What Constitutes Vulnerable Self-Esteem? Comparing the Prospective Effects of Low, Unstable,

and Contingent Self-Esteem on Depressive Symptoms

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Abstract

A growing body of longitudinal studies suggests that low self-esteem is a risk factor for depression. However, it is unclear whether other characteristics of self-esteem, besides its level, explain incremental or even greater variance in subsequent depression. We examined the prospective effects of self-esteem level, instability (i.e., the degree of variability in self-esteem across short periods), and contingency (i.e., the degree to which self-esteem fluctuates in response to self-relevant events) on depressive symptoms in one overarching model, using data from two longitudinal studies. In Study 1, 372 adults were assessed at 2 waves over 6 months, including 40 daily diary assessments at Wave 1. In Study 2, 235 young adults were assessed at 2 waves over 6 weeks, including about 6 daily diary assessments at each wave. Self-esteem contingency was measured by self-report and by a statistical index based on the diary data (capturing event-related fluctuations in self-esteem). In both studies self-esteem level, but not self-esteem contingency, predicted subsequent depressive symptoms. Self-esteem instability predicted subsequent depressive symptoms in Study 2 only, with a smaller effect size than self-esteem level. Also, level, instability, and contingency of self-esteem did not interact in the prediction of depressive symptoms. Moreover, the effect of self-esteem level held when controlling for neuroticism and for all other Big Five personality traits. Thus, the findings provide converging evidence for a vulnerability effect of self-esteem level, tentative evidence for a smaller vulnerability effect of self-esteem instability, and no evidence for a vulnerability effect of self-esteem contingency.

Keywords: self-esteem, depression, instability and contingency of self-esteem, Big Five personality traits, diary data

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In his benchmark essay "Mourning and Melancholia," published first in 1917, Freud

proposed that "the melancholic displays … an extraordinary diminution in his self-regard" (p.

246). Since then, a growing body of theory and empirical work has suggested that low self-

esteem is a risk factor for depression. In particular, longitudinal studies indicate that low self-

esteem prospectively predicts depression (e.g., Kernis et al., 1998; Orth, Robins, & Meier, 2009;

Orth, Robins, & Roberts, 2008; Roberts & Monroe, 1992; for a review, see Orth & Robins,

2013). A meta-analysis of the available longitudinal studies suggests that the effect of low self-

esteem on depression is robust and holds across sample and design characteristics of studies

(Sowislo & Orth, 2013).

However, research suggests that there is "more to self-esteem than whether it is high or

low" (Kernis, Cornell, Sun, Berry, & Harlow, 1993, p. 1090) and that other characteristics of

self-esteem, besides its level, can have important consequences for emotion, cognition, and

behavior. With regard to vulnerability to depression, researchers have proposed that fluctuations

in self-esteem might be influential (e.g., Crocker & Wolfe, 2001; Kernis et al., 1993; Roberts &

Monroe, 1994). To describe the extent and nature of fluctuations in self-esteem, two constructs

have been introduced into the literature, specifically self-esteem instability (e.g., Kernis, 2005)

and self-esteem contingency (e.g., Crocker & Wolfe, 2001). Although previous studies have

investigated the relations of self-esteem instability and contingency with depression (e.g., Bos,

Huijding, Muris, Vogel, & Biesheuvel, 2010; Butler, Hokanson, & Flynn, 1994; Kernis et al.,

1998; Kim & Cicchetti, 2009; Meier, Semmer, & Hupfeld, 2009; Roberts, Shapiro, & Gamble,

1999; Sargent, Crocker, & Luhtanen, 2006), the results of these studies are highly inconsistent,

as we will review in detail below. Moreover, we are not aware of any study that has pitted the

effects of self-esteem level, instability, and contingency on depression against each other in the

context of a single study. Thus, it is unclear whether instability and contingency of self-esteem

explain incremental variance in subsequent depression or even greater variance than level of self-

esteem. To address these issues, in the present research we use trait and diary data from two

longitudinal studies and examine the reciprocal relations of self-esteem level, instability, and

contingency with depression.

Models of Vulnerable Self-Esteem

Self-esteem has been defined as "a person's appraisal of his or her value" (Leary &

Baumeister, 2000, p. 2). Vulnerable self-esteem can be defined by "those characteristics of [self-

esteem] that place individuals at risk for future depression" (Roberts & Monroe, 1994, p. 162).

Although vulnerable self-esteem plays an important role in several classic theories and

contemporary models of depression (Abramson, Seligman, & Teasdale, 1978; Blatt, D'Afflitti, &

Quinlan, 1976; Brown & Harris, 1978), just which characteristics constitute vulnerable self-

esteem is still open to debate. In the following we will discuss three alternative models of

vulnerable self-esteem, namely *vulnerability as a function of self-esteem level*, *vulnerability as a*

function of self-esteem instability, and *vulnerability as a function of self-esteem contingency*. Of

course, these three models are not mutually exclusive because two or even all three processes

(i.e., low, unstable, and contingent self-esteem contributing to depression) might operate

simultaneously. It is important to note that even though these models are commonly accepted

views of the causal relation between self-esteem and depression (see below), there is as yet no

theory that fully explains the relation.

Vulnerability as a Function of Self-Esteem Level

The first model states that a low level of self-esteem is a causal risk factor for depression (Beck, 1967; Metalsky, Joiner, Hardin, & Abramson, 1993; Roberts & Monroe, 1992). For example, according to Beck's (1967) cognitive theory of depression, negative beliefs about the self are not just a symptom of depression but a diathesis exerting causal influence in the onset and maintenance of depression. The mechanisms that account for the vulnerability effect of low self-esteem on depression are not yet understood. For example, a possible interpersonal mechanism is that individuals with low self-esteem might excessively seek reassurance from friends and relationship partners, which might lead to interpersonal conflicts that in turn elicit depressive symptoms (Joiner, Alfano, & Metalsky, 1992). A possible intrapersonal mechanism might operate through rumination (Kuster, Orth, & Meier, 2012); individuals with low self-esteem are prone to ruminate about negative aspects of their self, which in turn increases depression (Nolen-Hoeksema, 2000).

Vulnerability as a Function of Self-Esteem Instability

The second model is based on the observation that people not only differ in their habitual level of self-esteem, but also in the extent to which their self-esteem fluctuates around this level. For some individuals, self-esteem fluctuates strongly, so that on one day they may feel self-confident, whereas on the next day they may feel incompetent and useless. In contrast, the self-esteem of other individuals is relatively stable across several weeks or even months. The extent of temporal fluctuation in self-esteem is captured by measures of self-esteem instability (Kernis, 2005).

The notion that unstable self-esteem is a risk factor for depression is a commonly accepted view of the causal relationship between self-esteem and depression (Crocker, 2002a;

Roberts & Gotlib, 1997). For example, Kernis et al. (1998) state that unstable self-esteem

"appears to be a diathesis for depressive symptoms" (p. 665).

A possible explanation can be derived from Beck's (1967) cognitive theory of depression,

which states that schemata are generally latent until activated. Individuals at risk for depression

might lack resilience to primes that activate negative self-schemata. A particularly important

prime is negative mood (Teasdale & Dent, 1987). Thus, episodes of negative mood may activate

negative cognitions about the self, which in turn increase depressive symptoms. Another

cognitive approach proposes that short-term fluctuations in self-esteem might induce the feeling

of helplessness (Crocker & Wolfe, 2001), which is a risk factor for depression (Metalsky &

Joiner, 1992).

In addition, it is possible that the effect of self-esteem instability on depression depends

on the level of self-esteem, or, to put it differently, that level and instability interact in their effect

on depression. For example, Kernis et al. (1991) hypothesized that instability is associated with

different psychological processes among individuals with low versus high self-esteem.

Vulnerability as a Function of Self-Esteem Contingency

The third model proposes that the contingency of self-esteem is a vulnerability factor for

depression. Generally, self-esteem contingency has been defined as the degree to which self-

esteem fluctuates in response to positive and negative self-relevant events, such as starting a new

relationship, getting a compliment from a friend, receiving a bad grade in an exam, or

performing poorly at work (Crocker & Park, 2004; Crocker & Wolfe, 2001; Kernis, 2005).

Whereas some people experience boosts and drops in their self-esteem even when they receive

minor social feedback, other people's self-esteem fluctuates only when major self-relevant

events occur. Even though instability and contingency of self-esteem are conceptually related,

the two constructs should be distinguished. For example, it is possible that the self-esteem of an individual varies non-contingently over time. Moreover, even if the self-esteem of an individual is highly contingent, it is possible that he or she experiences complete stability in self-esteem for some time, because no relevant events happen in the person's life at this time.

There are several theories that suggest that contingent self-esteem is a risk factor for depression (for an overview see Roberts & Monroe, 1994). In particular, psychoanalytic approaches have suggested that individuals at risk for depression lack internal foundations of self-esteem and base their self-esteem on approbation and recognition from others (Rado, 1928). Importantly, as long as external sources of self-esteem are present, the level of self-esteem of these individuals is not necessarily reduced (Roberts & Monroe, 1992). Moreover, Jacobson (1975) suggested that individuals at risk for depression are marked by low narcissistic tolerance. Accordingly, these individuals have problems with tolerating threats to their overly positive self-image and, when failing in a specific domain, overgeneralize the failure to the entire self. Generally, these approaches suggest a positive linear effect of self-esteem contingency on depression.

In contrast, sociometer theory (Leary & Baumeister, 2000) suggests that a certain degree of self-esteem contingency is beneficial for the individual (Leary, 2006). The theory states that self-esteem is a sociometer that serves as a subjective monitor of the extent to which a person is valued as a member of desirable groups and relationships (Leary & Baumeister, 2000). This monitoring process requires self-esteem contingency: the sociometer reacts to cues that are relevant for the individual's relational value with drops or boosts in self-esteem. In particular, drops in self-esteem motivate behavior aimed at increasing or restoring the threatened relational value. Leary (2004) suggests that a medium degree of contingency is optimal for the individual's

psychological and social adjustment, whereas both low and high degrees of contingency are signs of a miscalibrated system. Thus, both a hypersensitive sociometer (i.e., the person's self-esteem reacts too strongly) and a hyposensitive sociometer (i.e., the person's self-esteem reacts too little or not at all), interferes with adaptive regulation of social interactions, which in turn might harm social relationships and consequently could increase the risk for depression (Oosterwegel, Field, Hart, & Anderson, 2001). In other words, sociometer theory proposes a curvilinear, U-shaped relation between self-esteem contingency and depression.

Evidence on the Relation between Vulnerable Self-Esteem and Depression

In this section, we review studies that (a) are prospective (i.e., that tested effects of self-esteem characteristics measured on one occasion on depression measured on a subsequent occasion) and (b) controlled for prior levels of the predicted variable (i.e., controlled for autoregressive effects). Controlling for prior levels of the variables is of crucial importance, because it rules out the possibility that prospective effects are simply due to concurrent relations between the variables and stability of the predicted variable (Finkel, 1995).

Effect of Self-Esteem Level on Depression

Overall, the available evidence supports the vulnerability effect of low self-esteem on depression, as indicated by a recent meta-analysis covering 77 longitudinal studies (Sowislo & Orth, 2013). Furthermore, the evidence suggests that the effect is robust, holding for men and women (Orth et al., 2008; Orth, Robins, Trzesniewski, Maes, & Schmitt, 2009; Sowislo & Orth, 2013), for all age groups from childhood to old age (Orth, Robins, Trzesniewski, et al., 2009; Sowislo & Orth, 2013), for different measures of self-esteem and depression (Sowislo & Orth, 2013), and for affective-cognitive and somatic symptoms of depression (Kuster et al., 2012; Orth, Robins, Trzesniewski, et al., 2009).

Effect of Self-Esteem Instability on Depression

Some studies have investigated whether self-esteem instability prospectively predicts depression, over and above the effect of self-esteem level. Table 1 provides a summary of the findings from these studies, which yielded highly inconsistent results: Four studies supported the hypothesis that unstable self-esteem predicts depression, whereas four other studies did not find supporting evidence. Moreover, two studies found evidence for a significant interaction effect between level and instability of self-esteem, whereas four other studies did not find significant evidence of interactions.

A possible explanation for these inconsistencies is that many previous studies were based on relatively small samples (see Table 1), providing insufficient power to test whether level and instability of self-esteem predict depression, and even lower statistical power to test for interactive effects (Cohen, Cohen, West, & Aiken, 2003). In addition, some studies examined effects of self-esteem instability on depression, but did not control for prior levels of depression. However, these studies also yielded inconsistent results (de Man, Gutiérrez, & Sterk, 2001; Kernis et al., 1991; Roberts, Kassel, & Gotlib, 1995; Vickery, Sepehri, Evans, & Jabeen, 2009; Vickery, Sepehri, Evans, & Lee, 2008).

Effect of Self-Esteem Contingency on Depression

Only two studies examined whether self-esteem contingency prospectively predicts depression, over and above the effect of self-esteem level. While the study by Wouters et al. (2013) used a self-report measure of contingent self-esteem, the study by Butler et al. (1994) used a more objective statistical index (see Method section for further details). These different measures notwithstanding, the studies did find neither a main effect of contingency of self-esteem nor interactive effects between contingency and level of self-esteem on depression.

However, other studies on self-esteem contingency, which did not control for the effect of self-esteem level, partially supported the hypothesis that contingent self-esteem predicts depression (Burwell & Shirk, 2006; Crocker, 2002b; Sargent et al., 2006). All of these studies tested for a linear effect of self-esteem contingency on depression; we are not aware of any study that tested for a curvilinear, U-shaped effect of self-esteem contingency on depression, corresponding to the assumptions of sociometer theory as outlined above.

The Present Research

Thus, although previous research has examined whether self-esteem instability and contingency are—in addition to a low level of self-esteem—vulnerability factors for depression, the available evidence on the effects of instability and contingency is inconclusive. First, as illustrated by Table 1, the results are highly inconsistent. Second, most of the relevant studies were underpowered. Third, no previous study simultaneously tested for effects of self-esteem level, instability, and contingency on depression. In the present research, we therefore examined the reciprocal effects between all three characteristics of self-esteem and depressive symptoms, using data from two longitudinal studies. We also systematically tested for interactions between the three self-esteem characteristics.

The present research advances previous studies in several ways. First, we simultaneously tested for effects of self-esteem level, instability, and contingency on depressive symptoms, using one overarching model. Second, we used data from two independent studies with different design characteristics; by replicating the findings across studies we reduce methodological concerns unique to each study and strengthen confidence in the overall pattern of results. Third, in each study, we used two divergent approaches to measure contingent self-esteem, which allowed for a more thorough evaluation of the hypothesis that vulnerability is a function of self-

esteem contingency. As we will describe in more detail below, we used both a subjective measure (i.e., self-report) and a more objective measure of contingency (i.e., a statistical index that captures the degree to which self-esteem fluctuates in response to self-relevant events, across a series of diary assessments). Fourth, in addition to testing for a linear effect of self-esteem contingency on depressive symptoms, we tested for a curvilinear effect, corresponding to the assumptions of sociometer theory. Fifth, one of the studies (i.e., Study 1) included a measure of the Big Five personality traits, which allowed us to test, and possibly rule out, an important alternative explanatory account. Specifically, it is possible that broad personality factors such as neuroticism influence both self-esteem and depression, thereby creating a spurious link between the two constructs (Hankin, Lakdawalla, Carter, Abela, & Adams, 2007; Watson, Suls, & Haig, 2002). For example, neuroticism is related to low self-esteem (Robins, Hendin, & Trzesniewski, 2001) and depression (Ormel, Oldehinkel, & Brilman, 2001). Consequently, even if longitudinal studies indicate that vulnerable self-esteem predicts depression, this effect might be confounded by effects of personality factors such as neuroticism, if these factors are not included in the model (Little, Preacher, Selig, & Card, 2007).

Study 1

Method

Data came from the study My Partner and I (MPI), a German-language study with a sample of couples living in Switzerland (Erol & Orth, 2013; Orth, 2013). Participants were assessed on trait measures of self-esteem and depressive symptoms on two occasions separated by six months (denoted as Time 1 and Time 2). Moreover, following the trait assessments at Time 1, participants were assessed on 40 consecutive days using short diary questionnaires including measures of state self-esteem and daily events. Data were collected using Web-based

questionnaires. Participants were recruited by contacting members of a university-based online

panel, which includes individuals who are interested in occasionally participating in Web-based

studies. Individuals were invited to participate (a) if they were currently in a relationship, (b) if

their relationship partner was also willing to participate, and (c) if both partners were 18 years or

older. Participants received information on the purpose and procedure of the study and were

informed that their data would be treated as strictly confidential. After providing informed

consent, each partner received individual links to the assessments, and participants were asked to

complete the questionnaires without his or her partner being present. The daily diary

questionnaires could be accessed between 4 p.m. and 2 a.m. on the corresponding day. The

average number of daily reports was 33.9. After completion of the study, participants were

provided with individualized feedback on selected study variables (i.e., how their scale scores

compared with population norms) and received 80 Swiss francs in exchange for participation in

the study.

Participants. The sample consisted of 372 individuals (50% female). Mean age of

participants at Time 1 was 29.1 years ($SD = 8.8$, range $= 18$ to 61). Ten percent had completed

the obligatory 9 school years, 54 % had completed secondary education (approximately 12

years), 15% had a Bachelor's degree, 19% had a Master's degree, and 2% had a doctoral degree.

Data on study variables were available for 371 individuals at Time 1 and 341 individuals at Time

2. To investigate the potential effect of attrition, we tested for differences in study variables

between participants who completed the Time 2 assessment and participants who had dropped

out before Time 2. Participants who dropped out reported slightly higher depressive symptoms

than those who did not ($Ms = 0. 82$ vs. 0.58; $d = 0.55$). Although differences in depressive

symptoms were of medium size, differences in self-esteem level, self-esteem instability, the self-

report measure of self-esteem contingency, and the statistical index of self-esteem contingency were nonsignificant.[1] Thus, nonrepresentativeness because of attrition was not a serious concern in the present study.

Trait measures.

Self-esteem level. Self-esteem level was assessed with the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), a 10-item self-report measure of self-esteem, which is frequently used and well-validated (cf. Blascovich & Tomaka, 1991; Robins et al., 2001). Responses were measured on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The alpha reliability was .91 at both Time 1 and Time 2.

Self-esteem contingency (self-report). The most widespread approach to assessing the contingency of self-esteem is using a self-report measure that asks people directly to what degree their self-esteem is contingent on events in daily life (Crocker, Luhtanen, Cooper, & Bouvrette, 2003; Kernis & Goldman, 2006). We used the 5-item Others' Approval subscale of the Contingencies of Self-Worth Scale (CSW; Crocker et al., 2003). The subscale measures the extent to which an individual's self-esteem is contingent on approval from generalized others. Item examples are "My self-esteem depends on the opinions others hold of me" and "I don't care what other people think of me" (reverse-scored). Responses were measured on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The alpha reliability was .83 at Time 1 and .84 at Time 2.

Depressive symptoms. Depressive symptoms were assessed with the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977; for the German version see Hautzinger & Bailer, 1993). The CES-D is a frequently used 20-item self-report measure for the assessment of depressive symptoms in nonclinical, subclinical, and clinical populations, and its

validity has been repeatedly confirmed (Eaton, Smith, Ybarra, Muntaner, & Tien, 2004).

Participants were instructed to assess the frequency of their reactions within the preceding seven

days. Responses were measured on a 4-point scale (0 = *rarely or none of the time, less than one*

day; 1 = *some or a little of the time, one to two days;* 2 = *occasionally or a moderate amount of*

time, three to four days; 3 = *most or all of the time, five to seven days*). The alpha reliability was

.89 at both Time 1 and Time 2. On the basis of the recommended cutoff value of 23 (Hautzinger

& Bailer, 1993), 10% of participants at both Time 1 and at Time 2 exhibited a clinically relevant

level of depressive symptoms.

Big Five personality traits. The Big Five personality traits were assessed with the 44-

item Big Five Inventory (BFI; John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008;

for the German version see Lang, Lüdtke, & Asendorpf, 2001), a well-validated measure of the

Big Five dimensions (John et al., 2008). Responses were measured using a 5-point scale ranging

from 1 (*disagree strongly*) to 5 (*agree strongly*). Extraversion was assessed with 8 items,

agreeableness with 9 items, conscientiousness with 9 items, neuroticism with 8 items, and

openness to experience with 10 items. The alpha reliabilities were .84 (Time 1) and .86 (Time 2)

for extraversion, .72 and .74 for agreeableness, .81 and .79 for conscientiousness, .85 and .86 for

neuroticism, and .83 and .82 for openness to experience.

Daily measures.

Daily self-esteem. Daily self-esteem was assessed with five items of the RSE , which

were slightly adapted to measure daily self-esteem.[2] The items were: "I am satisfied with

myself," "I am able to do things as well as most other people," "I take a positive attitude towards

myself," "I certainly feel useless" (reverse coded), "I feel that I am a failure" (reverse coded).

Participants were instructed to rate the items with regard to their feelings on the current day.

Responses were measured on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The alpha reliability was .90, averaged across daily assessments.

Daily events. In the daily assessments, participants reported the occurrence of positive and negative events in 10 domains: marriage/relationship; family; friends; neighbors; work; coworkers; recreational activities; traffic and shopping; finances; health and physical well-being. As suggested by Butler et al. (1994), we aggregated the items into an overall daily event measure by subtracting the number of negative events (possible values ranging from 0 to 10) from the number of positive events (possible values ranging from 0 to 10). Thus, possible values of the daily event measure ranged from −10 to +10.[3]

Computing measures of self-esteem instability and self-esteem contingency.

Self-esteem instability. For each participant, instability of self-esteem was computed as the intraindividual standard deviation of daily self-esteem across daily assessments. The intraindividual standard deviation is the most widely used measure of instability of self-esteem (Kernis & Goldman, 2006).

Self-esteem contingency (statistical index). In addition to the subjective measure of self-esteem contingency (i.e., the Others' Approval subscale of the CSW), we used a more objective measure of self-esteem contingency. Using the daily diary data, we computed for each participant a statistical index of self-esteem contingency, which captures the degree to which the participant's daily self-esteem fluctuates in response to events occurring on the same day. This approach has been employed previously for measures of affect and self-esteem (Meier, Orth, Denissen, & Kühnel, 2011), although different labels such as lability (Butler et al., 1994) and reactivity (Bolger & Zuckerman, 1995; Mroczek & Almeida, 2004) have been used. Because of the multilevel structure of the data (daily assessments nested within persons), we used a

multilevel random coefficient model allowing for simultaneous modeling of random error at

different levels of analysis (Nezlek, 2001). For the analyses, we used the Mplus 6 program

(Muthén & Muthén, 2010). The daily event measure was centered on the individual mean, and

the intercept and slope were allowed to correlate. The Level 1 equation was of the form:

$$\text{daily self-esteem}_{ij} = \beta_{0j} + \beta_{1j} \,(\text{daily events}) + r_{ij}. \tag{1}$$

In this equation, daily self-esteem$_{ij}$ is the self-esteem score for Person j on Day i, β_{0j} is the

intercept for Person j, β_{1j} is the coefficient of the effect of daily events for Person j, and r_{ij}

represents the error term. The Level 2 equations were of the form:

$$\beta_{0j} = \gamma_{00} + \mu_{0j} \tag{2}$$

$$\beta_{1j} = \gamma_{10} + \mu_{1j}. \tag{3}$$

In these equations, γ_{00} and γ_{10} represent the means of the Level 1 intercept and slope,

respectively, and μ_{0j} and μ_{1j} represent error terms. The Level 1 slope of daily events predicting

daily self-esteem, β_{1j}, represents the individual contingency of self-esteem. The participants'

scores on the slope were saved and used in the subsequent analyses.

Procedure for the statistical analyses. The analyses were conducted using Mplus 6. To

deal with missing values, we employed full-information maximum likelihood to fit models

directly to the raw data, which produces less biased and more reliable results compared with

conventional methods of dealing with missing data, such as listwise or pairwise deletion (Schafer

& Graham, 2002). At Time 1, the percentage of missing data was 0.8% for self-esteem level,

2.2% for self-esteem instability, 0.8% for self-reported self-esteem contingency, 1.6% for the

statistical index of self-esteem contingency, 0.3% for depressive symptoms, and 0.3% for the Big

Five personality traits. At Time 2, the percentage of missing data was 8.3% for self-esteem level,

8.6% for self-reported self-esteem contingency, and 8.6% for depressive symptoms. Models

including latent interactions were estimated by numerical integration using the default algorithm

(i.e., rectangular integration) with 15 integration points. Model fit was assessed by the

comparative fit index (CFI), the Tucker-Lewis index (TLI), the Bayesian information criterion

(BIC), and the root-mean-square error of approximation (RMSEA). Hu and Bentler (1999)

suggested that that good fit is indicated by values greater than or equal to .95 for TLI and CFI

and less than or equal to .06 for RMSEA. To test for differences in model fit, we used the test of

small difference in fit recommended by MacCallum, Browne, and Cai (2006, Program C). For

these tests, statistical power was high, with values above .99 (MacCallum et al., 2006, Program

D).

Results and Discussion

Table 2 shows means and standard deviations of the measures used in Study 1. In the

analyses, the multi-item measures (i.e., self-esteem level, self-reported contingency of self-

esteem, depressive symptoms, and the Big Five personality traits) were examined as latent

variables; for these measures, we used item parcels as indicators because they produce more

reliable latent variables than individual items (Little, Cunningham, Shahar, & Widaman, 2002).

Following Little, Rhemtulla, Gibson, and Schoemann (2013) we used the balancing approach

(i.e., parcels are balanced with respect to the item communalities), which is recommended for

unidimensional constructs such as self-esteem as measured with the RSE (Gray-Little, Williams,

& Hancock, 1997; Marsh, 1996). Following the recommendations by Little et al.(2002), items

were aggregated into three parcels per construct. The parceling scheme was kept constant across measurement occasions.

First, we tested models that did not include any interactions between self-esteem level, instability, and contingency. For the analyses, we used cross-lagged regression modeling (Finkel, 1995; Little et al., 2007). We tested two different groups of models, one of which included self-esteem contingency measured by self-report and one of which included self-esteem contingency measured by the statistical index. The two measures of self-esteem contingency were not used as indicators of a common factor because in both studies the intercorrelation of the two measures was of only small to medium size (see the supplementary material), indicating that the measures assessed overlapping constructs that were, however, not sufficiently correlated to use them as indicators of a common latent variable. We used separate models to test for the effects of these two measures of self-esteem contingency, because it is important that each potential vulnerability factor (i.e., level, instability, and contingency of self-esteem) was represented by only one measure at a time. If the two measures of self-esteem contingency were included in the same model, the effects of both measures could be reduced due to their overlap and, consequently, the effect of self-esteem contingency could be underestimated relative to the effects of self-esteem level and instability. Models from the first group included seven construct variables: four constructs measured at Time 1 and three constructs at Time 2 (see Figure 1A; self-esteem instability was not measured at Time 2). Models from the second group included six construct variables: four constructs measured at Time 1 and two constructs measured at Time 2 (see Figure 1B; self-esteem instability and the statistical index of self-esteem contingency were not measured at Time 2).

In all models, all construct variables at Time 2 were predicted by all construct variables at Time 1. Thus, the models included stability paths (also called autoregressive paths; e.g., the path from self-esteem level at Time 1 to self-esteem level at Time 2) and cross-lagged paths (e.g., the path from self-esteem level at Time 1 to depressive symptoms at Time 2). The cross-lagged paths indicate the effect of one variable on the other, after controlling for the stability of the variables over time (Finkel, 1995). For constructs that were assessed on both measurement occasions, the uniquenesses of individual indicators were correlated over time to control for bias due to parcel-specific variance (Cole & Maxwell, 2003). We tested for metric measurement invariance of the latent construct factors (Widaman, Ferrer, & Conger, 2010) by comparing the fit of two models. In Models 1 and 3, we freely estimated the factor loadings of the latent constructs, whereas in Models 2 and 4 we constrained the factor loadings to be equal across time (Table 3). If the constrained model does not fit worse than the unconstrained model, then the constraints are empirically justified and ensure that the latent variables are measured similarly across time. As indicated by the test of small difference in fit, the differences between Models 1 and 2 and between Models 3 and 4 were nonsignificant. Consequently, we favored the more parsimonious Models 2 and 4 and retained the metric invariance constraints in the subsequent analyses. The fit of the models was good (Table 3).

Then, we tested whether there were—in addition to the main effects examined in the previous analyses—interactive effects of the self-esteem characteristics on depressive symptoms.[4] Because interactions that involve latent variables significantly increase the computational demands (each interaction adds two dimensions of integration), the interactions were examined in separate models; thus, we examined six models, each of which included one interaction between two of the four self-esteem variables (i.e., level, instability, self-reported

contingency, and statistical index of contingency). The results showed that none of the

interaction effects were significant.[5]

Thus, the results suggested that the self-esteem characteristics did not interact in

predicting subsequent depressive symptoms. We therefore examined the structural coefficients

for Model 2 (Figure 1A) and Model 4 (Figure 1B), which did not include interactive effects.

Only two significant cross-lagged effects emerged. First, self-esteem level had a negative effect

on depressive symptoms, corresponding to the available evidence on the vulnerability model for

low self-esteem and depression (Sowislo & Orth, 2013). Second, self-esteem contingency, as

measured by the statistical index, predicted a decrease in level of self-esteem. All other cross-

lagged effects were nonsignificant two significant cross-lagged effects emerged: Again, self-

esteem level had a negative effect on subsequent depressive symptoms. Furthermore, self-esteem

contingency predicted a decrease in self-esteem level. Thus, in both models, self-esteem

instability and the two measures of self-esteem contingency did not predict change in depressive

symptoms, controlling for the effect of self-esteem level and controlling for prior levels of

depressive symptoms. The stability coefficients were .73 (Model 2) and .68 (Model 4) for level

of self-esteem, .80 for self-reported contingency of self-esteem, and .35 for depressive

symptoms, comparable to the stabilities reported in the literature (Sowislo & Orth, 2013;

Trzesniewski, Donnellan, & Robins, 2003).[6]

We also tested for gender differences in the structural coefficients using a multiple group

analysis. However, as indicated by the test of small difference in fit, models allowing for

different coefficients for female and male participants did not significantly improve model fit

relative to a model with constraints across gender. For both female and male participants, the

estimates were similar to the estimates for the total sample.

Next, we tested whether self-esteem contingency had a curvilinear, U-shaped effect on depressive symptoms, corresponding to the assumptions of sociometer theory. The first model included eight construct variables, that is, the seven construct variables included in Model 2 and the quadratic term of the self-reported self-esteem contingency. The second model included seven construct variables, that is the six construct variables included in Model 4 and the quadratic term of the statistical index of self-esteem contingency.[7] As in Models 2 and 4, level of self-esteem had a negative effect on depressive symptoms (β = -.23 to -.24, p < .05). However, neither the quadratic term of self-reported contingency (β = -.07; p = .17) nor the quadratic term of the statistical index of contingency (β =.06; p = .37) had a significant effect on depressive symptoms.

Finally, we tested whether the vulnerability effect of low self-esteem on depressive symptoms holds when the Big Five personality traits are controlled for. For this purpose, we tested a cross-lagged regression model, which included seven constructs: self-esteem level, depressive symptoms, extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience, at both Time 1 and Time 2. As in the models reported above, level of self-esteem had a negative prospective effect on depressive symptoms (β = -.23, p < .05). However, none of the Big Five personality traits significantly predicted subsequent depressive symptoms, with standardized regression coefficients ranging from -.05 (p = .43) for conscientiousness to .06 (p = .38) for extraversion. Given that, in particular, neuroticism has been discussed as a third variable that may account for the vulnerability effect of low self-esteem, we also tested a model that just included self-esteem level, depressive symptoms, and neuroticism. Again, however, self-esteem level had a significant effect on depressive symptoms (β = -.25, p < .05), whereas neuroticism did not significantly predict depressive symptoms (β = .04, p = .64).

The results of Study 1 suggest that (a) only level of self-esteem, but not instability and contingency of self-esteem, predicts subsequent depressive symptoms; (b) this result holds for both the self-report measure and the statistical index of self-esteem contingency; (c) the pattern of results holds across gender; (d) the vulnerability effect of low self-esteem on depressive symptoms is not influenced by interactions with instability and contingency of self-esteem; and (e) the vulnerability effect of low self-esteem on depressive symptoms holds when neuroticism and all other Big Five personality traits are controlled for.

To cross-validate the findings, we replicated the analyses using a second data set. Study 2 differed from Study 1 in three major characteristics. First, in Study 2 we examined a sample of young adults. The developmental period of young adulthood is particularly important to understand the etiology of depression because the prevalence of depression is high during this period (Blazer, Kessler, McGonagle, & Swartz, 1994) and because self-esteem and depression are likely to show changes due to the many transitions that occur in young adulthood (cf. Erol & Orth, 2011; Mirowsky & Kim, 2007; Orth, Trzesniewski, & Robins, 2010). Second, the data for Study 2 were collected in the work context, using a sample of trainees; moreover, in Study 2 a different type of daily event was assessed: specifically, work-related positive and negative events, which could be used for computing the statistical index of self-esteem contingency. Third, the study design included diary assessments at both Time 1 and Time 2, which enabled us to compute statistical indices of self-esteem instability and contingency on both measurement occasions. Consequently, Study 2 allowed testing for reciprocal relations between these characteristics of self-esteem and the other measures included in the model.

Study 2

Method

Data came from the Trainee Diary Study (TDS), a German-language study with a sample

of trainees from a large Swiss company (Orth, Robins, & Meier, 2009).[8] Participants were

assessed on trait measures of self-esteem and depressive symptoms on two occasions separated

by 6 weeks (denoted as Time 1 and Time 2). Moreover, during the first 12 workdays after each

of the trait assessments at Time 1 and Time 2, participants were assessed using short diary

questionnaires including measures of state self-esteem and daily events. Data were collected

using Web-based questionnaires that were accessible only to individuals who were invited to

participate. Participants received information on the purpose and procedure of the study and were

informed that their data would be treated as strictly confidential. Because most of the trainees

had to attend school on some of the weekdays, six daily reports per assessment period (i.e., Time

1 and Time 2) were expected for each participant. However, for practical reasons, participants

received e-mails providing access to the questionnaire on every weekday; therefore, the

maximum number of daily reports per assessment period was 12. The average number of daily

reports was 5.2 at Time 1 and 7.2 at Time 2. The daily diary assessments were conducted at

11.30 a.m. After completion of the study, participants were provided with individualized

feedback on selected study variables (i.e., how their scale scores compared with the mean score

of the sample) and participated in a raffle (in which they could win a portable media player and

several audio compact disks) in exchange for participation in the study.

Participants. The sample consisted of 253 trainees (36% female). Mean age of

participants at Time 1 was 18.0 years ($SD = 1.3$, range $= 16$ to 23). Data were available for 222

individuals at Time 1 and for 185 individuals at Time 2. To investigate the potential effect of

attrition, we tested for differences on study variables between participants who completed the

Time 2 assessment and participants who had dropped out before Time 2. No significant

differences emerged.[9]

Trait measures.

Self-esteem level. As in Study 1, self-esteem level was assessed with the RSE. Responses

were measured on a 6-point scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). The

alpha reliability was .86 at Time 1 and .89 at Time 2.

Self-esteem contingency (self-report). As in Study 1, we used the Others' Approval

subscale of the CSW. Responses were measured on a 6-point scale ranging from 0 (*strongly*

disagree) to 5 (*strongly agree*). The alpha reliability was .81 at both Time 1 and Time 2.

Depressive symptoms. Depressive symptoms were assessed with the German 15-item

short form of the CES-D (Hautzinger & Bailer, 1993). Participants were instructed to assess the

frequency of their reactions within the preceding seven days. Responses were measured on a 4-

point scale (0 = *rarely or none of the time*, 1 = *sometimes*, 2 = *frequently*, 3 = *most of the time*).

The alpha reliability was .92 at both Time 1 and Time 2. On the basis of the recommended cutoff

value of 17 (Hautzinger & Bailer, 1993), 17% of participants at Time 1 and 20% of participants

at Time 2 exhibited a clinically relevant level of depressive symptoms.

Daily measures.

Daily self-esteem. As in Study 1, daily self-esteem was assessed with five items from the

RSE, which were adapted to measure daily self-esteem.[10] The items were: "I take a positive

attitude towards myself," "I am satisfied with myself," "I feel that I'm a person of worth," "I

certainly feel useful," "I have respect for myself." Participants were instructed to rate the items

with regard to their feelings at the present moment. Responses were measured on a 6-point scale

ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). The alpha reliability was .94 at Time 1 and .95 at Time 2, averaged across daily assessments.

Daily events. In the daily assessments, participants reported the occurrence of events at the workplace, using a 12-item scale including six positive events and six negative events. Item examples are: "I completed an important task," "I was able to help another person in an important matter," "I made a mistake that will have consequences," and "I was left alone in a difficult situation." We aggregated the items into an overall daily event measure by subtracting the number of negative events (possible values ranging from 0 to 6) from the number of positive events (possible values ranging from 0 to 6). Thus, possible values of the overall daily event measure ranged from −6 to +6.

Computing measures of self-esteem instability and self-esteem contingency. The statistical indices of self-esteem instability and self-esteem contingency were computed using the same procedures as in Study 1.

Procedure for the statistical analyses. The analyses were conducted using Mplus 6. We used the same procedures as in Study 1. At Time 1, the percentage of missing data was 13.7% for self-esteem level, 27.3% for self-esteem instability, 13.7% for self-reported self-esteem contingency, 23.9% for the statistical index of self-esteem contingency, and 15.3% for depressive symptoms. At Time 2, the percentage of missing data was 27.5% for self-esteem level, 32.5% for self-esteem instability, 27.8% for self-reported self-esteem contingency, 31.4% for the statistical index of self-esteem contingency, and 28.2% for depressive symptoms.

For the tests of small difference in fit, statistical power was high with values above .99 (MacCallum et al., 2006, Program D).

Results and Discussion

Table 4 shows means and standard deviations of the measures used in Study 2. The

models tested were identical to Study 1, except that the Study 2 models included the statistical

indices of self-esteem instability and contingency at both Time 1 and Time 2. Again, we first

tested models that did not include interactions between the measures of self-esteem level,

instability, and contingency. As in Study 1, the test of small difference in fit indicated that metric

measurement invariance held across assessments (see Table 5). Consequently, we used metric

invariance constraints in the subsequent analyses. The fit of the models was good (Table 5).

Furthermore, tests for interactive effects between the self-esteem characteristics on depressive

symptoms showed that none of the interaction effects were significant.[11]

We therefore examined the structural coefficients for Models 2 (Figure 2A) and 4 (Figure

2B), which did not include interactive effects. In Model 2 (self-esteem contingency measured by

self-report), six significant cross-lagged effects emerged. First, self-esteem level had a negative

prospective effect on depressive symptoms, corresponding to the vulnerability model of low self-

esteem and depressive symptoms (Sowislo & Orth, 2012). Second, self-esteem level had

negative prospective effects on self-esteem instability and self-esteem contingency. Third, self-

esteem instability predicted increases in depression and decreases in self-esteem level. Fourth,

depression had a positive effect on subsequent self-esteem contingency. In Model 4 (self-esteem

contingency measured by the statistical index), only two significant cross-lagged effects

emerged. More precisely, depression was negatively predicted by self-esteem level and was,

albeit to a smaller extent, positively predicted by self-esteem instability. Thus, replicating the

findings from Study 1, the two measures of self-esteem contingency did not predict change in

depressive symptoms, controlling for the effect of self-esteem level and controlling for prior

levels of depressive symptoms.[12] However, in contrast to Study 1, self-esteem instability had a

significant prospective effect on depression, although this effect was smaller (β = .16 to .18) than

the effect of self-esteem level (β = -.36 to -.43).

Then, using multiple group analyses, we tested for gender differences in the structural

coefficients. However, as in Study 1, the test of small difference in fit revealed no significant

gender differences.[13] Finally, as in Study 1, neither the quadratic term of the self-reported self-

esteem contingency (β = .01; p = .83) nor the quadratic term of the statistical index of self-

esteem contingency (β =.02; p = .73) had a significant effect on depressive symptoms.[14]

General Discussion

In this research we examined the question of what constitutes vulnerable self-esteem or,

more precisely, which characteristics of self-esteem put individuals at risk for depressive

symptoms. As reviewed in the introduction, previous research on the depressogenic effects of

self-esteem level, instability, and contingency did not consider all three self-esteem

characteristics simultaneously, suffered from low power, and yielded inconsistent results. The

present research advances the field by investigating main and interactive effects of self-esteem

level, instability, and contingency on depressive symptoms in one overarching model, using data

from two independent longitudinal studies. The results from both studies suggest that level, but

not contingency, of self-esteem predicts subsequent depressive symptoms. Self-esteem instability

predicted depression in Study 2 but not in Study 1, although the effect was smaller than the effect

of self-esteem level. The three self-esteem characteristics did not interact in the prediction of

depressive symptoms. Moreover, the effect of self-esteem level on depressive symptoms held

when controlling for neuroticism and for all other Big Five personality traits. Thus, the findings

provide converging evidence for the vulnerability effect of self-esteem level, tentative evidence

for the vulnerability effect of self-esteem instability, and no evidence for the vulnerability effect of self-esteem contingency. Next, we discuss these findings in more detail.

Implications of the Findings

The results of both studies support the vulnerability model of low self-esteem and depression, which states that low self-esteem is a risk factor for depression (Orth et al., 2008; Sowislo & Orth, 2013; Zeigler-Hill, 2011). In both studies, low self-esteem prospectively predicted depressive symptoms (controlling for prior levels of depressive symptoms and instability and contingency of self-esteem). Across both studies, the effect was of about medium size, according to the conventions suggested by Cohen (1988). In contrast, only Study 2 supports the vulnerability effect of self-esteem instability (i.e., the degree of variability in self-esteem across short periods). This result must be interpreted with caution, as the effect is smaller than the effect of self-esteem level and could not be replicated in Study 1, which had a higher statistical power than Study 2. The results of both studies do not support the vulnerability model of contingency (i.e., the degree to which self-esteem fluctuates in response to self-relevant events).

Moreover we tested for a curvilinear, U-shaped relation between self-esteem contingency and depressive symptoms, as sociometer theory suggests that a medium degree of contingency is optimal for psychological adjustment (Leary, 2004). However, in both studies, the results did not support a curvilinear effect. A possible explanation for the nonsignificant result is that depression is a relatively distal outcome of a miscalibrated sociometer; in this case, curvilinear effects of self-esteem contingency on depression could emerge when examining longer prospective time intervals (e.g., several years). However, self-esteem contingency could have more immediate

curvilinear effects on more proximal outcomes of a miscalibrated sociometer, such as negative

social reactions, decreased popularity among peers, and withdrawal by relationship partners.

The present results provide important information on the robustness of the vulnerability

effect of low self-esteem on depressive symptoms. First, we did not find any significant

interactions between level, instability, and contingency of self-esteem, showing that the

vulnerability effect of low self-esteem is robust across different levels of self-esteem contingency

and self-esteem instability. Second, the results clearly suggest that the vulnerability effect of low

self-esteem is not due to a confounding influence of neuroticism or of any of the other Big Five

personality traits. Third, as in previous studies (e.g., Orth et al., 2008; Orth, Robins,

Trzesniewski, et al., 2009; Sowislo & Orth, 2013), the vulnerability effect of low self-esteem on

depressive symptoms held for both men and women. Of course, men and women may differ in

their average levels of self-esteem and depression (Hyde, Mezulis, & Abramson, 2008; Kling,

Hyde, Showers, & Buswell, 1999). However, the findings suggest that the structural relations

between self-esteem and depression are not influenced by gender.

Although the present research did not provide strong support for instability and

contingency of self-esteem being vulnerability factors for depressive symptoms, we note that

research supports the validity of the constructs and their utility in other fields of research. Several

studies have supported the discriminant validity of self-esteem instability and contingency

(Crocker et al., 2003; Meier et al., 2011; Okada, 2010; Oosterwegel et al., 2001; Roberts &

Gotlib, 1997) and their predictive validity over and above the effects of self-esteem level

(Kernis, Grannemann, & Barclay, 1989; Kernis, Lakey, & Heppner, 2008; Park & Crocker,

2005).

Even though the intraindividual standard deviation is considered the gold standard for

measuring self-esteem instability (cf. Meier et al., 2011), the approach nevertheless bears some

limitations. First, measures of self-esteem instability might show a lower reliability than

measures of self-esteem level and might consequently lead to smaller cross-lagged effects.[15]

Thus, differences in the strengths of cross-lagged effects might, at least partly, be due to

differences in the reliability of the measures. Second, the standard deviation does not distinguish

between different forms of instability, such as fewer and larger fluctuations versus multiple

smaller fluctuations (Franck & De Raedt, 2007). Consequently, it might be interesting to further

investigate different patterns of self-esteem instability and their relation to psychological

adjustment. Possibly, not self-esteem instability per se, but only certain patterns of instability

(e.g., relatively large fluctuations) constitute vulnerability to depression.

In this research, we used two divergent approaches to measure self-esteem contingency.

In addition to a commonly used self-report measure of contingent self-esteem, we computed a

statistical index of contingency which captures interindividual differences in the intraindividual

effect of daily events on daily self-esteem. We used this nonreactive and more objective

approach because the self-assessment of contingent self-esteem is likely a complex cognitive

task and people might not be fully aware of their contingencies. Although cognitive psychology

suggests that people are able to accurately judge contingencies in many situations (cf. Allan,

1993), in some situations the ability to accurately perceive and report contingencies is

significantly reduced (Custers & Aarts, 2011; Dickinson, Shanks, & Evendena, 1984; Fiedler,

Freytag, & Meiser, 2009; Tversky & Kahneman, 1982). For example, Leary et al. (2003) showed

that the event of social disapproval clearly affected the self-esteem of even those individuals who

believed that evaluations by others do not influence their self-esteem (but see Park & Crocker,

2008). It is, however, important to note that the statistical index of self-esteem contingency is not a completely objective measure, as it is based on self-reports on positive and negative events, which may be biased. For instance, if inaccuracy of event memory correlates with fluctuations in self-esteem, the validity of the statistical index might be reduced. Future research would therefore benefit from using an objective measure of events. Yet, the convergence of the present findings across the self-report measure and the more objective measure strengthens the conclusion that contingent self-esteem is not a risk factor for depressive symptoms.

Limitations and Conclusions

A limitation of the present research is that the study designs do not allow for strong conclusions regarding the causal influence of self-esteem on depressive symptoms, because effects may be caused by third variables that were not controlled for (Finkel, 1995). However, as reported above, Study 1 enabled us to partially overcome this limitation by statistically controlling for possible third-variable effects of broad personality factors such as neuroticism. The findings suggest that the vulnerability effect of low self-esteem on depressive symptoms is not due to confounding effects of the Big Five personality traits. Correspondingly, Orth, Robins, Widaman, and Conger (2014) found that the prospective effect of low self-esteem on depressive symptoms held when social support, maternal depressive symptoms, stressful events, and relational victimization were controlled for. These results cumulatively strengthen the case for the vulnerability model of low self-esteem.

Another limitation of the present research is that the results do not allow for firm conclusions with regard to clinical categories of depression such as major depressive disorder. First, the measures of depressive symptoms used in our research rely on self-report; however, conclusions about the antecedents of major depressive disorder should be based on clinical

interviews. Second, we used nonclinical samples, which do not allow for valid conclusions about depressive episodes in clinical populations, even if nontrivial proportions of the samples experienced relatively high levels of depression. However, given that meta-analytic results suggest that the prospective effect of low self-esteem on depression holds in both clinical and nonclinical samples (Sowislo & Orth, 2013) and, moreover, given that low self-esteem prospectively predicts clinically diagnosed depression (Ormel, Oldehinkel, & Vollebergh, 2004; Trzesniewski et al., 2006), we believe that the present findings are relevant also for clinically significant levels of depression.

A strength of the present research is the convergence of findings across the two studies, despite different study characteristics, which increases confidence in the generalizability of the findings. The studies differed in type of sample (relationship partners in Study 1 vs. trainees in Study 2), age of participants (i.e., adults from 18 to 61 years in Study 1 vs. young adults in Study 2), prospective time interval (six months in Study 1 vs. six weeks in Study 2), and type of events used in the statistical index of self-esteem contingency (a broad set of events in Study 1 vs. workplace events in Study 2).

In conclusion, the present results contribute to the refinement of theory about vulnerable self-esteem by providing converging evidence for a vulnerability effect of self-esteem level, tentative evidence for a smaller vulnerability effect of self-esteem instability, and no evidence for a vulnerability effect of self-esteem contingency. If future research confirms the causal link between self-esteem level and depression, these findings have implications for work in clinical and counseling settings. To assess vulnerable self-esteem, it may be less important to examine the extent and causes of fluctuations in self-esteem over multiple assessments, but it may be crucial to assess the overall level of self-esteem. Moreover, when focusing on self-esteem in the

prevention and treatment of depression, interventions should primarily seek to increase a

person's level of self-esteem rather than focus on instability and contingency of self-esteem.

Nevertheless, future investigations of vulnerable self-esteem are needed to gain a thorough

understanding of the processes by which low self-esteem contributes to vulnerability to

depression.

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Footnotes

[1] Furthermore, the cross-sectional correlations of depression with self-esteem level ($r = -.60$ at Time 1 and $r = -.58$ at Time 2) and with the self-report measure of self-esteem contingency ($r = .23$ at Time 1 and $r = .29$ at Time 2) were quite similar across time.

[2] The five items of the RSE were chosen ad hoc for the survey instrument of the present study. However, given that previous research indicates that self-esteem can be validly measured with few items (Gray-Little et al., 1997) or even a single item (Robins et al., 2001), and given that the internal consistency of the present scale was high, there is reason to believe that the present scale is a reliable and valid measure.

[3] We did not compute the alpha reliability for the daily event measures used in Studies 1 and 2. Coefficient alpha is not an appropriate measure of reliability for these scales because they are emergent, not latent, constructs, defined by an aggregation of relatively independent indicators (Bollen & Lennox, 1991).

[4] As some theories (e.g., Crocker & Wolfe, 2001) assume an interactive effect of self-esteem contingency and events on depression, we additionally tested for this interaction. We computed an overall positive event score by summing all positive events across the consecutive daily measurements and an overall negative event score by summing all negative events across the consecutive daily measurements. Separately for positive and negative events, the main effect of events and the interaction between events and self-esteem contingency on depression were added to Model 2 and Model 4. None of the interactions was significant, neither for self-esteem contingency measured by self-report nor for self-esteem contingency measured by the statistical index.

[5] Because of the exploratory character of the interaction tests, we adjusted the significance level following the Bonferroni method. Thus, for the six interactions the significance level was adjusted to $p < .008$ (i.e., dividing .05 by 6).

[6] With regard to self-reported contingency of self-esteem, we chose to focus on the Others' Approval CSW subscale because interpersonal acceptance is considered the most important source of self-esteem (Leary & Baumeister, 2000). However, given that the MPI includes two additional self-report scales of contingent self-esteem, we replicated the analyses using these measures (no other contingency scales were included in the data set). The two scales measured contingency in the domain of job performance (adapted from the "Academic Competence" subscale of the CSW; item example: "My self-esteem is influenced by my job performance") and in the relationship domain (adapted from the "Family Support" subscale of the CSW; item example: "Knowing that my partner loves me makes me feel good about myself"). Both scales included 5 items. The alpha reliabilities ranged from .71 to .79. For both scales, the results were virtually identical to the results for the Others' Approval subscale: only level, but not instability and contingency, of self-esteem predicted subsequent depressive symptoms.

[7] The variables self-reported contingency and statistical index of self-esteem contingency were centered for the analyses.

[8] Orth, Robins, and Meier (2009, Study 2) used the data of the TDS to examine the relation between level of self-esteem and depression; however, that study did not examine whether instability and contingency of self-esteem predict depression or whether instability and contingency interact with level of self-esteem in the prediction of depression.

[9] Furthermore, the cross-sectional correlations of depression with self-esteem level ($r = -.64$ at Time 1 and $r = -.72$ at Time 2), with self-esteem instability ($r = .26$ at Time 1 and $r = .33$ at Time 2), with the self-report measure of self-esteem contingency ($r = .17$ at Time 1 and $r = .23$ at Time 2), and with the statistical index of self-esteem contingency ($r = .49$ at both Time 1 and Time 2) were quite similar across time.

[10] The five items of the RSE were chosen ad hoc for the survey instrument of the present study. However, as in Study 1, there is reason to believe that the present scale is a reliable and valid measure (see Footnote 2).

[11] As in Study 1, because of the exploratory character of the interaction tests, we adjusted the significance level following the Bonferroni method. Thus, for the six interactions the significance level was adjusted to $p < .008$ (i.e., dividing .05 by 6). Furthermore, using the same procedures as in Study 1, we tested for interactions of self-esteem contingency with events on subsequent depression (see Footnote 5). As in Study 1, none of the interactions was significant, neither for self-esteem contingency measured by self-report nor for self-esteem contingency measured by the statistical index.

[12] As in Study 1, with regard to self-reported contingency of self-esteem, we focused on the Others' Approval subscale of the CSW. However, given that the TDS includes two additional self-report scales of contingent self-esteem, we replicated the analyses using these measures (no other contingency scales were included in the data set). The two scales measured contingency in the domains of physical attractiveness (i.e., the "Appearance" subscale of the CSW; item example: "My self-esteem is influenced by how attractive I think my face or facial features are") and job performance (adapted from the "Academic Competence" subscale of the CSW; item example: "My self-esteem is influenced by my job performance"). Both scales included 5 items

and the alpha reliabilities ranged from .71 to .79 across the two waves. For both scales, the

results were virtually identical to the results for the Others' Approval subscale: self-esteem level,

and to a smaller extent self-esteem instability, predicted subsequent depressive symptoms.

[13] Due to the restricted sample size (i.e., $n = 80$ in the female group), the results of the

multiple group analysis testing for gender differences in the structural coefficients must be

treated with caution. Although there are no valid rules of thumb regarding sample size in

structural equation modeling, estimating complex models with less than 100 cases is generally

problematic (Kline, 1998).

[14] As in Study 1, the variables self-reported contingency and statistical index of self-

esteem contingency were centered for the analyses.

[15] This criticism applies to the statistical index of self-esteem contingency as well.

Table 1

Summary of Previous Studies Simultaneously Testing the Effects of Level and Instability of Self-Esteem on Subsequent Depression,

Controlling for Prior Depression

Study	*N*	% female	Prospective time interval	Main effect of SE level	Main effect of SE instability	Interaction effect of SE level and instability
Butler et al. (1994, Study 2)[a]	73	77	5 months	*ns*	+	*ns*
Franck & De Raedt (2007)[b]	52	78	6 months	*ns*	+	*ns*
Kernis et al. (1998, BDI)[c]	98	86	4 weeks	*ns*	+	*ns*
Kernis et al. (1998, CES-D)[c]	98	86	4 weeks	*ns*	*ns*	+
Kim & Cicchetti (2009)[d,e]	215	36	1.5 years[f]	–	*ns*	not tested
Roberts & Gotlib (1997)[e,g]	122	100	6 weeks	*ns*	*ns*	not tested
Roberts et al. (1999)	26	65	11 weeks[h]	–	+	+
Vickery et al. (2009)[e,i,j]	120	57	not available	–	*ns*	*ns*

Note. SE = self-esteem; BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies-Depression Scale; "+" denotes

a significant positive effect; "−" denotes a significant negative effect; "*ns*" denotes a nonsignificant effect.

[a] Effects were controlled for a measure of life stress and additional interactive effects. [b] Effects were controlled for history of

depression (i.e., never depressed vs. formerly depressed). [c] Effects were controlled for a measure of daily hassles and additional

interactive effects. [d] Effects were controlled for maltreatment status and additional interactive effects. [e] Self-esteem level was operationalized as average across daily assessments. [f] Information on the predictors were based on aggregations of repeated measurements over four occasions (with 1-year intervals). Depression on the forth occasion served as the outcome variable. We thus used the mean prospective time interval. [g] Effects were controlled for anxiety at Times 1 and 2, severity of lifetime depression, neuroticism, competence, life stress, and additional interactive effects. [h] The exact prospective time interval was not given. However, we estimated the time interval based on the following information: Predictors were based on mean scores of an intake assessment, which was conducted between one and three weeks prior to the first treatment session and an assessment at the first treatment session. The treatment took eight weeks (see Lewinsohn, Antonuccio, Steinmetz, & Teri, 1984). The outcome was based on mean scores of the final treatment session and the follow-up, which was conducted between one and three weeks after the final treatment session. [i] Vickery, Evans, Sepehri, Jabeen, & Gayden (2009). [j] Effects were controlled for hospitalization-based hassles.

Table 2

Means and Standard Deviations of the Manifest Variables in Study 1

Variable	Time 1		Time 2	
	M	*SD*	*M*	*SD*
SE level	4.07	0.75	4.17	0.75
SE instability	0.37	0.22	--	--
SE contingency (self-report)	2.71	0.88	2.73	0.90
SE contingency (statistical index)	0.07	0.05	--	--
Depressive symptoms	0.60	0.43	0.56	0.43
Extraversion	3.46	0.72	3.50	0.69
Agreeableness	3.59	0.54	3.62	0.53
Conscientiousness	3.59	0.66	3.67	0.60
Neuroticism	2.77	0.75	2.72	0.74
Openness to experience	3.74	0.66	3.73	0.65

Note. Dash indicates that data were not available. SE = self-esteem.

Table 3

Fit of the Models Tested in Study 1

Model	χ^2	*df*	TLI	CFI	BIC	RMSEA [90% CI]
Model with self-reported self-esteem contingency (Figure 1A)						
1. Free loadings	222.1*	123	.98	.97	9363	.047 [.037, .056]
2. Metric invariance	238.1*	129	.98	.97	9344	.048 [.038, .057]
Model with statistical index of self-esteem contingency (Figure 1B)						
3. Free loadings	123.2*	58	.98	.97	2911	.055 [.042, .069]
4. Metric invariance	138.1*	62	.98	.97	2902	.058 [.045, .070]

Note. For BIC, lower values indicate better model fit. TLI = Tucker-Lewis index; CFI = comparative fit index; BIC = Bayesian information criterion; RMSEA = root-mean-square error of approximation; CI = confidence interval.

* $p < .05$.

Table 4

Means and Standard Deviations of the Manifest Variables in Study 2

Variable	Time 1		Time 2	
	M	*SD*	*M*	*SD*
SE level	3.78	0.86	3.74	0.90
SE instability	0.51	0.35	0.44	0.30
SE contingency (self-report)	2.77	1.10	2.75	1.07
SE contingency (statistical index)	0.14	0.04	0.11	0.07
Depressive symptoms	0.68	0.56	0.72	0.59

Note. SE = self-esteem.

Table 5

Fit of the Models Tested in Study 2

Model	χ^2	*df*	TLI	CFI	BIC	RMSEA [90% CI]
Model with self-reported self-esteem contingency (Figure 2A)						
1. Free loadings	187.7*	135	.98	.98	7283	.041 [.025, .054]
2. Metric invariance	198.3*	141	.98	.97	7261	.041 [.027, .054]
Model with statistical index of self-esteem contingency (Figure 2B)						
3. Free loadings	89.6	74	.99	.99	2518	.030 [.000, .050]
4. Metric invariance	93.7	78	.99	.99	2500	.029 [.000, .049]

Note. For BIC, lower values indicate better model fit. TLI = Tucker-Lewis index; CFI = comparative fit index; BIC = Bayesian information criterion; RMSEA = root-mean-square error of approximation; CI = confidence interval.
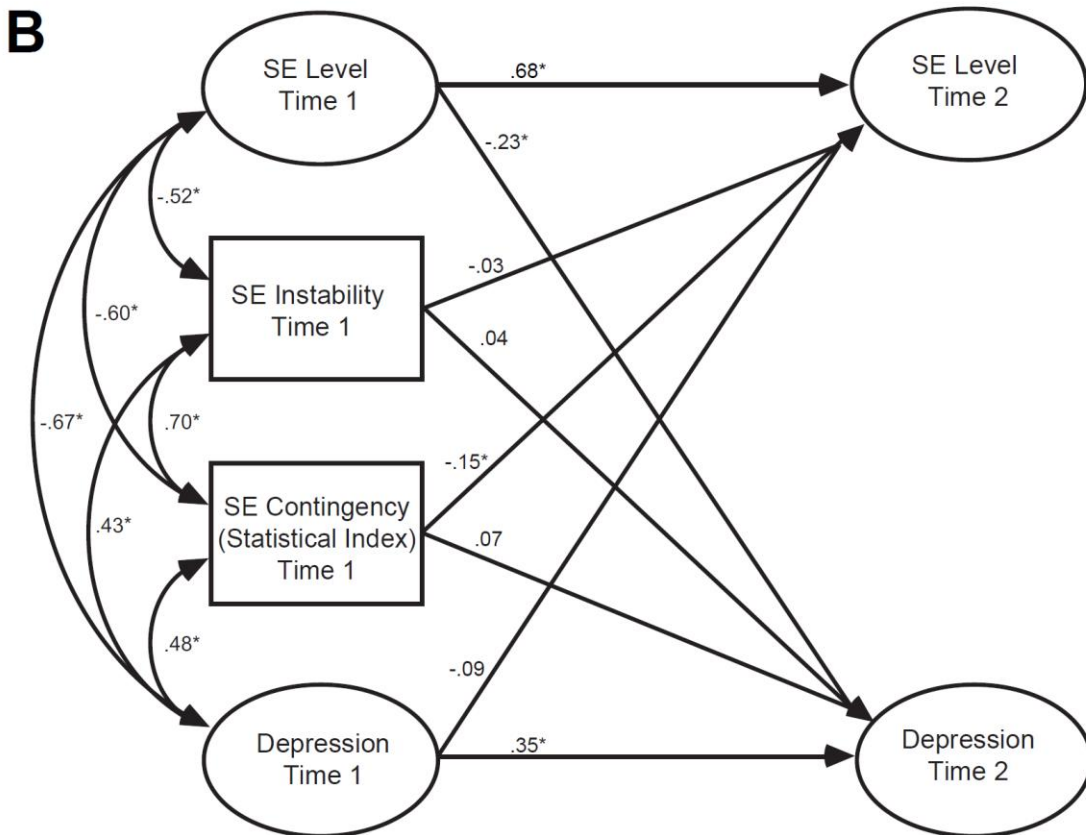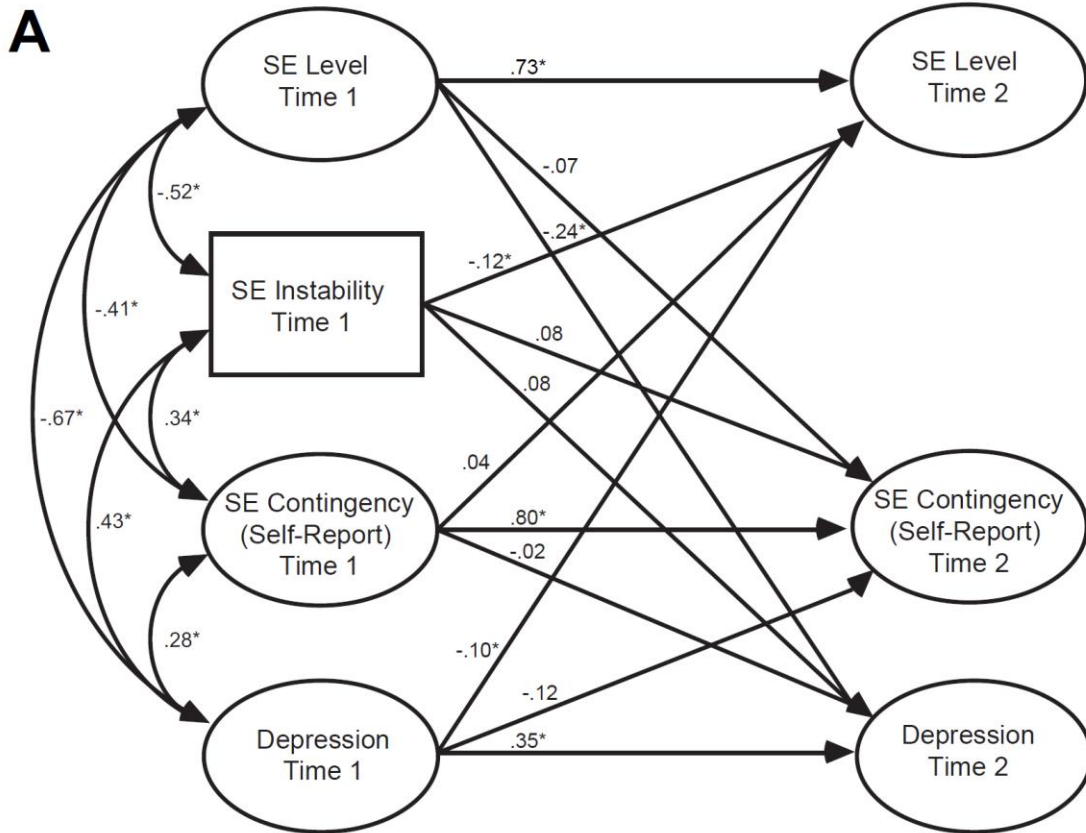
* $p < .05$.

Figure 1. Standardized structural coefficients for the "no interaction" models with longitudinal

constraints (Study 1). Panel A shows the model with self-esteem contingency measured by self-

report and Panel B the model with self-esteem contingency measured by the statistical index.

To keep the figure simple, indicators of latent variables and correlations of residual variances at

Time 2 are omitted. SE = self-esteem.

* $p < .05$.

Figure 2. Standardized structural coefficients for the "no interaction" models with longitudinal constraints (Study 2). Panel A shows the model with self-esteem contingency measured by self-report and Panel B the model with self-esteem contingency measured by the statistical index. To keep the figure simple, indicators of latent variables and correlations of residual variances at Time 2 are omitted. SE = self-esteem.
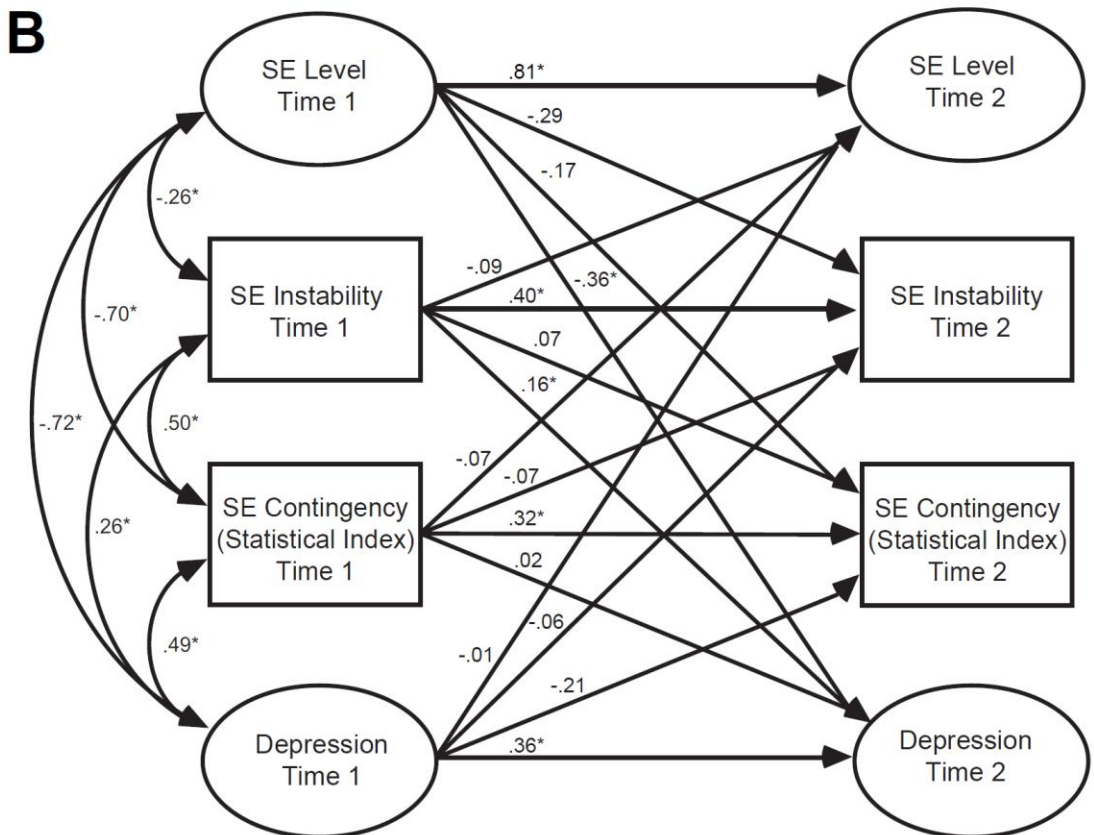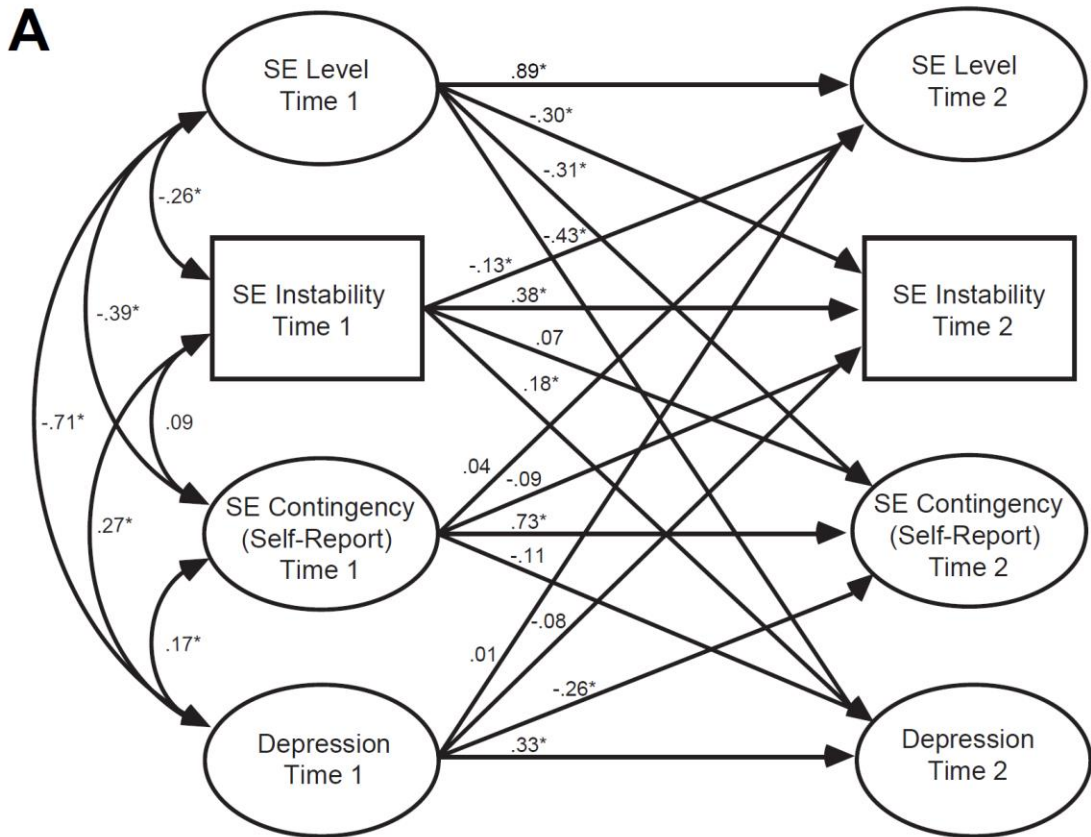
* $p < .05$.

Supplementary Material

Table 1

Intercorrelations of Self-Esteem Characteristics, Depressive Symptoms, and the Big Five Personality Traits in Study 1

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. SE level, Time 1	--												
2. SE level, Time 2	.80*	--											
3. SE instability, Time 1	-.50*	-.50*	--										
4. SE contingency (self-report), Time 1	-.36*	-.29*	.32*	--									
5. SE contingency (self-report), Time 2	-.34*	-.37*	.33*	.73*	--								
6. SE contingency (statistical index), Time 1	-.57*	-.61*	.69*	.30*	.34*	--							
7. Depressive symptoms, Time 1	-.60*	-.56*	.40*	.23*	.29*	.45*	--						
8. Depressive symptoms, Time 2	-.47*	-.58*	.33*	.22*	.29*	.39*	.51*	--					
9. Extraversion, Time 1	.37*	.34*	-.18*	-.13*	-.16*	-.26*	-.30*	-.18*	--				
10. Agreeableness, Time 1	.33*	.29*	-.21*	-.08	-.06	-.22*	-.28*	-.21*	.26*	--			
11. Conscientiousness, Time 1	.28*	.32*	-.26*	-.05	-.10	-.26*	-.34*	-.22*	.20*	.30*	--		
12. Neuroticism, Time 1	-.66*	-.58*	.43*	.38*	.34*	.47*	.52*	.38*	-.28*	-.42*	-.26*	--	
13. Openness to experience, Time 1	.04	.09	.09	-.05	-.11*	.01	.03	-.04	.24*	.14*	-.01	.00	--

Note. SE = self-esteem; * $p < .05$.

Table 2

Intercorrelations of Self-Esteem Characteristics and Depressive Symptoms in Study 2

Variables	1	2	3	4	5	6	7	8	9	10
1. SE level, Time 1	--									
2. SE level, Time 2	.77*	--								
3. SE instability, Time 1	-.24*	-.41*	--							
4. SE instability, Time 2	-.32*	-.30*	.43*	--						
5. SE contingency (self-report), Time 1	-.34*	-.28*	.08	.06	--					
6. SE contingency (self-report), Time 2	-.38*	-.41*	.17*	.08	.74*	--				
7. SE contingency (statistical index), Time 1	-.65*	-.67*	.52*	.35*	.24*	.24*	--			
8. SE contingency (statistical index), Time 2	-.55*	-.59*	.41*	.60*	.20*	.21*	.61*	--		
9. Depressive symptoms, Time 1	-.64*	-.61*	.26*	.28*	.17*	.09	.49*	.51*	--	
10. Depressive symptoms, Time 2	-.61*	-.72*	.40*	.33*	.11	.23*	.53*	.49*	.65*	--

Note. SE = self-esteem; $*p < .05$.