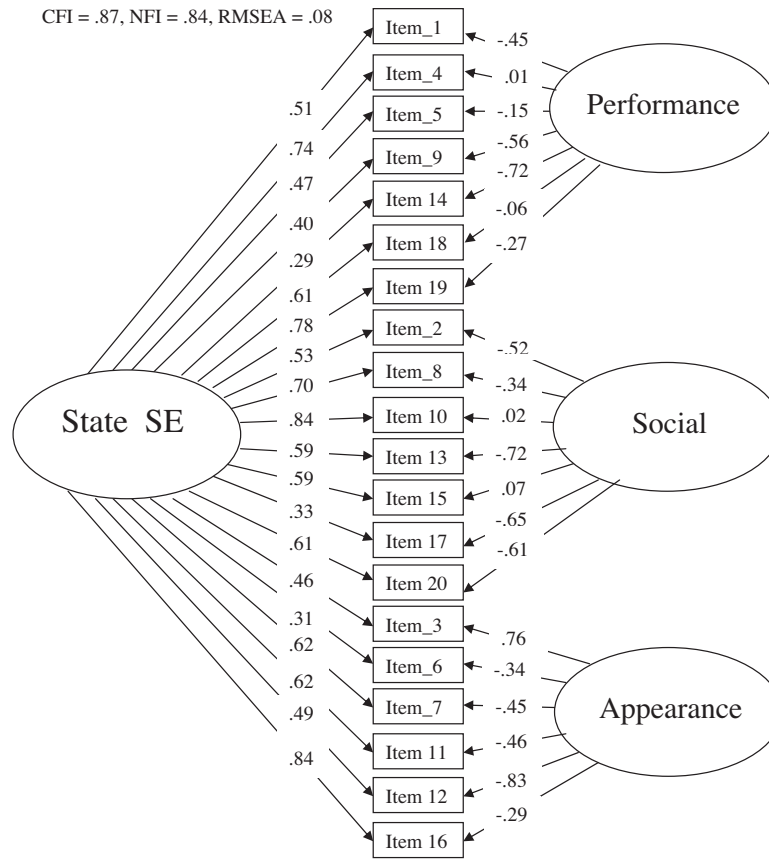
$\chi^2(150) = 709.25, \ p < .001, \ \chi^2/df = 4.73,$

CFI = .87, NFI = .84, RMSEA = .08

Fig. 3. Bifactor model of state self-esteem.

Table 1
Correlations between the SSES subscales and full scale and the HEXACO personality traits.

SSES	$r\,(\beta)$ HEXACO factors					
	Openness	Conscientiousness	Agreeableness	Extraversion	Emotionality	Honesty/Humility
Performance	.16** (.06)	.39** (.26**)	.18** (.02)	.48** (.38**)	−.11* (−.15**)	.11 (.03)
Social	.09 (−.02)	.17** (.01)	.15** (.01)	.38** (.38**)	−.23** (−.27**)	.19** (.20**)
Appearance	−.01 (−.12*)	.23** (.07)	.18** (.07)	.51** (.49**)	−.12* (−.15**)	.04 (.01)
State self esteem	.09 (−.03)	.31** (.13*)	.20** (.04)	.55** (.50**)	−.19** (−.23**)	.14* (.10*)

  * $p < .01$.
  ** $p < .001$.

Table 2
Correlations between the SSES subscales and full scale and the Dark Triad.

SSES	$r\,(\beta)$ Dark Triad traits		
	Machiavellianism	Psychopathy	Narcissism
Performance	−.26** (−.17*)	−.30** (−.23**)	−.10 (.09)
Social	−.27** (−.18**)	−.22** (−.07)	−.28** (−.13)
Appearance	−.13* (.17*)	−.13* (−.09)	.04 (−.17*)
State self esteem	−.27** (.02)	−.26** (−.15*)	−.14** (−.19*)

  * $p < .01$.
  ** $p < .001$.

evidence of a relationship between narcissism and unstable self-esteem (Zeigler-Hill, 2006). Threats to this unstable self-esteem produce aggressive behavior in narcissists (Baumeister, Bushman, & Campbell, 2000) and psychopaths (Cale & Lilienfeld, 2006), potentially linking it to darker personality traits. Because state self-esteem measures momentary self-regard rather than more stable, trait self-regard, both lower state self-esteem scores and higher Dark Triad scores may appear under threat. This is further supported by the fact that the narcissism questions of the Dirty Dozen appear to reflect more vulnerable aspects of narcissism (e.g., "I tend to want others to pay attention to me"). However, when we controlled for shared variance among the Dark Triad traits, the negative relationship between them and state self-esteem remained, implying that there is more to these relationships than narcissistic processes. More research will be needed to clarify the relationship between self-esteem and the Dark Triad. However, these results may provide discriminate validity in that they distinguish the SSES from measures of more stable, trait self-esteem.

Table 3
Correlations between the SSES subscales and full scale and sociosexual orientation.

SSES	r (β) Sociosexuality		
	Short term mating orientation	Long term mating orientation	Previous mating behavior
Performance	−.12[*] (.04)	.23[**] (.22[**])	−.15[**] (−.13)
Social	.01 (.05)	.06 (.06)	−.01 (−.02)
Appearance	.04 (.14)	.13[*] (.17[**])	−.02 (−.06)
State self esteem	−.03 (.09)	.17[**] (.18[**])	−.07 (−.08)

[*] p < .01.
[**] p < .001.

Both appearance and performance self-esteem were positively related to long-term mating orientation, while performance self-esteem was negatively related to short-term mating orientation and previous mating behavior. Although a relationship between low trait self-esteem and short-term mating orientation has previously been supported mostly in women (Kruger & Fisher, 2008), these relationships were stronger in men. Given that mate value in men is more strongly based on ability to provide for and protect future offspring (i.e., Penke, Todd, Lenton, & Fasolo, 2007), it is plausible that perceived failure in the area of performance could lead to lowered self-esteem, lower perceived mate value, insecure attachment, and a reliance on short-term mating as a strategy for reproductive success (i.e., mating strategies are adaptive responses calibrated on inputs). This process may occur more strongly in the short-term, leading us to detect it with state but not trait self-esteem measures. More research will be needed to explore this possibility, but the current results appear to support this interpretation.

While our study was limited by some of its weak predictions and reliance on brief measures, it provides unique insight into the factor structure of the SESS and the dark nomological network surrounding it. State self-esteem as measured by the SSES is better conceptualized as a bifactor model, with both a global factor and subfactors. This is theoretically interesting, but also of practical importance because it demonstrates that the SSES can be used as both a global or subfactor form. In terms of dark personality, the general pattern is that state self-esteem is negatively associated with darker traits. However, there were many nuances in these findings, and more work needs to be done in this area, especially using more context- or domain-specific measures of state self-esteem.

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