Does Low Self-Esteem Predict Depression and Anxiety?

A Meta-Analysis of Longitudinal Studies

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Abstract

Low self-esteem and depression are strongly related, but there is not yet consistent evidence on the nature of the relation. Whereas the vulnerability model states that low self-esteem contributes to depression, the scar model states that depression erodes self-esteem. Furthermore, it is unknown whether the models are specific for depression or whether they are also valid for anxiety. We evaluated the vulnerability and scar models of low self-esteem and depression, and low self-esteem and anxiety, by meta-analyzing the available longitudinal data (covering 77 studies on depression and 18 studies on anxiety). The mean age of the samples ranged from childhood to old age. In the analyses, we used a random effects model and examined prospective effects between the variables, controlling for prior levels of the predicted variables. For depression, the findings supported the vulnerability model: the effect of self-esteem on depression (β = -.16) was significantly stronger than the effect of depression on self-esteem (β = -.08). In contrast, the effects between low self-esteem and anxiety were relatively balanced: self-esteem predicted anxiety with β = -.10 and anxiety predicted self-esteem with β = -.08. Moderator analyses were conducted for the effect of low self-esteem on depression; these suggested that the effect is not significantly influenced by gender, age, measures of self-esteem and depression, or time lag between assessments. If future research supports the hypothesized causality of the vulnerability effect of low self-esteem on depression, interventions aimed at increasing self-esteem might be useful in reducing the risk of depression.

Keywords: self-esteem, depression, anxiety, longitudinal studies

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There is an overwhelming amount of self-help literature that explains how people can boost and sustain their self-esteem in order to improve their psychological adjustment. But does self-esteem indeed contribute to psychological health or, to put it differently, does low self-esteem compromise a person's psychological adjustment? Previous research suggests that self-esteem is linked to indicators of psychological adjustment such as happiness (H. Cheng & Furnham, 2004; Diener & Diener, 1995), high positive affect and low negative affect (Orth, Robins, & Widaman, 2011), and to the absence, or a low number, of psychological symptoms such as depression (Orth, Robins, Trzesniewski, Maes, & Schmitt, 2009; J. E. Roberts & Monroe, 1992) and bulimia (Vohs et al., 2001). However, with respect to many of these variables, the precise nature of their relation with self-esteem has not ultimately been established (Baumeister, Campbell, Krueger, & Vohs, 2003).

In the present research, we focus on the relation of self-esteem with two important indicators of low psychological adjustment, specifically depression and anxiety.[1] The central goal of this study is to evaluate the vulnerability and scar model of low self-esteem and depression, by meta-analyzing the available longitudinal data. Moreover, we test whether the vulnerability and scar model (if supported by the data) are specific for depression or whether they are also valid models for anxiety. Finally, we examine moderators that might explain variability in the relation between low self-esteem and depression.

Self-Esteem: Concept, Measurement, Function, and Consequences

Concept of Self-Esteem

The concept of self-esteem has elicited a large body of theoretical accounts and empirical research (see, e.g., Baumeister, 1998; Kernis, 2006; Swann & Bosson, 2010). Historically, the first influential definition of self-esteem dates back to James (1890), who considered self-esteem to be the ratio of success and pretensions in important life domains. While James focused to a stronger degree on the individual processes that form self-esteem, later symbolic interactionism approaches stressed the social influences on self-esteem (Cooley, 1902; Goffman, 1959; Mead, 1934). For instance, in his conception of the looking-glass self, Cooley (1902) hypothesized that self-views are based upon information gathered from explicit or implicit feedback from others. More recent definitions of self-esteem emphasize the fact that self-esteem should be distinguished from other components of the self-concept (such as self-knowledge and self-efficacy), insofar as self-esteem represents the affective, or evaluative, component of the self-concept; it signifies how people feel about themselves (Leary & Baumeister, 2000). This affective self-evaluation is subjective at its core and is not based on specific behaviors (Robins, Hendin, & Trzesniewski, 2001). According to Rosenberg (1989), high self-esteem "expresses the feeling that one is 'good enough'. The individual simply feels that he is a person of worth (… .) He does *not* necessarily consider himself superior to others" (p. 31). Although Baumeister and his colleagues share the view of self-esteem as self-appraisal with an affective component, they expand the definition of self-esteem to include feelings of superiority, arrogance, and pride (e.g., Baumeister, 1998; Baumeister, Smart, & Boden, 1996).

In the literature, it is debated whether self-esteem is best conceptualized as a global evaluation of the self (i.e., global self-esteem) or as an evaluation in specific self-relevant domains such as intellectual abilities, physical appearance, and social competence (i.e., domain-specific self-esteem; Swann & Bosson, 2010). One finding that sheds more light on this debate is

that both global and domain-specific self-evaluations show predictive ability for important outcomes, as long as these outcomes exhibit the same degree of specificity as the self-evaluation which is used as a predictor (specificity-matching principle; Swann, Chang-Schneider, & McClarty, 2007). More precisely, global self-esteem seems to have predictive ability for outcomes measured at a global level (such as several outcomes bundled together; for an example see Trzesniewski et al., 2006), whereas domain-specific self-esteem seems to have predictive ability for outcomes measured at a specific level (e.g., academic self-esteem predicts academic outcomes; Marsh, Trautwein, Lüdtke, Koller, & Baumert, 2006).

With regard to the relation between self-esteem and psychological adjustment, there are three reasons for focusing on global self-esteem rather than domain-specific self-esteem. First, most of the theories linking self-esteem to psychological adjustment address global self-esteem but not domain-specific self-esteem (e.g., Abramson, Seligman, & Teasdale, 1978; Blatt, D'Afflitti, & Quinlan, 1976; G. W. Brown & Harris, 1978). Second and relatedly, most studies in this field have used measures of global self-esteem (for reviews see Orth, Robins, & Roberts, 2008; Zeigler-Hill, 2010). Third, according to the specificity-matching principle it seems reasonable to examine global self-esteem in this context, because indicators of psychological adjustment such as depression and anxiety are relatively global constructs that combine a number of cognitive, affective, and somatic symptoms (Swann et al., 2007).

Measurement of Self-Esteem

Measures of self-esteem reflect the distinction between global and domain-specific self-evaluations (for a review see Blascovich & Tomaka, 1991). Frequently used measures of global self-esteem, all of which are multi-item scales, include the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Janis-Field Feelings of Inadequacy Scale (Fleming & Courtney, 1984),

the Texas Social Behavior Inventory (Helmreich & Stapp, 1974), and the Self-Liking/Self-Competence Scale (Tafarodi & Swann, 2001). Prominent measures of domain-specific self-esteem are, e.g., the Self-Description Questionnaire (Marsh, 1990), the Self-Perception Profile for Children (Harter, 1985), and the Self-Perception Profile for Adolescents (Harter, 1988). Research suggests that these measures generally have good psychometric properties (Blascovich & Tomaka, 1991; Byrne, 1996; Fleming & Courtney, 1984; Gray-Little, Williams, & Hancock, 1997; Marsh, Ellis, Parada, Richards, & Heubeck, 2005; Marsh, Scalas, & Nagengast, 2010). For example, the widely used Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) shows good internal consistency and test-retest reliability (Blascovich & Tomaka, 1991; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002). Moreover, research supports the construct validity of this measure: First, factor analyses suggest that there is only one substantive factor that explains responses to the RSE (Gray-Little et al., 1997; Marsh et al., 2010; Schmitt & Allik, 2005). Second, the RSE shows good discriminant validity, for instance regarding measures of life satisfaction, optimism, and academic outcomes (Blascovich & Tomaka, 1991; Lucas, Diener, & Suh, 1996; Robins et al., 2001). Third, the RSE shows convergent validity with other measures of self-esteem (Bosson, Swann, & Pennebaker, 2000). For example, in a multi-sample study by Zeigler-Hill (2010), correlations between the RSE and the above-mentioned measures of global self-esteem ranged from .63 to .90.

All of the measures discussed above are based on self-reports; that is, respondents are explicitly asked to reflect on their global or domain-specific self-worth. As self-esteem, by definition, is a subjective construct, it cannot be validly assessed using objective criteria (Baumeister, 1998). However, in the past few decades, researchers have also explored methods other than self-report to assess self-esteem, namely implicit measures (Bosson et al., 2000;

Krizan & Suls, 2009). According to a recent review by Buhrmester, Blanton, and Swann (2011), the most frequently used implicit measures of self-esteem are the Implicit Association Test (Greenwald & Farnham, 2000) and the Name-Letter Test (Greenwald & Farnham, 2000; Nuttin, 1985). However, research suggests that the currently available implicit measures of self-esteem suffer from low reliability and low convergent validity (a) with each other (Bosson et al., 2000; Krizan & Suls, 2009,) and (b) with explicit measures of self-esteem (Bosson et al., 2000; Krizan & Suls, 2008). Moreover, implicit measures of self-esteem show weak predictive validity for theoretically relevant criteria such as personality (Krizan & Suls, 2009) and well-being (Buhrmester, Blanton, & Swann, 2011; Schimmack & Diener, 2003). Buhrmester et al. (2011) conclude from their review that the Implicit Association Test and the Name-Letter Test measure generalized implicit affect and implicit egotism, respectively, rather than self-esteem; thus, although implicit measures are a promising avenue for self-esteem measurement, there is not yet sufficiently strong support for their validity. For these reasons, in the present research we restricted our analyses to explicit measures of self-esteem.

Function of Self-Esteem

People tend to have a pervasive motive to increase their self-esteem and to maintain high self-esteem (Sedikides, 1993; Sedikides, Gaertner, & Toguchi, 2003; but see Heine, Lehman, Markus & Kitayama, 1999). Correspondingly, many psychological theories assume that people are motivated to enhance and maintain their self-esteem without further delineating its functional value (cf. Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). However, there are a few approaches that seek to explain why self-esteem is important for humans (for an outline of these approaches see Crocker & Park, 2004; Leary & Baumeister, 2000).

First, according to sociometer theory (Leary & Baumeister, 2000; Leary, Tambor, Terdal, & Downs, 1995), humans have a fundamental need for belongingness, because social inclusion has many adaptive benefits (e.g., the possibility of sharing knowledge within social groups; see also Baumeister & Leary, 1995). 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. Thus, when people perceive their relational value as low, their self-esteem should be equally low, motivating behavior aimed at increasing or restoring social inclusion.

Second, according to terror management theory (J. Greenberg, Pyszczynski, & Solomon, 1986; Pyszczynski et al., 2004), people have a central motive to identify with cultural values and groups, because this identification promises either literal immortality (e.g., being part of a religious group that believes in reincarnation) or symbolic immortality (e.g., being part of a cultural group whose existence will endure after one's own death) and consequently reduces the deeply rooted fear of death. Thus, when people see themselves as living up to these cultural values, their self-esteem should be high, in turn serving as a buffer against the fear of death.

Interestingly, the fact that both theories stress the interpersonal component of self-esteem is in line with early psychological accounts of self-views as mentioned above (e.g., Cooley, 1902; Goffman, 1959; Mead, 1934). Moreover, both theories imply an association between self-esteem and psychological adjustment. For terror management theory, this association is more evident, as self-esteem is assumed to buffer against anxiety. From the perspective of sociometer theory, self-esteem is related to psychological adjustment via beneficial aspects of social inclusion. For example, socially excluded individuals may suffer from loneliness and low social support, which increases the risk for depression (e.g., Joiner, 1997; Nolan, Flynn, & Garber, 2003; Stice, Ragan, & Randall, 2004).

Consequences of Self-Esteem

A much debated question in the literature is whether self-esteem has an impact on real-life outcomes or whether self-esteem is merely an epiphenomenon of success and well-being in the relationship, work, and health domain (Baumeister et al., 2003; Harter, 1999; Swann et al., 2007). Although research suggests that self-esteem is correlated with many factors in important life domains (e.g., relationship satisfaction, Shackelford, 2001; socioeconomic status, Twenge & Campbell, 2002), this research does not demonstrate that self-esteem actually influences these correlates. The available longitudinal studies suggest that self-esteem might have significant positive effects on important life outcomes (e.g., Orth et al., 2011; Trzesniewski et al., 2006; but see Boden, Fergusson, & Horwood, 2008), but further research is needed to test the causality of the hypothesized effects of self-esteem. Moreover, research suggests a causal link between self-esteem and task persistence (Baumeister et al., 2003). More precisely, laboratory experiments have repeatedly shown that high self-esteem facilitates more adaptive persistence behavior: Individuals with high self-esteem persist longer in the face of failure (e.g., Perez, 1973; Shrauger & Sorman, 1977), but whenever persistence is maladaptive (e.g., when confronted with unsolvable tasks) they persist less than individuals with low self-esteem (e.g., Di Paula & Campbell, 2002; McFarlin, 1985). This adaptive self-regulatory behavior might contribute to the link between self-esteem and psychological adjustment (Baumeister et al., 2003). For instance, Shrauger and Sorman (1977) argue that persistence is often needed for the accomplishment of complex tasks and thereby helps to attain long-lasting satisfaction and external rewards. Furthermore, they suggest that task persistence may result in a sense of mastery and control (Shrauger & Sorman, 1977), which is inversely related to phenomena such as depression (Abramson et al., 1978).

Importantly, some researchers have proposed that self-esteem may not only be associated with positive outcomes (i.e., the bright side of high self-esteem), but may also be associated with negative attributes (i.e., the dark side of high self-esteem). More precisely, Baumeister, Smart, and Boden (1996) suggested that some forms of high self-esteem—specifically, inflated and unstable high self-esteem—may cause interpersonal aggression and violence, because people with overly high self-esteem are more prone to experience ego threats and, consequently, are more strongly motivated to defend their self-esteem by devaluating and attacking people who question their inflated self-views (see also Crocker & Park, 2004; Kernis, Grannemann, & Barclay, 1989). However, other studies suggest that low, but not high, self-esteem predicts antisocial behavior and interpersonal violence, in particular when the confounding effect of narcissism is statistically controlled for (e.g., Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005; Paulhus, Robins, Trzesniewski, & Tracy, 2004). Overall, the available research suggests that high self-esteem may have positive consequences for the well-being and success of the individual, and that low self-esteem may be a risk factor for negative outcomes.

Relation Between Low Self-Esteem and Depression

Depression is not only an important indicator of low psychological adjustment, but also a universal major health concern (Moussavi et al., 2007). According to the World Health Organization (2008), depressive disorders are among the leading contributors to the global burden of disease. For example, major depression affects a wide range of the population (e.g., a lifetime prevalence of 16.6% was estimated in the study of Kessler, Berglund, et al., 2005) and is highly recurrent (e.g., Kessler et al., 2003; Solomon et al., 2000). It is associated with impaired functioning in the relationship (e.g., Davila, Karney, Hall, & Bradbury 2003; Wade & Pevalin, 2004), work (e.g., Adler et al., 2006; Kessler et al., 2006), and health domain (e.g., Raikkonen,

Matthews, & Kuller, 2007; Wulsin & Singal, 2003), and with elevated rates of suicidal behavior

(e.g., Berman, 2009; Harris & Barraclough, 1997). As yet, the etiology of depression is not fully

understood, but a biopsychosocial model is often assumed to best explain the emergence of

depression (Gotlib & Hammen, 2009).

Although it is generally undisputed that low self-esteem and depression are related,

researchers disagree about the nature of the relation. Importantly, some researchers have argued

that self-esteem and depression are essentially one construct and should be conceptualized as

opposite poles of a single dimension (i.e., depression being the same as low self-esteem; Watson,

Suls, & Haig, 2002). Watson et al. (2002) found strong negative correlations between self-

esteem and depression and, on the basis of these results, cautioned against treating self-esteem

and depression as distinct constructs (see also Judge, Erez, Bono, & Thoresen, 2002).

However, theoretical considerations suggest that it is useful to distinguish between the

two constructs. First, self-esteem plays an important role in several classic theories of depression

that do not conceptualize low self-esteem as a synonym for depression but as a distinct construct

(Abramson et al., 1978; Blatt et al., 1976; G. W. Brown & Harris, 1978); moreover,

contemporary models of depression and reviews of the literature also emphasize the role of low

self-esteem in the etiology of depressive disorders (Evraire & Dozois, 2011; Hammen, 2005;

Joiner, 2000; Morley & Moran, 2011; O'Brien, Bartoletti, & Leitzel, 2006; J. E. Roberts, 2006).

Second, although feelings of worthlessness are a symptom of depressive disorders, they are

neither a sufficient nor a necessary criterion (American Psychiatric Association, 2000). Third,

low self-esteem is not only a symptom of depression, but also an associated feature of a wide

range of other clinical conditions, such as learning disorders, stuttering, social phobia, and

attention-deficit/hyperactivity disorder (American Psychiatric Association, 2000).

Likewise, empirical findings suggest that it is useful to distinguish between self-esteem and depression. First, the correlations reported in previous research range from the -.20s to the -.70s (for a review see Orth et al., 2008). Thus, the correlation between self-esteem and depression varies widely across studies, and, although some studies found strong correlations, the relation is not as strong as would be expected if self-esteem and depression were indicators of a common construct. Second, studies assessing the frequency of individual depressive symptoms have found that feelings of worthlessness are present only in a portion of individuals diagnosed with depression and that feelings of worthlessness do not belong to the most frequent depressive symptoms (Buchwald & Rudick-Davis, 1993; Minor, Champion, & Gotlib, 2005; Spalletta, Troisi, Saracco, Ciani, & Pasini, 1996). In line with the diagnostic criteria for depressive episodes, which do not require that feelings of worthlessness are present (American Psychiatric Association, 2000), these findings suggests that there can be depression without low self-esteem. Third, in two independent samples, Orth et al. (2008) found that a common factor model did not provide a good fit to the data, whereas a two-factor model did (but see Hankin, Lakdawalla, Carter, Abela, & Adams, 2007). Fourth, self-esteem and depression are differentially related to events that happen in people's lives. For example, whereas there is a robust predictive effect of stressful life events on depression (Hammen, 2005; Kessler, 1997), the available evidence suggests that stressful life events do not predict changes in self-esteem (Orth, Robins, & Meier, 2009; Orth, Trzesniewski, & Robins, 2010). Moreover, whereas there is consistent evidence that depression contributes to the occurrence of future stressful life events (i.e., stress generation effect; Cole, Nolen-Hoeksema, Girgus, & Paul, 2006; Hammen, 1991), the results of three independent studies suggest that self-esteem does not predict whether stressful life events will occur (Orth, Robins, & Meier, 2009). Finally, some studies have shown that self-esteem and

depression are cross-sectionally (McPherson & Lakey, 1993) and prospectively (Orth, Robins, Trzesniewski, et al., 2009) related to each other, even after controlling for prior levels of each construct. It is unlikely that two indicators of a common factor would have replicable cross-lagged effects because their shared variance has been systematically removed in the models. Given these conceptual arguments and empirical results, we believe that it is useful to distinguish between self-esteem and depression.

To further illustrate the difference between the constructs, it might be useful to highlight characteristics of a prototypical person with low self-esteem vs. a prototypical person with depressive symptoms. According to Rosenberg and Owens (2001; see also Baumeister, 1993) individuals with low self-esteem can be described as follows. For example, they tend to be sensitive to criticism and to focus their attention on how others see them. Moreover, they tend to avoid people by whom they feel their self-esteem might be threatened and to conceal their inner thoughts and feelings from others. Also, as members of a group, these individuals have the tendency to stay at its fringes and not to contribute much to the group discussion. More generally, individuals with low self-esteem tend to avoid risk and try to protect their self-esteem instead of putting their abilities to the test. Furthermore, they may be marked by an attitude of uncertainty, particularly regarding the self and moral convictions. As a consequence, individuals with low self-esteem may lack spontaneity, be shy, and feel lonely and alienated from others. Current depression tends to be clinically heterogeneous and can present with different patterns of symptoms (Kendler, Gardner, & Prescott, 1999). For example, as described in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000), individuals with current depression might feel empty and sad, or have the feeling of not being able to take it anymore. Moreover, they tend to lose the ability to derive pleasure from things that used to

interest them, and they may feel a lack of drive and energy for work, family, and recreational activities. They tend to have problems concentrating and others may notice that their movement and speech is slowed down. Individuals with depression might also experience alterations in sleep and appetite. Again, individuals with depression can, but do not have to, experience low self-esteem.

Two dominant models on the relation between low self-esteem and depression exist in the literature. Within a diathesis-stress framework, the vulnerability model suggests that negative evaluations of the self (which are conceptually close to low self-esteem; A. T. Beck, Steer, Epstein, & Brown, 1990) constitute a causal risk factor of depression (e.g., A. T. Beck, 1967; Butler, Hokanson, & Flynn, 1994; Metalsky, Joiner, Hardin, & Abramson, 1993; J. E. Roberts & Monroe, 1992; Whisman & Kwon, 1993). 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. Conversely, the scar model states that low self-esteem is a consequence of depression, rather than a causal factor, because episodes of depression may leave permanent scars in the self-concept of the individual (cf. Coyne, Gallo, Klinkman, & Calarco, 1998; Coyne & Whiffen, 1995; Rohde, Lewinsohn, & Seeley, 1990; Zeiss & Lewinsohn, 1988). It is important to note that the vulnerability model and scar model are not mutually exclusive, because both processes (i.e., low self-esteem contributing to depression and depression eroding self-esteem) might operate simultaneously.

The extant research has not yet provided unequivocal evidence in favor of the vulnerability or scar model. Although a growing body of longitudinal studies suggest that low self-esteem prospectively predicts depression (e.g., Kernis et al., 1998; Orth, Robins, & Meier, 2009; Orth et al., 2008; Orth, Robins, Trzesniewski, et al., 2009; J. E. Roberts & Monroe, 1992),

some studies failed to confirm this temporal pattern of results, and, moreover, the results of some

studies have found prospective effects in support of the scar model (Burwell & Shirk, 2006;

Shahar & Davidson, 2003; Shahar & Henrich, 2010). It is possible that these inconsistencies are

not only due to within-study sampling error, but that systematic differences between studies

(e.g., age of participants or measures used) account for variability in the findings. In the present

research, we therefore test for moderating factors of vulnerability and scar effects, or, in other

words, whether the vulnerability and scar effects replicate across sampling and method factors

such as gender, age, sample type, time lag between assessments, and measures of self-esteem and

depression.

Relation Between Low Self-Esteem and Anxiety

An important question is whether the vulnerability model and scar model (if supported by

the meta-analytic results) are specific for depression or whether low self-esteem is related in

similar ways to affective symptoms other than depressive symptoms. To address this question,

we decided to focus on anxiety for several reasons. First, anxiety is an important affective

variable (Endler & Kocovski, 2001), because it is the core symptom in the group of anxiety

disorders (American Psychiatric Association, 2000) that cause a major burden of disease (P. E.

Greenberg et al., 1999). Second, anxiety is associated with depression: self-report measures of

depression and anxiety are strongly correlated in clinical (Mendels, Weinstein, & Cochrane,

1972) and non-clinical samples (Dobson, 1985; Gotlib, 1984; Tanaka-Matsumi & Kameoka,

1986), and depressive and anxiety disorders show a high diagnostic comorbidity (T. A. Brown,

Campbell, Lehman, Grisham, & Mancill, 2001; Kessler, Chiu, Demler, & Walters, 2005). Third,

although depression and anxiety are related, the constructs are conceptually distinct and can be

empirically distinguished (e.g., B. J. Cox, Swinson, Kuch, & Reichman, 1993; Endler, Denisoff,

& Rutherford, 1998; McWilliams, Cox, & Enns, 2001; Watson & Clark, 1992). Fourth, many

previous studies have examined whether risk factors and correlates of depressive disorders are

specific for depression or whether they are also related to anxiety (A. T. Beck, Steer, & Epstein,

1992; R. Beck & Perkins, 2001; R. Beck et al., 2001; Hankin, Abramson, Miller, & Haeffel,

2004; Joiner, 1995; Mor & Winquist, 2002).

The relation between self-esteem and anxiety has only rarely been studied (J. E. Roberts,

2006). Cross-sectional studies have reported negative, medium-sized to strong correlations

between the constructs (Lee & Hankin, 2009; Riketta, 2004; Watson et al., 2002). However, we

are not aware of any longitudinal study that has explicitly focused on the prospective relation

between self-esteem and anxiety.[2] Several theories postulate that self-esteem serves as a buffer

against anxiety (see Crocker & Park, 2004). For example, terror management theory (J.

Greenberg et al., 1986; Pyszczynski et al., 2004) suggests that self-esteem may predict a decrease

in subsequent anxiety because high self-esteem buffers against anxiety elicited by awareness of

human mortality. However, the opposite causal direction is also plausible, that is, experiences of

intense anxiety might leave scars in the self-concept that persistently threaten and reduce self-

esteem.

Theoretical Perspectives on the Relation of Low Self-Esteem

With Depression and Anxiety

There are two established theories that allow for hypotheses about how depression and

anxiety might be differentially related to self-esteem. First, according to the tripartite model (e.g.,

Clark, Watson, & Mineka, 1994), depression should exhibit a stronger relation to self-esteem

than does anxiety. The tripartite model states that depression and anxiety share the feature of

high negative affectivity, that is, a stable disposition to experience nonspecific distress and

unpleasant mood. However, the model also states that each construct includes a unique component, with low positive affectivity being specific to depression and with heightened autonomic arousal being specific to anxiety. Thus, whereas depression is linked to both positive affect and negative affect, anxiety is linked to negative affect only. Given that self-esteem is correlated with both positive and negative affect at about similar effect size (Aspinwall & Taylor, 1992; Joiner, 1995; Watson et al., 2002), the tripartite model suggests that low self-esteem is more relevant for depression than for anxiety.

Second, the cognitive content hypothesis of Beck, Steer, and Epstein (1992), which was derived from Beck's cognitive theory of depression (A. T. Beck, 1967), posits that depression and anxiety can be distinguished by specific cognitive vulnerabilities. The cognitive content hypothesis states that depressive cognitions reflect negative evaluations of the self, the world, and the future, whereas anxious cognitions reflect the anticipation of a physical or psychological threat. Accordingly, low self-esteem should be a stronger diathesis for depression than for anxiety.

The Present Research

The first goal of our study was to evaluate the vulnerability and scar models of low self-esteem and depression by means of meta-analysis. To increase the validity of conclusions, we analyzed effect size measures that were (a) based on longitudinal data 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 the stability of the predicted variable (Finkel, 1995). Figure 1 provides a generic illustration of the effect size measures used, exemplary for the relation of self-esteem with depression. First, we examined the

stability (i.e., autoregressive) coefficients for each construct (e.g., the effect of depression at Time 1 on depression at Time 2). Second, we examined the cross-lagged coefficients between the constructs, which are controlled for autoregressive effects (e.g., the effect of self-esteem at Time 1 on depression at Time 2, controlling for depression at Time 1). Third, for reasons of completeness, we also examined the concurrent correlation between self-esteem and depression, using the data from Time 1. Given the findings from primary studies discussed above, we hypothesized that self-esteem has a significant negative effect on subsequent depression (corresponding to the vulnerability model) and that the effect of depression on subsequent self-esteem is nonsignificant or, if significant, smaller than the self-esteem effect on depression.

In this context, it is important to distinguish between two related approaches, specifically cross-lagged correlation analysis and cross-lagged regression analysis. Cross-lagged correlation analysis has been critiqued because cross-lagged correlations not only reflect the prospective influence of the predictor on the outcome, but also depend on the stability of the outcome (Locascio, 1982; Rogosa, 1980). Thus, cross-lagged correlations are confounded by the stability of the variables and may result in misleading interpretations. It is possible that a large cross-lagged correlation simply reflects high stability of the outcome, when the constructs simultaneously show a strong concurrent correlation at Time 1. In contrast, cross-lagged regression analysis statistically controls for the stability of the variables. In other words, whereas cross-lagged correlations inform about whether the predictor at Time 1 is related to the outcome at Time 2, cross-lagged regressions inform about whether the predictor at Time 1 is related to *change* in the outcome between Time 1 and Time 2 (because the level of the outcome at Time 1 is controlled for; see Finkel, 1995). Therefore, in this research we used the cross-lagged

regression approach which avoids the possible confounding effect of the stability of the variables.

The second goal of our study was to examine whether anxiety is related to low self-esteem much as depression is, or whether the vulnerability model and scar model (if supported by the results) are specific for depression. We therefore meta-analyzed the available longitudinal data on self-esteem and anxiety, examining the same effect size measures as for self-esteem and depression. On the basis of the theoretical perspectives discussed above, we expected weaker concurrent and cross-lagged relations of self-esteem with anxiety than with depression. However, we had no hypotheses on the relative strength of the cross-lagged effects between self-esteem and anxiety (i.e., whether the self-esteem effect on anxiety would be stronger than the anxiety effect on self-esteem).

The third goal of our study was to test for moderators of the effect sizes. Because the number of studies was low for the relation between self-esteem and anxiety, we focused exclusively on the relation of self-esteem with depression (see the Results section for further information). Although previous studies tested whether the prospective relation between self-esteem and depression holds across gender (Orth et al., 2008; Orth, Robins, Trzesniewski, et al., 2009) and across different age groups from adolescence to old age (Orth et al., 2008; Orth, Robins, Trzesniewski, et al., 2009; Shahar & Henrich, 2010), the meta-analytic approach provides for a more powerful and valid test of the moderating effects of gender and age. We also tested whether the results hold across different types of samples, most importantly representative and clinical samples. Another important moderator might be the temporal design of the primary studies. Methodologists have advised that it is necessary to study different time lags between assessments to gain a "complete understanding of a variable's effect" (Gollob & Reichardt,

1987, p. 82). More specifically, Collins and Graham (2002) highlight the importance of studying the influence of time lags on the effect size when longitudinal studies are meta-analyzed. We therefore tested for the moderating impact of time lag, e.g., whether a minimum time lag is required to observe any prospective effect between self-esteem and depression or whether effect sizes become smaller when assessed across long time intervals. Finally, we tested whether the effects replicate across different measures of self-esteem and depression or whether the effects are methodological artifacts of specific measures of the constructs. To summarize, we tested whether gender, age, sample type, time lag between assessments, and measures of self-esteem and depression moderate the strength of the prospective effect of self-esteem on depression.

The effect size coefficients examined in the present research were based on continuous measures of self-esteem, depression, and anxiety. The measures typically employed in this field include multiple indicators and have good psychometric properties, legitimating the statistical approach used in this meta-analysis. With regard to self-esteem, the most frequently used measures and their psychometric properties have already been discussed above. With regard to depression, frequently used measures are the Beck Depression Inventory (BDI; A. T. Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and the Center of Epidemiologic Studies Depression Scale (CES-D; Gotlib, Lewinsohn, & Seeley, 1995; Radloff, 1977), both of which can be used in nonclinical, subclinical, and clinical populations. The BDI is a self-report instrument comprising 21 items; research suggests that the BDI is a valid and reliable measure of depressive symptoms (A. T. Beck, Steer, & Carbin, 1988; Nezu, Nezu, Friedman, & Lee, 2009; Osman, Kopper, Barrios, Gutierrez, & Bagge, 2004). Similarly, the CES-D—a 20-item self-report measure—is a well-validated and reliable measure of depressive symptoms (Eaton, Smith, Ybarra, Muntaner, & Tien, 2004; Shaver & Brennan, 1991). With regard to anxiety, two frequently used measures are

the Beck Anxiety Inventory (BAI; A. T. Beck, Epstein, Brown, & Steer, 1988) and the State-

Trait Anxiety Inventory (STAI; Spielberger & Sydeman, 1994). Both measures are multi-item

self-report scales; the available research supports the reliability and validity of the BAI (Fydrich,

Dowdall, & Chambless, 1992; Osman, Kopper, Barrios, Osman, & Wade, 1997) and STAI

(Barnes, Harp, & Jung, 2002; Spielberger & Sydeman, 1994).

This meta-analysis extends the primary studies on self-esteem and depression in several

ways. First, prospective relations were estimated with greater power and based on a wide variety

of study characteristics. Methodological concerns unique to each primary study were thus

reduced, and more valid indications for the direction of the relation between self-esteem and

depression were procured. Second, we tested whether the vulnerability and scar model are

specific for the relation of self-esteem with depression, or whether similar relations exist with

anxiety. As yet, no previous study has tested whether low self-esteem prospectively predicts

anxiety or, vice versa, whether anxiety prospectively predicts low self-esteem. Third, the meta-

analytic approach enabled us to test for moderators that are difficult to examine in primary

studies, such as sample type and time lag between assessments. For example, in this study we

tested whether the prospective effects between self-esteem and depression systematically differ

when assessed across a few days, weeks, months, or several years.

Method

Selection of Studies

To search for relevant studies we used three strategies. First, English-language journal

articles, books, book chapters, and dissertations were searched in the databases PsycINFO and

MEDLINE for all years covered through July 2011.[3] We used the following search terms:

depress*, dysphori*, dysthym*, anxi*, fear, phobi*, self-esteem, self-worth, self-liking, self-

respect, longitudinal, prospective, and *antecedent*. The asterisk (i.e., the truncation symbol)

allowed for the inclusion of alternate word endings of the search term (e.g., *depress** yielded

articles containing depression, depressive, etc.). Second, we examined the information provided

by relevant review articles (A. T. Beck, 1987; Dance & Kuiper, 1987; J. Greenberg et al., 1992;

O'Brien et al., 2006; Pyszczynski et al., 2004; J. E. Roberts, 2006). Third, we examined the

reference sections of all articles included in the meta-analysis. The search resulted in 251

potentially relevant journal articles and 44 dissertations. There were no relevant books or book

chapters.

　　　We decided to include dissertations in our meta-analysis because dissertations are a

category of unpublished studies that has important advantages for examining publication bias

(Ferguson & Brannick, 2011; McLeod & Weisz, 2004). Dissertations are indexed in databases

and, consequently, allow for an exhaustive search and avoidance of selection bias in sampling

the relevant studies. In contrast, it is not possible to exhaustively search for other types of

unpublished studies such as presentations at conferences and unpublished manuscripts. The

empirical findings by Ferguson and Brannick (2011) suggest that the unpublished literature

included in meta-analyses is frequently plagued by selection bias because several mechanisms

prevent meta-analysts from obtaining a random sample of, e.g., unpublished manuscripts. It is

important to note that dissertations, although indexed in databases, are generally not subject to

publication bias because dissertations are frequently accepted by dissertation committees even if

the research reported in the dissertation did not yield significant effects. Moreover, Ferguson and

Brannick (2011) found that effect sizes that are based on non-indexed unpublished studies are,

on average, closer to effect sizes based on published studies than effect sizes based on

dissertations. Ferguson and Brannick (2011) therefore conclude that dissertations are better suited for examining publication bias than other types of unpublished studies.

All studies were then assessed in full text by the first author of this meta-analysis. In addition, a random sample of 79 studies was rated by the second author to obtain estimates of interrater agreement. The interrater agreement on inclusion or exclusion in the meta-analysis was high ($\kappa = .97$) and all diverging assessments were discussed until consensus was reached.[4]

Studies were included in the meta-analysis if the following criteria were fulfilled: (a) self-esteem was assessed using an explicit measure of global self-esteem; (b) depression and/or anxiety was assessed using continuous measures of the constructs; (c) the study used a longitudinal study design; (d) at least one of the constructs (i.e., self-esteem or depression/anxiety) was assessed on at least two measurement occasions; and (e) enough information was given to compute effect sizes. We included samples of all age groups in the meta-analysis, covering the full life span from childhood to old age. If a sample was analyzed by more than one study, only one study was included in the meta-analysis to ensure independence of effect sizes. In these cases, we included the study that provided the most comprehensive coding information and excluded the other studies. Finally, studies were excluded if inconsistent information for the computation of effect sizes was given.

This procedure left 53 journal articles and 7 dissertations for analysis. The articles of Colarossi and Eccles (2003), Chen (1995), Cox et al. (2006), , Le et al., (2007), Schroevers, Ranchor, and Sanderman (2003), Orth et al. (2008), , Ostrowsky, Rueger (2011), and Steinberg, Karpinski, and Alloy (2007) provided two relevant samples each; the article of Orth, Robins, Trzesniewski, Maes, and Schmitt (2009) provided 12 relevant samples; thus our dataset comprised 80 samples. Of these, 77 samples provided information on the prospective relations

between self-esteem and depression and 18 samples provided information on the prospective

relations between self-esteem and anxiety.

Coding of Studies

We coded the following data: sample size, country of origin, mean age of participants,

proportion of female participants, sample type (i.e., representative, clinical, college students, or

convenience sample other than college students), time lag between assessments, measure used to

assess self-esteem, measure used to assess depression and anxiety, and effect sizes.

A few studies did not report the exact mean age or the exact time lag between

assessments. Yet, when valid indicators were given in the studies, we used this information to

estimate the variables. For example, if a study that examined a sample of undergraduate students

did not report the mean age, we estimated it to be 20 years (as done by, e.g., Starr & Davila,

2008). To take another example, if a study reported that the first assessment was conducted in the

third trimester of pregnancy, we estimated Time 1 as two months before delivery. In the meta-

analytic data set, only few data were missing on moderator variables (i.e., 2.6%). We therefore

used the complete case analysis method (i.e., listwise deletion) to deal with missing data in the

moderator analyses (Pigott, 2009).[5]

In some cases, effect sizes were directly reported in the article (i.e., the standardized

regression coefficients as shown in Figure 1). However, in most cases we computed effect sizes

using the zero-order correlations between the variables (e.g., correlations between self-esteem

assessed at Time 1, self-esteem assessed at Time 2, depression assessed at Time 1, and

depression assessed at Time 2). For the computation, we used the following equation (Cohen,

Cohen, West, & Aiken, 2003, p.68), which is applicable when a criterion variable (Y) is

influenced by two predictors (X_1, X_2):

$$\beta_{Y1.2} = \frac{r_{Y1} - r_{Y2}r_{12}}{1 - r^2_{12}}. \tag{1}$$

Here, $\beta_{Y1.2}$ is the standardized regression coefficient of X_1 predicting Y, controlling for the effect

of X_2 (e.g., the effect of self-esteem at Time 1 on depression at Time 2, controlling for depression

at Time 1); r_{Y1} and r_{Y2} are the zero-order correlations between each predictor (X_1, X_2; e.g., self-

esteem at Time 1, depression at Time 1) and the criterion (Y; e.g., depression at Time 2); and r_{12}

is the correlation between the two predictors (X_1 and X_2; e.g., the cross-sectional correlation of

self-esteem at Time 1 and depression at Time 1). For studies that provided more than one effect

size for one of the coefficients examined (e.g., because more than one measure of self-esteem

was used), we averaged the correlations and standardized regression coefficients, respectively,

using Fisher's Z_r transformations.

All articles were coded by the first author of this meta-analysis. In addition, a random

sample of 33 studies was coded by the second author to obtain estimates of interrater agreement.

The interrater agreement was high ($\kappa \geq .95$ for categorical variables and $r \geq .99$ for continuous

variables). All diverging assessments were discussed until consensus was reached.

Meta-Analytic Procedure

All computations with effect sizes were made using Fisher's Z_r transformations and using

study weights with $\omega = n - 3$ (see Lipsey & Wilson, 2001). For the computations we used SPSS

and the SPSS macros written by Daniel B. Wilson (see Lipsey & Wilson, 2001, Appendix D).

We conducted the following preliminary analyses. First, we searched for statistical

outliers on effect size variables. Second, we determined whether there was evidence of

publication bias, that is, whether studies with nonsignificant results had a lower probability of

being published. We hypothesized that publication bias would not be an issue in this research

because the majority of studies included in the meta-analysis did not focus specifically on the relations of low self-esteem with depression and anxiety, but reported their intercorrelations together with intercorrelations among a larger set of constructs. Nevertheless, we tested for publication bias, using two methods. First, if publication bias exists, studies resulting in low effect sizes should have a low probability of being published if the sample size is small (because of a low probability of significant findings). In contrast, studies resulting in large effect sizes have a high probability of being published even if the sample size is small (because of a high probability of significant findings). The relationship of sample size and effect size can be examined visually using a funnel graph (cf. Sutton, 2009). If the funnel graph does not show a symmetrical shape and if studies with small sample size show a bias toward larger effect sizes, there is evidence for publication bias. Second, we tested whether effect sizes based on dissertations differed significantly from effect sizes based on published studies.

In the effect size analyses, we used a random effects model, following the recommendations by Field and Gillett (2010) and Raudenbush (2009). We first computed weighted mean effect sizes and tested for homogeneity of effect size distributions. Then, we examined moderators of the effect sizes using multiple regression analysis and analysis of variance. In multiple regression analysis, only continuous or dichotomous predictors can be used; therefore, we dichotomized the categorical variable sample type into a variable contrasting representative vs. non-representative samples. We decided to focus on this contrast because representative samples provide more valid results compared with non-representative samples. Finally, using analysis of variance, we investigated the influence of the variable sample type in more detail using all the original categories, and also examined the moderating effects of the self-esteem and depression measures used.

Results

Description of Studies

The 80 studies included in the meta-analysis were published between 1984 and 2010, with the median in 2004. Sample sizes varied between 44 and 6,813 ($M = 447.5$, $SD = 1,050.2$ $Mdn = 214.5$). The average proportion of female participants was 64% (range = 0% to 100%). The average mean age of the participants at the time of the first assessment was 27.7 years ($SD = 17.4$, range = 8.2 to 79.3). The time lag between assessments varied between 1 week and 13 years ($M = 1.23$ years, $SD = 1.81$, $Mdn = 0.75$). Forty-nine studies used convenience samples other than college students, 19 used college student samples, 9 used representative samples, and 3 used clinical samples. Sixty-two studies were conducted in the United States, 6 in Germany, 3 in the United Kingdom, 2 in Canada, 2 in Israel and 1 each in Australia, China, Korea, in the Netherlands and Sweden. Tables 1 and 2 show the basic sample characteristics and effect sizes for each study, separated for depression and anxiety.

A wide variety of measures were used in the studies. Self-esteem ($k = 80$) was assessed by the Rosenberg Self-Esteem Scale (Rosenberg, 1965) in 61 studies, by the global self-worth subscale of the Self-Perception Profile for Children (Harter, 1985) or the Self-Perception Profile for Adolescents (Harter, 1988) in 11 studies, and by a range of other measures in 8 studies. Depression ($k = 77$) was assessed by the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) or its child version (Weissman, Orvaschel, & Padian, 1980) in 30 studies, by the Beck Depression Inventory (BDI; A. T. Beck et al., 1961) in 20 studies, by the Children's Depression Inventory (CDI; Kovacs, 1985) in 8 studies, and by other measures in 19 studies. Anxiety ($k = 18$) was assessed by the Beck Anxiety Inventory (BAI; A. T. Beck, Epstein, et al., 1988) in 5 studies, by the State-Trait Anxiety Inventory or its child version (Spielberger &

Sydeman, 1994) in 3 studies, by the anxiety subscale of the Mood and Anxiety Symptom

Questionnaire (Watson et al., 1995) in 2 studies, by the anxiety subscale of the Hospital Anxiety

and Depression Scale (Zigmond & Snaith, 1983) in 2 studies, and by other measures in 6 studies.

Preliminary Analyses

First, the data revealed that there were no statistical outliers on effect size variables. We

therefore used the complete data set for the subsequent analyses.

Second, the data showed evidence against any publication bias. For each effect size, the

funnel graphs indicated that studies with small sample size were not biased toward larger effect

sizes (Figures 2 and 3). The distributions of effect sizes exhibited a symmetrical shape typical of

nonbiased meta-analytic data sets. Moreover, we tested whether effect sizes based on

dissertations differed significantly from effect sizes based on published studies. These tests were

possible only for effect sizes related to depression, but not anxiety, because only one dissertation

related to anxiety was included in the data set. The tests showed that there were no significant

differences between dissertations and published studies (all ps > .05).

Effect Size Analyses

We computed weighted mean effect sizes for the relation between self-esteem and

depression and for the relation between self-esteem and anxiety. More specifically, we examined

the cross-sectional correlation between the constructs (for Time 1 as an example), the stability

coefficients of the constructs, and the cross-lagged effects between the constructs (cf. Figure 1).

Tables 3 and 4 show the results for depression and anxiety, respectively. As reported in the last

column of the tables, homogeneity statistics were significant for most effect sizes, except for the

cross-lagged effects between self-esteem and anxiety. A significant homogeneity figure indicates

that the variance of the corresponding effect size must be attributed not only to within-study sampling error but also to between-study sampling error.

The results for depression supported the vulnerability model of low self-esteem (Table 3). The mean cross-lagged effect of self-esteem on depression was -.16 ($p < .05$) and was larger than the mean cross-lagged effect of depression on self-esteem, which was -.08 ($p < .05$). No formal significance test for the difference between cross-lagged effects is available; however, the confidence intervals, which showed no overlap, clearly suggest that the two cross-lagged effects differ from each other.[6] Moreover, the mean stability coefficient of self-esteem was larger than the mean stability coefficient of depression. Because the cross-lagged effect of self-esteem on depression was based on a much larger number of studies ($k = 77$) than the cross-lagged effect of depression on self-esteem ($k = 42$), we repeated the computation of the self-esteem effect on depression using the same set of studies that was used for the computation of the depression effect on self-esteem. However, the self-esteem effect on depression was virtually unaltered (with a weighted mean effect size at -.16). Similarly, the stability of depression was virtually unaltered when computed using the smaller set of studies (with a weighted mean effect size at -.51).

The results for anxiety suggested a symmetric reciprocal relation between self-esteem and anxiety (Table 4). The cross-lagged effects between the constructs were significant and of similar size (-.10 and -.08; both ps $< .05$). As stated above, no formal significance test is available for the difference between the coefficients; however, the confidence intervals overlapped widely, which suggests that the coefficients do not significantly differ. Again, we tested whether the results for the self-esteem effect on anxiety differed when computed using the smaller set of studies ($k = 10$) used to compute the anxiety effect on self-esteem. However, the self-esteem effect on anxiety

was virtually unaltered (with a weighted mean effect size at -.10). Similarly, the stability of

anxiety was virtually unaltered when computed using the smaller set of studies (with a weighted

mean effect size at -.47).

Moderator Analyses

The preceding analyses revealed heterogeneity of the distributions of most effect sizes;

therefore, we investigated whether moderator variables explain variation of effect sizes. In the

moderator analyses, we focused on the effect of self-esteem on depression for several reasons.

First, the effect emerged as the strongest cross-lagged effect in the effect size analyses and is of

central importance for the vulnerability model. Second, the number of studies on which the other

cross-lagged effects were based was relatively low (i.e., 42, 18, and 10 studies), which limited

the statistical power of moderator analysis.

We first examined the simple correlations between the effect size and the moderator

variables (Table 5). The results showed that proportion of female participants, mean age of

participants, and sample type did not significantly correlate with the effect size. Only time lag

showed a significant zero-order correlation with the effect size ($r = -.25$, $p = .03$). To control for

multicollinearity of the predictors, we computed a multiple regression analysis with these

variables as predictors of the effect size (Table 5). The variance explained was relatively small

and only one predictor (i.e., sample type) yielded a significant regression weight, indicating that

the self-esteem effect on depression was smaller in representative than in non-representative

samples.[7] In a second multiple regression analysis, we also tested whether time lag showed a

significant quadratic relation to effect size by additionally including the square of the variable

(the variable time lag was centered for the analysis). However, neither the linear nor the

quadratic term was significant. Figure 4 further illustrates the relation between time lag and

effect size, showing that no linear or curvilinear relation is discernible in the data. Thus, given that in the multiple regression analysis only one significant predictor of the effect size was identified, the important conclusion in this context is that the vulnerability effect of low self-esteem on depression replicated across samples with different gender and age compositions and across different time lags between assessments.

Because sample type was used only as a dichotomous variable in the preceding analysis, we computed an analysis of variance to investigate the importance of sample type in more detail (Table 6). Although the effect size differed for representative and non-representative samples in the analysis reported above, the results of the analysis of variance indicated that the self-esteem effect on depression was present in all sample types (ranging from -.12 to -.19; all ps < .05).

Finally, we examined whether the effect size differed across measures of self-esteem and depression, using analyses of variance. Table 7 shows that the effect size was very similar across self-esteem measures (ranging from -.15 to -.18) and that there was no significant heterogeneity between measures ($Q_{between} = 0.39$, $p = .821$). Likewise, Table 8 shows that the effect size was relatively similar across depression measures (ranging from -.14 to -.20), and again that the heterogeneity between measures was nonsignificant ($Q_{between} = 2.30$, $p = .531$).

Together, the findings of the moderator analyses suggest that low self-esteem serves as a general, stable risk factor for depression: the effect holds for samples with different gender and age compositions, for different time lags, for different measures of self-esteem and depression, and for representative, clinical, and convenience samples.

Discussion

We investigated the prospective reciprocal relations of self-esteem with depression and anxiety, by meta-analyzing 77 longitudinal studies providing information on the relation between

self-esteem and depression and 18 longitudinal studies providing information on the relation

between self-esteem and anxiety. The studies included differed substantially with respect to

sample characteristics such as sample size, country of origin, sample type, mean age of

participants, and proportion of female participants. Moreover, the studies differed significantly

with respect to methodological characteristics, such as the time lag between assessments, and

used a wide variety of measures to assess self-esteem, depression, and anxiety. The heterogeneity

of the studies strengthens the generalizability of the findings: First, the analyses yielded

consistent support for the vulnerability model of low self-esteem and depression (i.e., low self-

esteem contributes to depression) and only weak support for the scar model (i.e., depression

erodes self-esteem). Second, the findings indicate that the relation between low self-esteem and

anxiety is more symmetric, with small, but significant, prospective effects in both directions.

Third, moderator analyses of the vulnerability effect of low self-esteem on depression suggested

that this effect is not significantly influenced by gender and age composition of the sample,

measures of self-esteem and depression, or the time lag between assessments. Moreover,

although the vulnerability effect differed significantly between representative, clinical, and

convenience samples, the effect was present in all types of samples examined in this research.

Implications of the Findings

The present results suggest that the prospective relation between low self-esteem and

depression is best described by the vulnerability model, whereas the prospective relation between

low self-esteem and anxiety is best described as a symmetric reciprocal relation. Consequently, it

would be interesting to gain further insight into (a) the mechanisms that account for the

vulnerability effect of low self-esteem on depression, (b) the mechanisms that account for the

small but significant scar effect of depression on self-esteem, and (c) the mechanisms that

account for the affective specificity of the results. Knowledge about mediating processes is of crucial importance because it provides for possible starting points for interventions, for instance interventions aimed at preventing or reducing depression.

The vulnerability effect of low self-esteem on depression might operate through both interpersonal and intrapersonal psychological pathways. One interpersonal pathway is that some individuals with low self-esteem might excessively seek reassurance from friends and relationship partners, which might lead to social disruptions which in turn foster depressive symptoms (Joiner, Alfano, & Metalsky, 1992; Potthoff, Holahan, & Joiner, 1995). A second interpersonal pathway is that individuals with low self-esteem seek negative feedback from their relationship partners to verify their negative self-concept. Negative feedback seeking might lead to rejection by close others and might undermine social support, which in turn increases the risk of depression (Giesler, Josephs, & Swann, 1996; Joiner, Katz, & Lew, 1997; Swann, Wenzlaff, & Tafarodi, 1992). An intrapersonal pathway explaining how low self-esteem contributes to depression might operate through self-focused attention (Mor & Winquist, 2002). Individuals with low self-esteem are prone to ruminating about negative aspects of the self, which in turn increases depression (e.g., Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). Overall, reassurance seeking, negative feedback seeking, and rumination are theoretically linked to low self-esteem and depression and there is some evidence that self-esteem contributes to these processes (Evraire & Dozois, 2011; Joiner, Katz, & Lew, 1999; Kuster, Orth, & Meier, 2012), making it less likely that reassurance seeking, negative feedback seeking, and rumination are third variables that cause the relation between low self-esteem and depression. However, the hypothesized mediational pathways should be tested directly. As yet, only one study has identified a mediator of the vulnerability effect of low self-esteem on depression. Using

longitudinal mediation analysis (Cole & Maxwell, 2003), Kuster et al. (2012) found that rumination partially mediated the prospective effect of low self-esteem on depression across several waves of data. Future research should continue to test for possible mediators of the vulnerability effect, such as reassurance seeking or negative feedback seeking.

Similarly, the small but significant scar effect of depression on self-esteem might unfold through interpersonal and intrapersonal psychological pathways. One interpersonal pathway is that depressive episodes may cause damage to important sources of self-esteem such as close relationships or social networks. A second interpersonal pathway is that depression might change how the individual is perceived by others; these representations may be relatively persistent and may cause the individual to be treated by others with low regard or in ways that minimize the individual's self-esteem, even if the depression has already remitted (Joiner, 2000). A possible intrapersonal pathway is that the experience of depression might influence self-esteem by persistently altering the way in which individuals process self-relevant information; for example, the chronic negative mood associated with depression may lead the individual to selectively attend to, encode, and retrieve negative information about the self, resulting in the formation of more negative self-evaluations.

In addition to the psychological pathways through which the vulnerability effect (and the small scar effect) might operate, biological factors might also play a role. As yet, there is little knowledge about the possible biological mechanisms underlying self-esteem and underlying its association with psychological adjustment (cf. Pruessner et al., 2005; Putnam & McSweeney, 2008). Generally, self-esteem shows a genetic component, with heritability estimates ranging widely, from 29% to 73% (cf. Saphire-Bernstein, Way, Kim, Sherman, & Taylor, 2011). More specifically, biological variables that have been associated with low self-esteem and depression

include reduced hippocampal volume (Pruessner et al., 2005), higher cortisol stress response (Pruessner, Hellhammer, & Kirschbaum, 1999), specific patterns of prefrontal electroencephalography alpha activity (De Raedt, Franck, Fannes, & Verstraeten, 2008; Putnam & McSweeney, 2008), variations in the oxytocin receptor gene (Saphire-Bernstein et al., 2011), and reduced cardiac vagal tone (Martens, Greenberg, & Allen, 2008). Future research should examine whether these factors contribute (e.g., as third variables, moderators, or mediators) to the explanation of the effect of low self-esteem on depression (for an example see Scarpa & Luscher, 2002).

We can only speculate as to why depression and anxiety are differentially linked to low self-esteem. Divergent mediating mechanisms might provide an explanation. For example, self-focused attention is differentially related to depression and anxiety. First, self-focused attention is more strongly related to depression than to anxiety (Mor & Winquist, 2002) and, if self-focused attention is a mediator of the vulnerability effect, it might account for the stronger effect of low self-esteem on depression than on anxiety. Second, depression is more strongly related to a focus on private aspects of the self, whereas anxiety is more strongly related to public aspects of the self (Mor & Winquist, 2002). If the vulnerability effect of low self-esteem is mediated more strongly by private self-focus than by public self-focus, this might provide a further explanation for the diverging effects on depression and anxiety. Third, given that the evidence suggests that self-focused attention has a reciprocal relation with depression and anxiety (Mor & Winquist, 2002), self-focused attention might also account for the small, but significant, reverse effects (i.e., the scar effects of depression and anxiety on self-esteem).

Another mechanism that might account for the divergent relations of self-esteem with depression and anxiety is that excessive reassurance seeking might lead to increases in

depressive, but not in anxious symptoms (Joiner & Schmidt, 1998). Consequently, if excessive

reassurance seeking is a mediator of the vulnerability effect, it might at least partially explain

why low self-esteem has stronger predictive effects on depression than on anxiety. Future

research should therefore explore the mediating mechanisms of the relation between self-esteem

and depression and anxiety from a perspective of specificity: Which common pathways mediate

the vulnerability effect of low self-esteem on both depression and anxiety? And which additional

unique pathways explain that low self-esteem has a stronger effect on depression than on

anxiety?

        The results suggest that the strength of the vulnerability effect of low self-esteem on

depression is not moderated by gender and age. Thus, although the mean levels of self-esteem

and depression vary as a function of gender (Hyde, Mezulis, & Abramson, 2008; Kling, Hyde,

Showers, & Buswell, 1999) and age (Kessler, Foster, Webster, & House, 1992; Lewinsohn,

Rohde, Seeley, & Fischer, 1991; Orth et al., 2011; Orth et al., 2010; Robins et al., 2002), the

structural relations between self-esteem and depression are unaffected by gender and age. The

present meta-analytic findings, which are based on study-level data, are consistent with the

findings from primary studies which suggested that the vulnerability effect of low self-esteem

holds across gender (Orth et al., 2008; Orth, Robins, Trzesniewski, et al., 2009) and replicates

across age groups from young adulthood to old age (Orth, Robins, Trzesniewski, et al., 2009; but

see the findings on adolescent age groups by Shahar & Henrich, 2010). From a theoretical

perspective, the evidence that the effect of low self-esteem on subsequent depression operates

independently from gender and age is in line with the vulnerability model, which states that low

self-esteem is a global risk factor for depression. In particular, we note that the vulnerability

effect was present not only in samples of adolescents and adults (which represent the majority of

the samples examined in this research), but also in samples of children.[8] Major depression in

childhood is a concern (although the prevalence in childhood is lower than in adolescence;

Costello, Erkanli, & Angold, 2006; Kessler, Avenevoli, & Merikangas, 2001), but as yet, few

studies have explicitly focused on the longitudinal relations between low self-esteem and

depression in children (Abela & Payne, 2003; Abela & Taylor, 2010; Borelli & Prinstein, 2006;

Conley, Haines, Hilt, & Metalsky, 2001; McCarty, Vander Stoep, & McCauley, 2007; Robinson,

Garber, & Hilsman, 1995). The finding that the vulnerability model holds for children is

important because children's self-esteem is subject to relatively strong developmental changes

(Robins et al., 2002; Trzesniewski, Donnellan, & Robins, 2003). Moreover, typical depressive

symptoms of children may differ from typical symptoms among adolescents and adults

(specifically, childhood depression can be characterized more strongly by irritable than

depressed mood; American Psychiatric Association, 2000). The finding that low self-esteem

shows a similar relation to depression in children as in adults is in line with findings on other

vulnerability factors for depression (Abela & Hankin, 2008).

The moderator analyses also indicated that the vulnerability effect of low self-esteem

holds in different sample types. One important finding is that the effect replicates in

representative samples (our data set included nine representative samples with altogether more

than 18,000 individuals), which significantly strengthens the generalizability of the findings.

Another important finding is that the effect also replicates in clinical samples, supporting the

hypothesis that low self-esteem is a risk factor not only for moderate but also for clinically

relevant levels of depression and, possibly, for depressive disorders. Although this conclusion

must be treated with caution because of the small number of data points (i.e., three clinical

samples including about 650 individuals), additional aspects support the conclusion. First,

longitudinal studies have demonstrated a relation between low self-esteem and clinically diagnosed depression (Ormel, Oldehinkel, & Vollebergh, 2004; Trzesniewski et al., 2006). Second, in the general population the prevalence of clinical depression is high (Kessler, Berglund, et al., 2005), which consequently should be reflected in the representative samples included in this meta-analysis. Third, as mentioned in Footnote 1, the available evidence suggests that depression is best conceptualized as a continuous rather than a categorical construct: representative samples, which cover the full range of depression levels from absence of any depressive symptom to severe levels of depression, should therefore provide for valid insights into the structural relations between self-esteem and depression.

We also tested for the moderating influence of the time lag between assessments, in response to a previous call for studying its influence on cross-lagged effects in a meta-analytic framework (Collins & Graham, 2002). We found that the vulnerability effect of low self-esteem on depression did not significantly vary as a function of the time interval between assessments, which is somewhat unexpected in view of the findings of Cole and Maxwell (2003). Cole and Maxwell's (2003) analysis suggests that the effect size should be zero when the time interval is zero (because any causal effect needs a minimum amount of time to unfold); that the effect size should increase when the time interval becomes larger, reaching a maximum at a specific time interval; and that subsequently the effect size should decrease again and approach zero (because after long time intervals the causal effect will have disappeared). Although our meta-analysis covered a large range of time lags (from several days to several years), no linear or curvilinear trend was detectable controlling for other study characteristics. One reason might be that the number of studies was too small for this type of moderator analysis, restricting the statistical power. Nevertheless, our analysis indicates that the vulnerability effect is stable and detectable

across a wide range of time intervals. This finding has two implications. First, it indicates that

self-esteem has predictive power over a long period of time. Consequently, an important avenue

for future research is to further investigate which mediating mechanisms account for the large

temporal stability of this effect. Second, the finding indicates that the vulnerability effect of low

self-esteem is already detectable after short time intervals. Consequently, future research should

examine which mediating mechanisms account for the self-esteem effect across a few weeks or

even a few days (and whether the mediating processes across short vs. long time intervals are

identical). For example, low self-esteem might elicit rumination on one day, which in turn

exacerbates depressive symptoms over the following days (Nolen-Hoeksema, 2000). Thus, in

future research it would be intriguing to study these phenomena in a higher temporal resolution,

for example using diary data.

An important task of future research is to further examine moderators of the vulnerability

effect of low self-esteem and to explain why some people with low self-esteem develop

depression while others do not. For example, previous research suggests that the vulnerability

effect might be stronger if a person's self-esteem is not only low but also unstable (Kernis,

Grannemann, & Mathis, 1997). Another example is research by Michalak, Teismann,

Heidenreich, Strohle, and Vocks (2011), suggesting that mindful acceptance buffers the

detrimental effect of low self-esteem on depression. Moreover, situational factors could moderate

the vulnerability effect. One hypothesis is that low self-esteem might have stronger effects on

depression when the individual simultaneously suffers from stressful life circumstances (e.g., J.

E. Roberts, 2006). However, in three independent studies, Orth, Robins, and Meier (2009) did

not find evidence that the occurrence of stressful life events or daily hassles influenced the

prospective effect of low self-esteem on depression. Nevertheless, it is possible that other

characteristics of the situation moderate the strength of the vulnerability effect. For example, social support by relationship partners, family, and friends might protect individuals with low self-esteem from spiraling downward into depression.

The results on the stability coefficients provide an additional argument in favor of the distinction between the concepts of self-esteem and depression. More precisely, the present results suggest that self-esteem is a more stable, trait-like construct than depression, corresponding to findings reported in the literature (Lovibond, 1998; Trzesniewski et al., 2003).[9] Given that the average time lag between assessments was more than one year, the stability coefficients for self-esteem are not much smaller than the stability coefficients of broad personality constructs such as the Big Five personality factors (Ferguson, 2010; B. W. Roberts & DelVecchio, 2000). This result is in line with the findings by Trzesniewski, Donnellan, and Robins (2003), who reported that the stability of self-esteem is moderately high across the lifespan (disattenuated correlations averaging in the .50s to .70s). Moreover, the present results are consistent with the notion that, typically, the more dispositional factor (i.e., self-esteem) influences the more fluctuating, state-like factor (i.e., depression) rather than vice versa. If low self-esteem and depression were two interchangeable indicators of the same construct, then they should have comparable stabilities because their individual stabilities should each reflect the stability of the common factor. However, we note that the stability coefficient for depression was still relatively large, indicating a moderate degree of stability.

Limitations

An important limitation of this research is that it does not allow for strong conclusions regarding the causality of the relations between self-esteem, depression, and anxiety, because all of the studies included in the meta-analysis used correlational designs. Therefore, the effects

under investigation were not experimentally induced but may be caused by third variables that were not controlled for (Finkel, 1995; Little, Preacher, Selig, & Card, 2007). For example, neuroticism is related to low self-esteem (Judge et al., 2002; Robins et al., 2001) and depression (Kendler, Neale, Kessler, Heath, & Eaves, 1993; Ormel, Oldehinkel, & Brilman, 2001) and therefore might be a third variable influencing both constructs. Another example might be common genetic factors of low self-esteem and depression (Neiss, Stevenson, Legrand, Iacono, & Sedikides, 2009; S. B. Roberts & Kendler, 1999). Future research should test relevant third-variable models that might account for the relations between low self-esteem and depression, and low self-esteem and anxiety. Nevertheless, when experimental designs are not feasible for ethical or practical reasons, longitudinal analyses are useful because they can indicate whether the data are consistent with a causal model of the relation between the variables, by establishing the direction of the effects and ruling out some (but not all) alternative causal hypotheses.

Another limitation is that nearly all studies included in the meta-analysis employed self-report measures of the constructs. Although the vast majority of the measures used are reliable and well-validated, a problem of the exclusive reliance on self-report methodology is that correlations between measures may be artificially inflated by shared method variance. Note, however, that shared method variance cannot account for the prospective cross-lagged effects because shared method variance has already been statistically removed by controlling for prior levels of the predicted construct. Nevertheless, future research would benefit from including measures based on informant-reports (e.g., ratings by relationship partners) and diagnostic interviews to further control for possible self-report biases.

Furthermore, the studies included in the meta-analysis were predominantly conducted in Western cultural contexts (i.e., only two studies were conducted in Asia). Therefore, future

research should test whether the results hold in other cultural contexts, such as in Asian or African cultures (Arnett, 2008; Henrich, Heine, & Norenzayan, 2010). The function of self-esteem and the frequency or intensity of depressive and anxious symptoms may vary cross-culturally. For example, individuals from Asian and Western cultures show different self-construal styles and different tendencies towards self-enhancement (Heine et al., 1999; Markus & Kitayama, 1991).To take another example, research suggests that there are cultural differences in the reporting of depressive symptoms (Parker, Gladstone, & Chee, 2001; Ryder et al., 2008). These cross-cultural differences might have consequences for the relation of low self-esteem with depression and anxiety. Therefore, whether studies with samples from other cultural contexts would yield the same results as the present meta-analysis is currently unknown.

An additional limitation is that our data did not allow us to investigate several, more nuanced characteristics of the relations between self-esteem, depression, and anxiety. First, it would be interesting to test for other models that could explain the relations between the constructs. For example, in addition to being a vulnerability factor, self-esteem might influence the course or treatment of depressive disorders (e.g., G. W. Brown, Bifulco, & Andrews, 1990; Ezquiaga et al., 2004), corresponding to the pathoplasty model (Clark, 2005; Klein, Kotov, & Bufferd, 2011; Santor, Bagby, & Joffe, 1997). The present meta-analysis did not allow examining the pathoplasty model because very few studies reported information on diagnoses and treatment of depressive disorders (information that would be needed to assess whether self-esteem predicts the course of depressive disorders). Another example is the common cause model (Klein et al., 2011), which states that low self-esteem and depression have a shared etiology accounting for the observed association and which corresponds to the third-variable models discussed above. The present meta-analysis did not allow testing the common cause

model because very few of the primary studies examined third variables that could serve as a common cause (as mentioned above, it would for example be interesting to test whether neuroticism is a common cause of low self-esteem and depression). Second, because clinical anxiety is a heterogeneous category (Heimberg et al., 1989; Mor & Winquist, 2002), research should clarify how low self-esteem relates to different forms of anxiety (e.g., social anxiety, worry, panic, and phobias). Recent studies with child, adolescent, and adult samples have found that some forms of anxiety (e.g., generalized anxiety) load together with depression and dysthymia on one factor, rather than on another factor together with the remaining forms of anxiety (Krueger, 1999; Lahey et al., 2004). Accordingly, low self-esteem might be a stronger vulnerability factor for certain forms of anxiety such as generalized anxiety (i.e., having a prospective effect of similar size as for depression). Similarly, it might be interesting to further investigate how low self-esteem relates do different forms of depression (e.g., depressive episodes with atypical or melancholic features; American Psychiatric Association, 2000).

Another limitation of the meta-analytic approach is that we could not control for potential content overlap between the constructs. Although self-esteem and anxiety measures typically do not overlap in their item content, depression measures frequently include one or two items that are conceptually related to self-esteem. However, the fact that the vulnerability effect of low self-esteem on depression replicated across different combinations of self-esteem and depression measures (which may differ in their degree of content overlap) suggests that the effect is not biased by potential content overlap. Moreover, the findings from four longitudinal studies (Orth et al., 2008; Orth, Robins, Trzesniewski, et al., 2009) which controlled for content overlap between self-esteem and depression scales suggest that the vulnerability effect of low self-esteem is not influenced by depression items that tap into the self-esteem construct. A related issue is

that depression and anxiety measures frequently overlap in their item content, which in turn might affect the relative strength of their individual relations to self-esteem. To further address this issue, future research should employ designs in which self-esteem, depression, and anxiety are simultaneously examined, and potential content overlap is controlled for. Moreover, this approach would afford the additional benefit of enabling tests of prospective effects between all three variables.

Furthermore, it is possible that the relations between self-esteem, depression, and anxiety are influenced by narcissism, which is conceptually related to high self-esteem (Morf & Rhodewalt, 2001; Tracy, Cheng, Robins, & Trzesniewski, 2009). Although measures of self-esteem and narcissism are only moderately correlated (Ackerman et al., 2011; R. P. Brown & Zeigler-Hill, 2004), it is possible that the prospective effects of low self-esteem on depression and anxiety are even stronger when narcissism is statistically controlled for.

Finally, it is possible that self-esteem, depression, and anxiety have been subject to generational changes in the past decades and, consequently, an important question is whether these possible secular trends in the mean levels of the constructs can be reconciled with the findings of our meta-analysis. First, we note that the evidence regarding generational changes in self-esteem, depression, and anxiety is inconsistent. For example, whereas some studies suggest that there are generational increases in self-esteem (Gentile, Twenge, & Campbell, 2010; Twenge & Campbell, 2001), the results of other studies—two of which used longitudinal data from national probability samples—suggest that the average level of self-esteem has not changed across the generations born in the 20th century (Erol & Orth, 2011; Orth et al., 2011; Orth et al., 2010). Similarly, the evidence regarding generational increases in constructs related to self-esteem, such as self-enhancement and narcissism, is inconsistent. For example, whereas some

studies find supporting evidence (Twenge & Foster, 2008; Twenge, Konrath, Foster, Campbell, & Bushman, 2008), the results of other studies suggest that there are no generational changes (Trzesniewski & Donnellan, 2010; Trzesniewski, Donnellan, & Robins, 2008). Also, with regard to depression and anxiety, some studies report significant generational increases (e.g., Twenge, 2000), whereas other studies did not find supporting evidence (Booth, Sharma, & Leader, 2011; Orth et al., 2011; Simon & VonKorff, 1992). In sum, the available evidence on generational changes in the constructs examined in this research is inconsistent and a topic of current debate in the literature.

Second, even if generational changes in the constructs were present, they do not necessarily contradict the findings of the present study. The reason is that mean levels of variables and the structural relations between these variables can vary independently from each other. For example, it is possible that the mean levels of self-esteem, depression, and anxiety change over time, while the structural relations between the constructs remain unaltered. In accordance with this reasoning, although previous research has documented significant age differences in the level of self-esteem (Meier, Orth, Denissen, & Kühnel, 2011; Orth et al., 2011; Orth et al., 2010) and depression (Kessler et al., 1992; Mirowsky & Kim, 2007) across the life course, this meta-analysis and a previous study (Orth, Robins, Trzesniewski, et al., 2009) found that age did not significantly moderate the prospective relations between self-esteem and depression. We therefore believe that the validity of our meta-analytic findings is not called into question by possible generational changes in the constructs.

Conclusions

The present research suggests that self-esteem shows diverging structural relations with depression and anxiety. As yet, drawing clinical recommendations from this affective specificity

would be premature. Nevertheless, continuing this line of research might ultimately lead to the identification of mechanisms specific to depression and anxiety, which in turn might provide important information for the further development of disorder-specific treatment approaches.

Moreover, the present research shows that the effect of low self-esteem on depression is robust and holds across different sample and design characteristics of studies. The robustness of the effect has important implications for research, suggesting that the conclusions of extant studies in this field are probably generalizable and that future studies can build on this effect and investigate it in more detail. Furthermore, when studying vulnerability factors for depression, researchers should control for low self-esteem in order not to overestimate the effects of other vulnerability factors. The robustness of the effect also strengthens the potential importance of self-esteem interventions. If future research supports the hypothesized causality of the relations between the constructs, interventions aimed at increasing self-esteem might be useful in reducing the risk of depression, regardless of the gender and age of the individuals, and might not only reduce the short-term risk of depression but have a long lasting positive influence.

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Footnotes

[1] Throughout this article, we use the term *depression* to denote a continuous variable (i.e., individual differences in depressive affect) rather than a clinical category such as major depressive disorder (American Psychiatric Association, 2000). Taxometric analyses suggest that depression is best conceptualized as a continuous construct (Hankin, Fraley, Lahey, & Waldman, 2005; Lewinsohn, Solomon, Seeley, & Zeiss, 2000; Prisciandaro & Roberts, 2005; Ruscio & Ruscio, 2000).

[2] Although no previous study has focused explicitly on the prospective relations between low self-esteem and anxiety, some longitudinal studies have included information on zero-order correlations between the constructs, which we used to compute the effect sizes examined in the present meta-analysis (see below).

[3] Although our search covered the entire time span indexed in these databases until July 2011, the earliest eligible study was published in 1984 (see Results section).

[4] The qualifications of the coders were as follows: The first author had a Master's degree in psychology, and the second author had a Ph.D. in psychology.

[5] We tested whether the results of the multiple regression analysis used in the moderator analyses were altered when we used a different method to deal with missing data (i.e., the expectation–maximization algorithm; Dempster, Laird, & Rubin, 1977). The results were very similar, and all of the significant effects remained significant and the nonsignificant effects remained nonsignificant.

[6] No formal significance test for the difference between the cross-lagged regression effects is available because the coefficients (a) do not involve the same set of variables and (b) are based on a partially, but not fully, overlapping set of studies. In this situation, none of the

tests discussed in, e.g., Clogg, Petkova, and Haritou (1995), Cohen et al. (2003), and Raghunathan, Rosenthal, and Rubin (1996) is applicable. We therefore used the confidence intervals as an approximate means of comparing the cross-lagged effects. For comparison purposes (although formally not admissible), we also computed unpaired t-tests, which bolstered our conclusions. For the cross-lagged effects between self-esteem and depression, the test was significant with $t(117) = 3.78$, $p < .001$, suggesting that the coefficients differed significantly. For the cross-lagged effects between self-esteem and anxiety, the test was nonsignificant with $t(26) = 1.18$, $p = .250$, suggesting that the coefficients did not significantly differ.

[7] In analyses of the moderating effect of time lag, we excluded one statistical outlier. In the study by Schafer (1998), the time lag between assessments was 13 years, which was 6.5 standard deviations longer than the average time lag. When this study was included in the multiple regression analysis, time lag significantly predicted the effect size ($\beta = -.26$, $p = .02$), indicating that with increasing time lag the effect size became more negative (i.e., the absolute value of the effect became larger). However, because this analysis was strongly influenced by the statistical outlier (Cohen et al., 2003),we decided to report the analyses without the outlier.

[8] The vulnerability effect of low self-esteem on depression, based on 7 samples ($N = 2,112$) with a mean age below 13 years, was -.16 ($p < .05$).

[9] No formal significance test for the difference between the stability coefficients of self-esteem and depression is available, for the reasons given in Footnote 6. We therefore used the confidence intervals as an approximate means of comparing the coefficients. Moreover, for comparison purposes, we also computed an unpaired t-test, which was significant with $t(117) = 5.10$, $p < .001$, suggesting that the coefficients differed significantly.

Table 1

Longitudinal Studies of the Relation Between Self-Esteem (SE) and Depression (D)

		Sample characteristics				Effect sizes				
Study	N	Proportion of female participants	Mean age (years)	Time lag (years)	Sample type	$r_{SE,D}$	SE→D[a]	D→SE[a]	SE→SE[a]	D→D[a]
Abela & Payne (2003)	314	.45	11.2	0.11	convenience	-.50	-.20	--	--	.58
Bohon et al. (2008)	496	1.00	16.5	1.00	convenience	-.34	-.09	-.06	.27	.61
Borelli & Prinstein (2006)	478	.51	12.7	0.92	convenience	-.59	-.06	--	--	.67
Burwell & Shirk (2006)	110	.58	13.6	0.58	convenience	-.45	-.30	-.21	.48	.43
Butler et al. (1994), Part 2	73	.77	20.0	0.42	college students	-.36	-.11	--	--	.36
Cambron et al. (2010), Study 3	230	.68	21.3	0.04	college students	-.61	-.21	-.16	.69	.64
Cast & Burke (2002)	574	.50	--	1.00	convenience	-.31	-.04	-.20	.57	.46
Chen (1995), Female Subsample	374	1.00	--	1.00	convenience	-.59	-.14	-.09	.72	.55
Chen (1995), Male Subsample	374	.00	--	1.00	convenience	-.50	-.10	-.11	.63	.62
Cheng & Lam (1997)	286	.27	15.8	0.25	convenience	-.64	-.26	--	--	.49
Cikara & Girus (2010)	67	.63	20.9	0.08	college students	-.65	-.26	-.19	.74	.52
Colarossi & Eccles (2003), Female Group	125	1.00	17.0	1.00	convenience	-.52	-.21	.19	.81	.46
Colarossi & Eccles (2003), Male Group	92	.00	17.0	1.00	convenience	-.52	-.19	.00	.60	.44
Conley et al. (2001)	147	--	8.2	0.06	convenience	-.45	-.19	--	--	.59
Fernandez et al. (1998)	729	.52	--	2.00	convenience	-.45	-.14	--	--	.34
Flynn (2006)	160	.73	19.5	--	college students	-.69	-.15	--	--	.57
Fontaine & Jones (1997)	45	1.00	31.0	0.21	convenience	-.64	-.39	--	--	.17
Hobfoll & Leiberman (1987)	99	1.00	28.0	0.25	convenience	-.47	-.15	-.21	.48	.39
Hobfoll & Walfisch (1984)	55	1.00	38.2	0.25	convenience	-.23	-.10	--	--	.49
Hubbs-Tait et al. (1994), Group of Mothers	44	1.00	17.7	3.42	convenience	-.68	-.59	-.04	.70	-.01
Jalajas (1994)	205	.38	23.4	0.25	college students	-.65	-.23	-.14	.72	.55
Joiner (1995), Group of Targets	100	.61	20.0	0.06	college students	-.62	-.11	-.02	.58	.40
Joiner et al. (1999)	177	.63	20.0	0.06	college students	-.58	-.17	-.02	.61	.39
Joiner et al. (2000)	143	.59	20.0	0.06	college students	-.56	-.13	-.03	.58	.45
Kakihara et al. (2010)	1022	.47	15.3	1.00	convenience	-.66	-.15	-.13	.54	.50
Katz et al. (1998), Female Group	134	1.00	19.0	0.11	convenience	-.67	-.24	--	-	.39
Kernis et al. (1998)	98	.88	20.0	0.08	college students	-.50	-.04	--	--	.72
Kim et al. (2008)	60	1.00	31.8	0.25	clinical	-.76	-.36	--	--	.26

Table 1 (continued)

Study	N	Sample characteristics Proportion of female participants	Mean age (years)	Time lag (years)	Sample type	Effect sizes $r_{SE,D}$	SE→D[a]	D→SE[a]	SE→SE[a]	D→D[a]
Klima & Repetti (2008)	226	.48	9.5	2.00	convenience	-.67	-.14	-.33	.33	.51
Kling et al. (2003)	285	1.00	69.5	1.17	convenience	-.33	-.20	-.10	.71	.42
Le et al. (2007), Female Group	6813	1.00	16.0	1.00	representative	-.46	-.06	--	--	.60
Le et al. (2007), Male Group	6504	.00	16.0	1.00	representative	-.41	-.08	--	--	.59
Lee & Hankin (2009)	350	.57	14.5	0.42	convenience	-.60	-.03	--	--	.68
Lewinsohn & Hoberman (1988)	562	--	--	0.69	convenience	-.51	-.14	--	--	.35
McCarty et al. (2007)	331	.47	12.0	1.00	clinical	-.60	-.21	-.07	.52	.46
Mindes et al. (2003)	67	1.00	33.0	0.75	convenience	-.57	.05	-.19	.61	.61
Ohannessian et al. (1994)	235	.56	12.2	1.00	convenience	-.31	-.13	--	--	.29
Orth et al. (2008), Study 1	2403	.50	15.5	2.00	representative	-.34	-.09	-.04	.51	.51
Orth et al. (2008), Study 2	359	.59	18.3	1.00	college students	-.60	-.20	.00	.80	.35
Orth et al. (2009)[b], Study 1, Age 18-29 years	95	.58	22.0	3.00	convenience	-.82	-.44	.18	.89	.32
Orth et al. (2009)[b], Study 1, Age 30-39 years	673	.57	35.5	3.00	convenience	-.70	-.22	.01	.80	.45
Orth et al. (2009)[b], Study 1, Age 40-49 years	146	.45	41.9	3.00	convenience	-.72	-.23	-.05	.84	.62
Orth et al. (2009)[b], Study 1, Age 50-59 years	270	.70	56.2	3.00	convenience	-.59	-.25	.02	.80	.37
Orth et al. (2009)[b], Study 1, Age 60-69 years	299	.49	63.4	3.00	convenience	-.71	-.23	.02	.90	.55
Orth et al. (2009)[b], Study 1, Age 70+ years	202	.58	79.3	3.00	convenience	-.44	-.29	.11	.89	.29
Orth et al. (2009)[b], Study 2, Age 18-29 years	371	.51	24.5	2.00	representative	-.77	-.10	-.09	.64	.64
Orth et al. (2009)[b], Study 2, Age 30-39 years	437	.49	34.4	2.00	representative	-.84	-.23	-.06	.81	.62
Orth et al. (2009)[b], Study 2, Age 40-49 years	476	.45	44.5	2.00	representative	-.75	-.17	.05	.92	.63
Orth et al. (2009)[b], Study 2, Age 50-59 years	545	.34	54.9	2.00	representative	-.78	-.16	-.01	.80	.68
Orth et al. (2009)[b], Study 2, Age 60-69 years	434	.29	64.0	2.00	representative	-.62	-.22	-.04	.82	.61
Orth et al. (2009)[b], Study 2, Age 70+ years	216	.34	74.0	2.00	representative	-.72	-.02	.03	.96	.83
Ostrowksy (2007), Female Subsample	253	1.00	14.0	1.00	convenience	-.46	.01	-.11	.44	.64
Ostrowsky (2007), Male Subsample	675	.00	14.0	1.00	convenience	-.43	-.14	-.13	.55	.49
Prinstein & La Greca (2002)	246	.60	16.8	6.00	convenience	-.54	-.15	-.05	.29	.20
Procopio et al. (2006)	150	1.00	45.2	2.50	convenience	-.63	-.28	-.36	.37	.48
Puckett (2010)	345	.58	14.0	0.50	convenience	-.75	-.07	--	--	.63
Ralph & Mineka (1998)	141	.54	20.0	0.02	college students	-.52	-.09	--	--	.49
Ritter et al. (2000)	191	1.00	24.5	0.63	convenience	-.49	-.07	--	--	.46

Table 1 (continued)

		Sample characteristics				Effect sizes				
Study	N	Proportion of female participants	Mean age (years)	Time lag (years)	Sample type	$r_{SE,D}$	SE→D[a]	D→SE[a]	SE→SE[a]	D→D[a]
Roberts & Kassel (1997)	213	.63	20.3	0.17	college students	-.58	-.09	-.13	.65	.52
Roberts & Monroe (1992)	192	.64	18.7	0.08	college students	-.51	-.21	--	--	.65
Robinson et al. (1995)	381	.58	12.0	0.38	convenience	-.71	-.22	--	--	.50
Rosario et al. (2005)	156	.49	18.3	0.50	convenience	-.62	-.52	--	--	.02
Rueger (2011), Female Subsample	256	1.00	13.2	0.33	convenience	-.67	-.03	--	--	.57
Rueger (2011), Male Subsample	241	.00	13.2	0.33	convenience	-.64	-.19	--	--	.41
Schafer et al. (1998)	98	.50	56.0	13.00	convenience	-.38	-.38	--	--	.38
Schroevers et al. (2003), Control Group	225	.70	57.0	1.00	convenience	-.33	-.13	--	--	.51
Schroevers et al. (2003), Study Group	403	.73	58.0	1.00	convenience	-.37	-.10	--	--	.64
Settles et al. (2009)	128	1.00	24.2	2.00	convenience	-.49	-.14	.01	.50	.33
Shahar & Davidson (2003)	260	.43	42.2	0.33	clinical	-.69	.01	-.20	.62	.70
Southall & Roberts (2002)	115	.50	16.5	0.04	convenience	-.69	-.21	--	--	.47
Steinberg et al. (2007), High-Risk Group	98	.61	20.0	0.34	college students	-.41	-.01	--	--	.55
Steinberg et al. (2007), Low-Risk Group	83	.61	20.0	0.34	college students	-.52	.07	--	--	.66
Terry et al. (1996)	185	1.00	27.5	0.25	convenience	-.37	-.14	--	--	.45
Thoms (2006)	91	.81	21.2	0.13	college students	-.55	-.19	-.30	.52	.41
Vohs et al. (2001)	70	1.00	20.0	0.10	college students	-.45	.00	--	--	.58
Whisman & Kwon (1993)	80	.66	18.9	0.25	college students	-.77	.01	--	--	.69
Yang (2006)	1149	.62	71.0	6.00	convenience	-.36	-.19	--	--	.38

Note. $r_{SE,D}$ = correlation between the constructs at Time 1.

[a] Standardized regression coefficient. [b] Orth, Robins, Trzesniewski, Maes, & Schmitt (2009).

Table 2

Longitudinal Studies of the Relation Between Self-Esteem (SE) and Anxiety (ANX)

		Sample characteristics				Effect sizes				
Study	N	Proportion of female participants	Mean age (years)	Time lag (years)	Sample type	$r_{SE,ANX}$	SE→ANX[a]	ANX→SE[a]	SE→SE[a]	ANX→ANX[a]
Borelli & Prinstein (2006)	478	.51	12.7	0.92	convenience	-.46	-.02	--	--	.61
Cast & Burke (2006)	574	.50	--	1.00	convenience	-.18	-.11	-.14	.60	.48
Cox et al. (2006), IVF Group	70	1.00	33.6	0.19	convenience	-.67	-.06	-.01	.80	.70
Cox et al. (2006), Control Group	111	1.00	29.3	0.19	convenience	-.40	.02	-.22	.63	.55
Ewen (2002)	115	.81	31.3	0.67	college students	-.66	-.24	-.15	.65	.42
Hobfoll & Walfisch (1984)	55	1.00	38.2	0.25	convenience	-.05	-.22	--	--	.30
Jalajas (1994)	205	.38	23.4	0.25	college students	-.38	-.15	-.07	.78	.46
Joiner (1995)	100	.61	20.0	0.06	college students	-.31	-.15	-.02	.58	.32
Joiner et al. (1999)	177	.63	20.0	0.06	college students	-.42	-.07	.11	.67	.41
Kim et al. (2008)	60	1.00	31.8	0.25	clinical	-.38	-.31	--	--	.61
Lee & Hankin (2009)	350	.57	14.5	0.42	convenience	-.53	-.21	--	--	.45
McCarty et al. (2007)	331	.47	12.0	1.00	clinical	-.37	-.04	-.08	.53	.53
Ohannessian et al. (1994)	235	.56	12.2	1.00	convenience	-.41	-.07	--	--	.25
Prinstein & La Greca (2002)	246	.60	10.8	6.00	convenience	-.31	-.05	.00	.31	.31
Procopio et al. (2006)	150	1.00	45.2	2.50	convenience	-.33	-.17	-.14	.50	.48
Ralph & Mineka (1998)	141	.54	20.0	0.02	college students	-.30	.01	--	--	.49
Rosario et al. (2005)	156	.49	18.3	0.50	convenience	-.35	-.10	--	--	.50
Vohs et al. (2001)	70	1.00	20.0	0.10	college students	-.45	-.13	--	--	.51

Note. $r_{SE,ANX}$ = correlation between the constructs at Time 1; IVF = in vitro fertilization.

[a] Standardized regression coefficient.

Table 3

Summary of Effect Sizes for Relation Between Self-Esteem (SE) and Depression (D)

Variable	k	N	Weighted mean effect size	95% CI	Homogeneity (Q)
$r_{SE,D}$	77	35,501	-.57*	[-.60, -.54]	1338.79*
SE→D[a]	77	35,501	-.16*	[-.18, -.14]	226.63*
D→SE[a]	42	14,049	-.08*	[-.11, -.05]	115.05*
SE→SE[a]	42	14,049	.69*	[.63, .74]	1692.57*
D→D[a]	77	35,501	.51*	[.48, .54]	758.05*

Note. Computations were made with a random effects model. k = number of studies; N = total number of participants in the k samples; $r_{SE,D}$ = correlation between the constructs at Time 1; CI = confidence interval.

[a] Standardized regression coefficient.

* $p < .05$.

Table 4

Summary of Effect Sizes for Relation Between Self-Esteem (SE) and Anxiety (ANX)

Variable	k	N	Weighted mean effect size	95% CI	Homogeneity (Q)
$r_{SE,ANX}$	18	3,597	-.40*	[-.46, -.33]	83.01*
SE→ANX[a]	18	3,597	-.10*	[-.14, -.06]	20.84
ANX→SE[a]	10	2,052	-.08*	[-.13, -.02]	13.83
SE→SE[a]	10	2,052	.62*	[.53, .69]	80.00*
ANX→ANX[a]	18	3,597	.47*	[.42, .52]	63.85*

Note. Computations were made with a random effects model. k = number of studies; N = total number of participants in the k samples; $r_{SE,ANX}$ = correlation between the constructs at Time 1; CI = confidence interval.

[a] Standardized regression coefficient.

* $p < .05$.

Table 5

Correlations and Standardized Regression Coefficients for Sample Characteristics Predicting

the Self-Esteem Effect on Depression (k =69)

Predictor	r	β
Proportion of female participants	.00	.13
Mean age	-.11	-.10
Time lag	-.25*	-.19
Sample type[a]	.09	.25*

Note. Computations for the multiple regression analysis were made with a random effects model.

Homogeneity $Q_{model} = 10.25$ ($df = 4$, $p = .036$); homogeneity $Q_{residual} = 84.55$ ($df = 64$, $p = .044$);

$R^2 = .11$. k = number of studies.

[a] 1 = representative, 0 = non-representative.

* $p < .05$.

Table 6

Analysis of Variance of Self-Esteem Effect on Depression by Sample Type (k = 77)

Sample type	k	N	Weighted mean effect size[a]	95% CI	Homogeneity (Q)
Representative	9	18,199	-.12*	[-.17, -.07]	6.47
Convenience	47	14,078	-.17*	[-.20, -.14]	66.93*
College students	18	2,573	-.13*	[-.18, -.08]	10.92
Clinical	3	651	-.15*	[-.26, -.03]	5.70

Note. Computations were made with a random effects model. Homogeneity $Q_{between} = 3.63$ ($df = 3$, $p = .304$); homogeneity $Q_{within} = 89.99$ ($df = 73$, $p = .086$). k = number of studies; N = total number of participants in the k samples; CI = confidence interval.

[a] Standardized regression coefficient.

* $p < .05$.

Table 7

Analysis of Variance of Self-Esteem Effect on Depression by Self-Esteem Measure (k = 77)

Self-esteem measure	k	N	Weighted mean effect size[a]	95% CI	Homogeneity (Q)
Rosenberg Self-Esteem Scale	60	30,954	-.15*	[-.18, -.13]	71.08
Harter Self-Perception Profile	11	2,721	-.16*	[-.21, -.10]	6.60
Other	6	1,826	-.18*	[-.25, -.10]	12.59*

Note. Computations were made with a random effects model. Homogeneity $Q_{between} = 0.34$ ($df = 2$, $p = .843$); homogeneity $Q_{within} = 90.27$ ($df = 74$, $p = .096$). k = number of studies; N = total number of participants in the k samples; CI = confidence interval.

[a] Standardized regression coefficient.

* $p < .05$.

Table 8

Analysis of Variance of Self-Esteem Effect on Depression by Depression Measure (k = 77)

Depression measure	K	N	Weighted mean effect size[a]	95% CI	Homogeneity (Q)
CES-D	30	24,872	-.14*	[-.18, -.11]	39.86
Beck Depression Inventory	20	4,390	-.16*	[-.21, -.12]	18.28
Children's Depression Inventory	8	2,487	-.13*	[-.19, -.07]	5.03
Other	19	3,752	-.18*	[-.23, -.14]	28.87

Note. Computations were made with a random effects model. Homogeneity $Q_{between} = 2.66$ ($df = 3$, $p = .447$); homogeneity $Q_{within} = 92.04$ ($df = 73$, $p = .065$). k = number of studies; N = total number of participants in the k samples; CI = confidence interval; CES-D = Center for Epidemiologic Studies-Depression Scale.

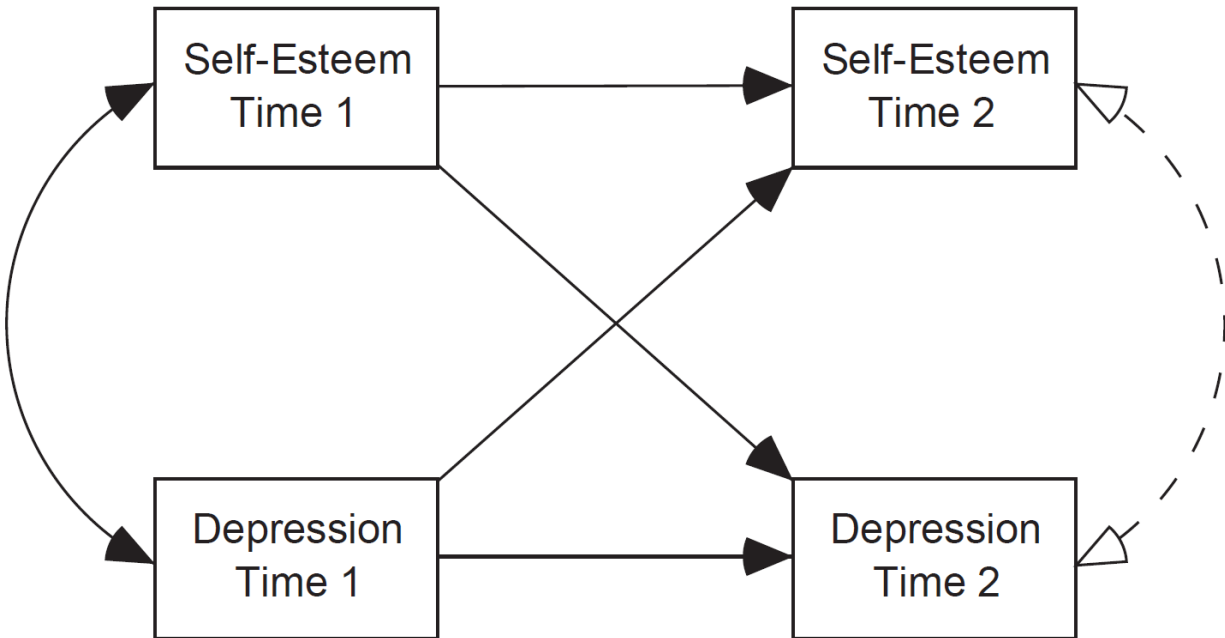[a] Standardized regression coefficient.

* $p < .05$.

Figure 1. The figure illustrates the coefficients meta-analyzed in the present research, exemplary

for the relation between self-esteem and depression (the coefficients for the relation between

self-esteem and anxiety were specified accordingly). The relations between the variables at the

two measurement occasions are specified as cross-lagged effects and stability effects. The cross-

lagged effects indicate the prospective effect of one variable on the other (e.g., effect of self-

esteem at Time 1 on depression at Time 2), after controlling for their stabilities across time (e.g.,

effect of depression at Time 1 on depression at Time 2). In addition to cross-lagged and stability

effects, we also examined the cross-sectional correlation between the constructs, for Time 1 as an
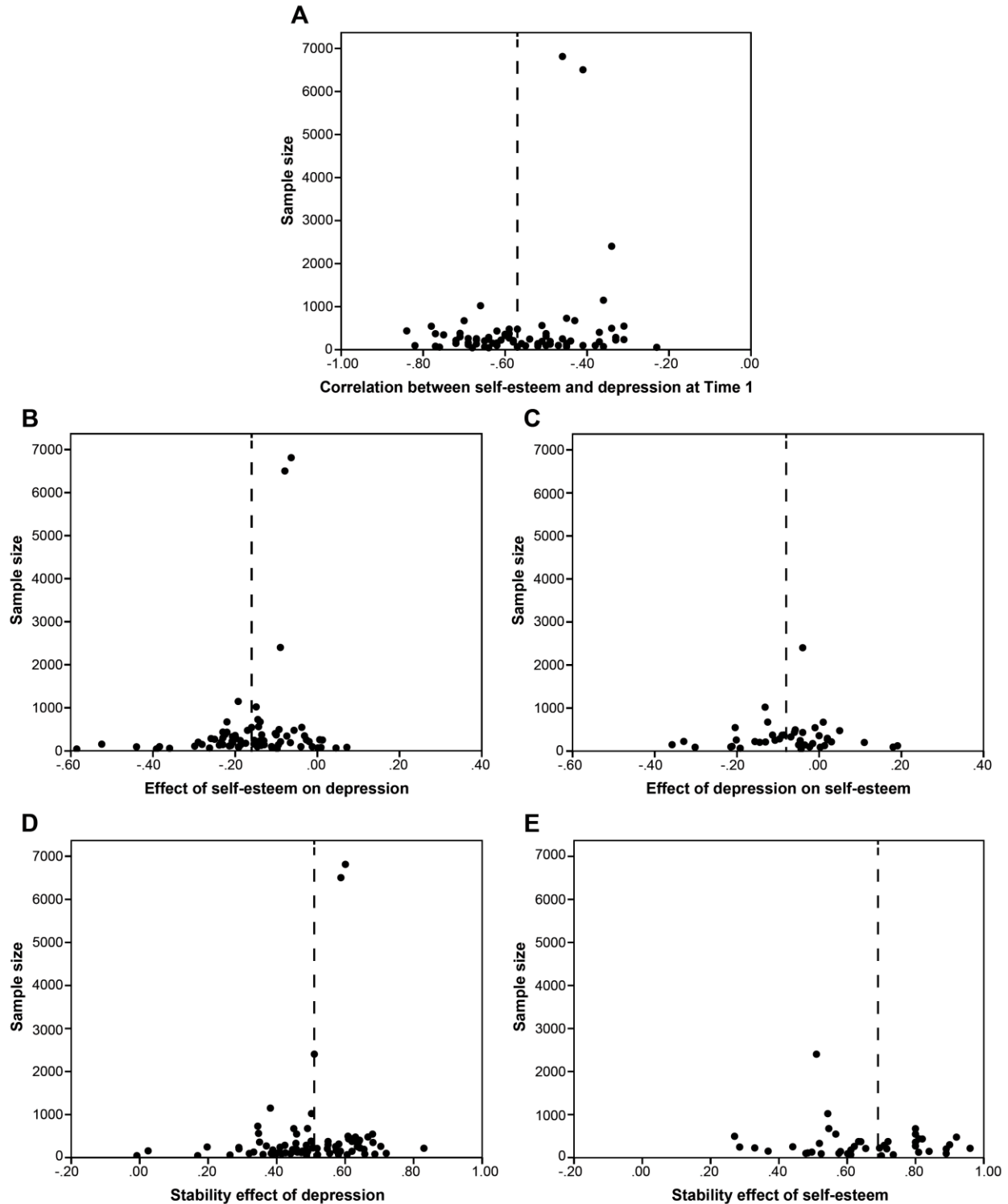
example.

Figure 2. Funnel graphs for the effect sizes of the relation between self-esteem and depression. The graphs display the relation between the effect size and sample size of the studies. The dashed lines show the weighted mean effect sizes.
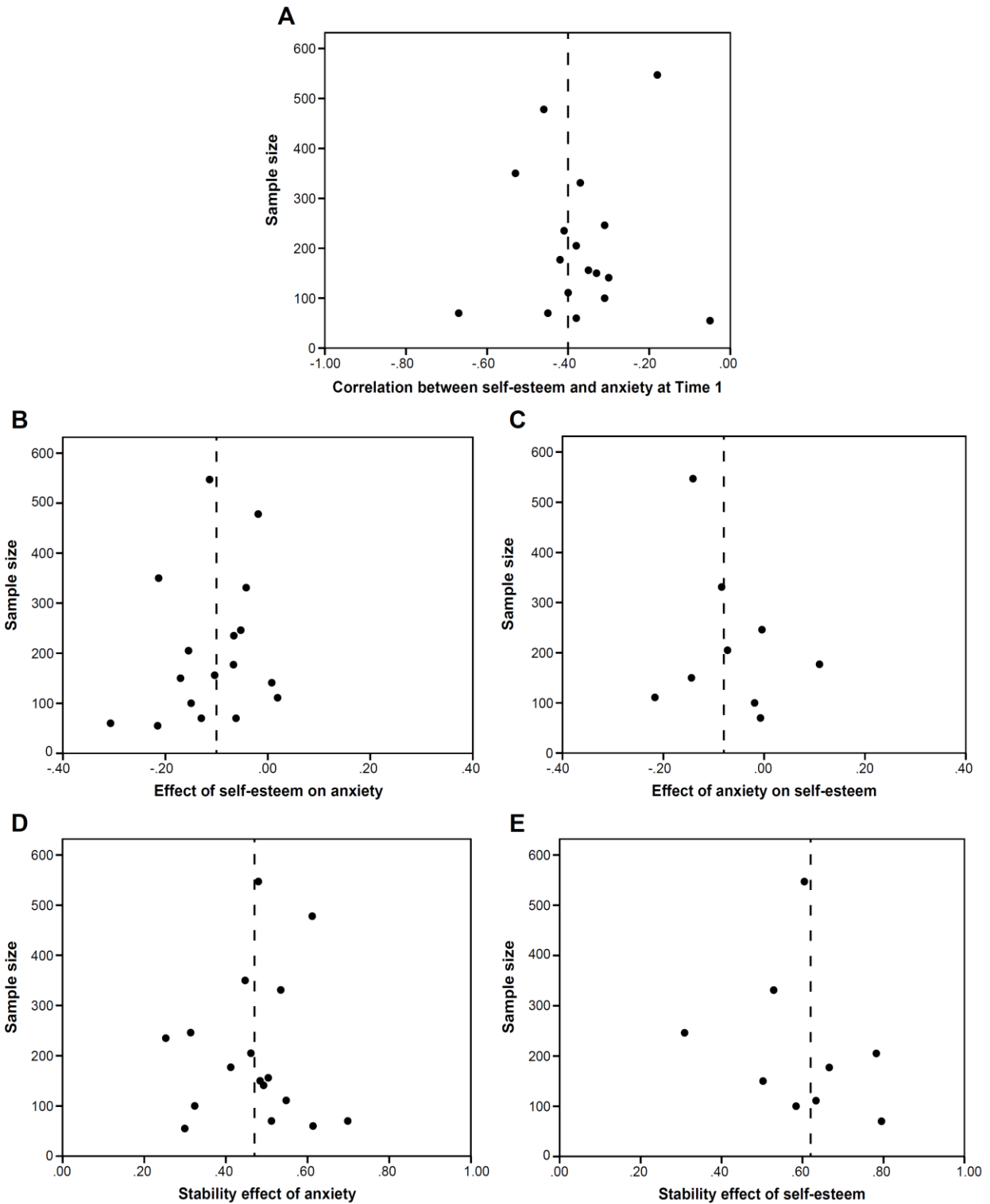
Figure 3. Funnel graphs for the effect sizes of the relation between self-esteem and anxiety. The graphs display the relation between the effect size and sample size of the studies. The dashed lines show the weighted mean effect size.
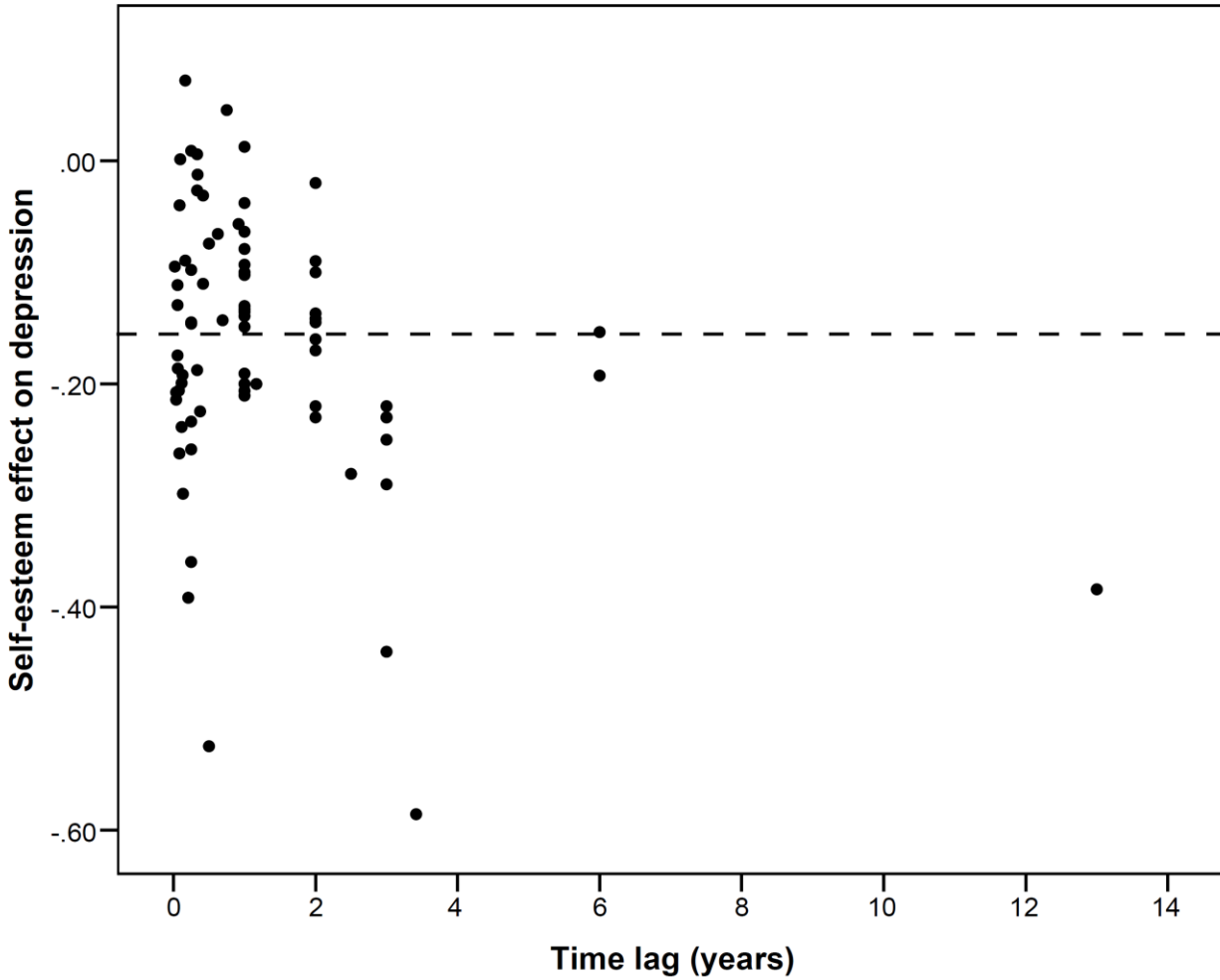
Figure 4. Scatter plot displaying the relation between the cross-lagged effect of self-esteem on depression (standardized regression weight) and the time lag between the two assessments. The dashed line shows the weighted mean effect size.