



Depression recurrence after recovery: Prognostic value of implicit and explicit self-depressed associations[☆]



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Major depressive disorder and dysthymia are some of the most prevalent lifetime disorders, with prevalence rates reported as high as 16.6% and 2.5%, respectively (Kessler et al., 2005). Depression is persistent with high rates of recurrence (i.e., return of symptoms following at least six months of no symptoms; e.g., 42% within 20 years Hardeveld, Spijker, Graaf, Nolen, & Beekman, 2013) and relapse (i.e., return of symptoms following a symptom-free period of less than six months; Frank et al., 1991). Periods of recovery decreases with each episode (Hardeveld et al., 2013), while the risk for recurrence increases with each episode (e.g., Mueller et al., 1999). Given the highly recurrent nature of depression, it imposes high personal and societal costs. It is therefore critical to understand the mechanisms that are potentially involved in the recurrence of depression.

Dysfunctional thoughts and attitudes about the self (“negative self-associations”) have been proposed as central factors that may contribute to the development and persistence of depression symptomatology (e.g., Beck, 2002). Dual-process models highlight the importance of distinguishing between more explicit self-associations and automatic (implicit) self-associations (Gawronski & Bodenhausen, 2006) as these can differ (e.g., Briñol, Petty, & Wheeler, 2006), and can manifest in different types of behaviours (Strack & Deutsch, 2004). Specifically, explicit self-associations are related to more deliberate behaviours, while implicit self-associations have been linked to more spontaneous behaviours (e.g., Rudolph, Schröder-Abé, Riketta, & Schütz, 2010). It has been theorized that implicit associations moderate mood and behaviour in response to stressors through the unintentional and fast activation of associated constructs in memory networks (Beevers, 2005). This in turn can trigger symptoms of depression (e.g., feelings of worthlessness, sad mood) which may trigger other symptoms of depression (e.g., change in appetite). If explicit associations are positive, they may correct negative implicit associations, thereby resulting in

positive moods and behaviours, and offering protection from depression. However, if explicit associations are also negative, they may worsen the effect of negative implicit associations (or weaken the effect of positive implicit associations), and consequently facilitate the emergence of depressive symptoms. Furthermore, even when explicit associations are positive, they may fail to correct negative implicit associations if there are insufficient cognitive resources (e.g., constrained working memory due to high stress), limited time, or lack of motivation (e.g., a person is not aware of persistent negative thoughts which may not be true; Elgersma, Glashouwer, Bockting, Penninx, & de Jong, 2013). A negative feedback loop can develop between negative self-associations and symptoms of depression which in relatively healthy individuals may be corrected through positive explicit associations (e.g., purposefully thinking of the things that have been done well recently). Therefore, negative implicit associations and explicit associations are considered distinct, yet related mechanisms through which depressive symptoms may be triggered or worsened.

During a period of depression, negative self-views emerge when reduced cognitive control fails to break a spiral between excessive self-focused thinking (e.g., rumination) and triggering of negative self-schemas (e.g., De Raedt, Remue, Loeys, Hooley, & Baeken, 2017). Associations between concepts of depression (e.g., hopelessness, worthlessness) and the self are particularly salient during this period, therefore becoming stronger at the explicit level, and with time, at the implicit level. This is supported by the observation that implicit self-depressed associations (SDA) and explicit SDA were stronger in those with a current depression in comparison to those with an anxiety disorder and those who had never had a depression or anxiety disorder (Glashouwer & de Jong, 2010). While recovery marks a period where symptoms of depression have reduced to non-clinical levels for at least six months, it is feasible that SDA remain strong. This might be

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particularly so for implicit self-associations, which require time and consistent explicit self-associations to change (see Gawronski & Bodenhausen, 2006, for a review of implicit and explicit attitude change). Indeed, those with a previous depression still showed stronger explicit SDA and implicit SDA than a never-depressed comparison group (Glashouwer & de Jong, 2010). Furthermore, where depression was present for a longer period, or where there is a history of relatively many depressive episodes, explicit SDA and implicit SDA were stronger (Elgersma et al., 2013). In the presence of stressors, SDA may facilitate the re-emergence of depressive symptoms by triggering dormant negative self-schemas. It is therefore feasible that remaining SDA in those who have recovered from a major depressive disorder or dysthymia may represent a cognitive vulnerability (“scar”) increasing risk for recurrence by facilitating the triggering of depressive symptoms. If SDA does represent a scar following depression, then it should “independently predict future recurrences” (Borcusa & Iacono, 2007, p. 16). Therefore, the first main aim of the current study was to test whether SDA in recovered depressed individuals indeed predict the recurrence of depression.

Not everyone who recovers from a depression will experience another episode, and therefore scars may not be present in everyone with a history of depression. As such, some appear to recover better than others. SDA following a depression regardless of changes may be a poorer predictor of recurrence than persistence of SDA from a current depression into recovery as the latter may be indicative of slower recovery or uncorrected SDA. The second aim was therefore to test whether SDA during a depression that persists into recovery is related to an increased risk for recurrence.

It has been argued that relatively negative self-associations as a *consequence* of the depressive episode represents a scar that lowers the threshold for the development of a new episode (i.e., the scar hypothesis; Lewinsohn, Steinmetz, Larson, & Franklin, 1981). However, for a construct to be considered a scar related to recurrence risk, it is important to differentiate between recurrence risk that is a consequence of a depressive episode from recurrence risk that existed *before* the onset of the depressive episode (Borcusa & Iacono, 2007). It is feasible that factors preceding the onset of a depression (i.e., first episode) already predict who will have a more recurrent course of depression (Bockting, Hollon, Jarrett, Kuyken, & Dobson, 2015). To identify whether SDA following a period of depression represents a scar or a premorbid vulnerability, an explorative analysis was conducted in a small subsample of those where onset of first episode of depression occurred during the study.

The first main hypothesis of this study was that implicit SDA and explicit SDA would predict recurrence in those with a history of major depressive disorder or dysthymia. The second main hypothesis is that persistent SDA (i.e., relatively less improvement) into recovery would particularly increase risk for recurrence. Finally, we included an explorative analysis to test whether SDA following a period of depression was best understood as a scar increasing the likelihood of recurrence, or a pre-episode factor predicting a recurrent course of depression. Understanding factors relating to recurrence may highlight potential targets for preventative interventions.

1. Method

1.1. Participants

The Netherlands Study of Depression and Anxiety (NESDA; www.nesda.nl) is an ongoing longitudinal cohort study. At baseline (2004–2007), participants were included in the study based on meeting the age criterion (18–65 years) and the presence of a depression or anxiety disorder ($n = 1701$), or if they were at-risk for or had a history of depression or anxiety ($n = 907$). A further 373 participants were included as the comparison group who reported no depression or anxiety currently or in the past, resulting in a final total sample of 2981.

Participants who met the criteria for other psychiatric disorders (e.g., psychotic disorder, severe addiction) or did not have a fluent command of the Dutch language were excluded from the study. A thorough overview of NESDA has been described elsewhere (Penninx et al., 2008). All participants provided written consent, and all participating institutions granted ethical approval (VU University Medical Center, Protocol number: 2003/183).

The present study makes use of data collected at baseline, the two-year follow-up (T2), the four-year follow-up, and the six-year follow-up. Participants were selected to form two groups: i) History of Depression; and ii) Recently Recovered. Diagnoses were determined with the Composite International Diagnostic Interview (CIDI; Robins et al., 1988, see measures section).

The history of depression subsample was determined by: 1) Selecting all participants who reported a history of either MDD and/or dysthymia at baseline and had not met the criteria for a depression for at least six months ($n = 815$); 2) Excluding those who had not completed measures of implicit SDA and explicit SDA at baseline (e.g., participation via telephone; $n = 63$); 3) excluding those missing at the two-year follow-up ($n = 74$) or missing at a later wave before recurrence was determined ($n = 62$). In the final sample of 616, 314 remained depression free in the six-year follow-up (51%) and 302 had an onset of a new depressive episode (49%; MDD and/or dysthymia).

The recently recovered subsample included participants who 1) reported MDD and/or dysthymia in the last month at baseline and no dysthymia and MDD for at least six months at the two-year follow-up ($n = 332$); 2) had completed measures of SDA at both baseline and T2 (excluded $n = 77$); 3) were not missing at follow-up before recurrence was determined (excluded $n = 35$). Of the final 220, 112 remained depression free at the four-year follow-up (51%), and 108 had a recurrence of depression (MDD and/or dysthymia) in the four-year follow-up (49%).

For the explorative analysis testing the pre-morbid vulnerability and scar hypotheses, participants were selected who 1) never had an episode of MDD or dysthymia at baseline, met the criteria for depression between baseline and the two-year follow-up ($n = 98$), and 2) had been depression free for at least six months at the two-year follow-up ($n = 27$). Four were missing at follow-up before recurrence could be determined and four had not completed measures of SDA at both baseline and the two-year follow-up. These were excluded from the relevant analysis. Of the 23 where recovery was determined, 19 remained depression free at the six-year follow-up and 4 had a recurrence of depression.

1.2. Measures

Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). A thorough overview of the depression IAT given at baseline and T2 in NESDA has been described previously (Glashouwer & de Jong, 2010). In brief, the depression IAT is a computer-based word-sorting task where words are presented from two target categories: *I* (I, myself, self, my, own) and *other* (other, you, they, them, themselves); and two attribute categories: *depressed* (useless, pessimistic, inadequate, negative, meaningless) and *elated* (positive, optimistic, active, valuable, cheerful; translated from Dutch). Participants sorted *depressed*- and *I*-related words with the same key and *elated*- and *other*-related words with the other key (pairing 1). This was repeated for two blocks of 20 trials. In the next test block, *elated*- and *I*-related words (and *depressed*- and *other*-related words) were sorted with the same key (pairing 2). Response and reaction time were recorded for each trial. The premise of the IAT is that the attribute and target categories that are more strongly associated for the participant are easier to sort when they share a key. A person with strong self-depressed associations is therefore expected to find it easier to sort words when *I* and *depressed* share a key than when *I* and *elated* share a key. For all participants, an anxiety IAT was given before the depression IAT (see Glashouwer & de Jong, 2010, for

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