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## Social identification and depression

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## RESEARCH ARTICLE

**Social identification and depression: A meta-analysis**Tom Postmes , Lenka J. Wichmann, Anne M. van Valkengoed & Hanneke van der Hoef

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**Abstract**

A meta-analysis of 76 studies ( $N = 31,016$ ) examined the relationship between social identification and depression. Overall, individuals who identify highly with a group tend to report less depression (average  $r_z = -.15$ ). However, a large amount of variability between studies was observed. The 95% prediction interval, which indicates the true effect size that can be expected in future research, ranged from  $r_z = -.50$  to  $.19$ . The relationship between depression and social identification is more complex than previously assumed. Some variability is related to the social identification measure used. Studies that focused on identification with interactive groups ( $r_z = -.28$ ) had larger effect sizes than studies that focused on social categories ( $r_z = -.11$ ). Moreover, studies of non-stigmatized groups ( $r_z = -.24$ ) had larger effect sizes than studies of stigmatized groups ( $r_z = -.10$ ). In conclusion, the structure and social identity content of groups appear to play an important role in the relationship between depression and social identification.

Depression is one of the most common mental disorders and causes of disability worldwide; one in five adults experience a depressive episode during their lifetime (World Health Organization (WHO), 2012). The WHO has declared that researching the antecedents of depression is a top priority in order to prevent depression and improve treatment programs (Lopez, Mathers, Ezzati, Jamison, & Murray, 2006). Depression is associated with impaired physical, social, and occupational functioning (McKnight & Kashdan, 2009). Within social psychology, researchers have studied the relationship between social identification, or the subjective perception of group membership, and depressive symptoms (e.g., Arbona & Jimenez, 2014; Bogart, 2015; Sani, Magrin, Scignaro, & McCollum, 2010). A narrative literature review by Cruwys, Haslam, Dingle, Haslam, and Jetten (2014) suggests that this social psychological approach to studying depression appears promising in providing new insights into the aetiology and treatment of depression.

In recent years, a sizable literature has examined the relationship between identification and depression in various contexts. It would be highly opportune to integrate these findings, because it appears that varying results are being reported in the literature and that many different operationalizations of depression and social identification are used across a wide variety of samples and groups. Accordingly, we believe there is a need for a synthesis of this burgeoning literature, with the goal to assess the

state of knowledge so far and to inform new studies on the topic. Against this background, the present article reports the results of a meta-analysis on the relationship between depression and social identification.

**Social Origins of Depression**

Depression is characterized by a range of symptoms such as anhedonia, apathy, depressive mood, and fatigue (American Psychiatric Association, 2013). Beyond its impact on mood states, depression is also associated with behavioural changes and cognitive impairments in social functioning, such as social withdrawal and social isolation (Kupferberg, Bicks, & Hasler, 2016). The resulting reduced social connectedness that is associated with depression is a core characteristic that distinguishes the condition from most other mental or physical illnesses (Hirschfeld et al., 2000). Hence, depression is not just an individual condition; it can be regarded as a social disorder (Cruwys, Haslam, Dingle, Haslam, et al., 2014).

Social functioning impairments can be seen as consequences or correlates of depression. But social factors are also considered prominent *causes* of depression (Ehsan & De Silva, 2015) alongside various biological and cognitive factors (Dobson & Dozois, 2011). For example, a prolonged period of perceived loneliness has been found to be predictive of depression long before its onset (Cacioppo, Hawkley, & Thisted, 2010;

Cacioppo, Hughes, Waite, Hawkey, & Thisted, 2006). More generally, perceiving a lack of social capital (the social network that an individual has access to, with the benefits this brings) has been found to be predictive of depressive symptoms (Ferlander *et al.*, 2016; Murayama *et al.*, 2013). Social factors do not only constitute long-term risk factors; often, social stressors such as the loss of a loved one can also function as a direct trigger for a depressive episode (Cruwys, Haslam, Dingle, Haslam, *et al.*, 2014; Tennant, 2002). Moreover, social functioning impairments tend to persist even after recovery from intra-individual symptoms such as depressive mood, which increases the risk of relapse (Kennedy, Foy, Sherazi, McDonough, & McKeon, 2007). In conclusion, although much emphasis in research has been put on how social functioning is impaired as a consequence of depression, there is evidence that social factors can also act as antecedents of depression (Cruwys, Haslam, Dingle, Haslam *et al.*, 2014).

Although there is a wealth of evidence documenting that social factors predict depression, there are also various processes that may account for this. A comprehensive theoretical framework might help explain the process by which social factors affect and are affected by depression, as well as how they can work as a buffer or treatment for depression. It has recently been proposed that social identity theory may offer a theoretical background to answer such questions (Cruwys, Haslam, Dingle, Haslam, *et al.*, 2014).

### A Social Identity Approach to Depression

The social identity approach proposes that the impact of factors such as loneliness, social capital, or the loss of a loved one depends on whether they affect a person's social identification (Cruwys, Haslam, Dingle, Jetten, *et al.*, 2014). This approach is based on the twin theories of social identity (Tajfel & Turner, 1979) and self-categorization (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). These theories were originally developed to explain group-mediated phenomena such as understanding the consequences of intergroup relations and intra-group processes for the self (e.g., Postmes & Branscombe, 2010; for an overview). One of the main contributions of this approach is the proposition that memberships of social groups have direct implications for a person's self-concept because social groups and relations can become an integral part of one's identity (e.g., Tajfel, 1972). It is because of this conceptual innovation that it becomes possible to explain why group events such as a victory at some national event can rouse strong personal emotions (Mackie, Devos, & Smith, 2000) or why societal phenomena such as discrimination can be experienced as personally hurtful (Schmitt, Branscombe, Postmes, & Garcia, 2014).

However, recent developments in the social identity approach have emphasized that social identities provide group members with more than just a personal

connection with a group's woes and good fortune. Social identification<sup>1</sup> plays a key role: It is one of the processes by which social identities are internalized. It has been argued that social identification plays an important role in mental health above and beyond the effects of, for example, social contact that is associated with group memberships (e.g., Haslam, Cruwys, & Haslam, 2014; Jetten, Haslam, Haslam, Dingle, & Jones, 2014; Sani, Herrera, Wakefield, Boroch, & Gulyas, 2012).

One reason why social identification can influence mental health and well-being is because it describes how people perceive themselves and their relations to others: Social identification structures how people interact with the world (Leach *et al.*, 2008). Cruwys, Haslam, Dingle, Haslam, *et al.* (2014) identified four key processes that might jointly explain how this affects mental well-being. First, within groups social identification allows for pro-social behaviors such as receiving and providing social support to take place (Haslam, Cruwys, Milne, Kan, & Haslam, 2016). Second, at the level of the individual's needs and emotions, social identification is related to well-being because feeling part of a group satisfies psychological needs such as the need to belong and the need for self-esteem (Greenaway, Cruwys, Haslam, & Jetten, 2016). Third, there are cognitive benefits because social identities (which can be internalized through identification) influence people's thoughts and behaviour. For example, social identification attenuates negative attribution styles that are associated with depression (Cruwys, South, Greenaway, & Haslam, 2015). Lastly, social identities benefit people because they provide knowledge and understandings about social relations between self and others in a broader network of societal relations among ingroups and outgroups. Identifying with a group thereby provides people with shared understandings and meaning (Haslam, Jetten, Postmes, & Haslam, 2009) and protects against existential anxiety (Sani *et al.*, 2012).

The social identity approach stresses that the benefits that stem from these group-related outcomes ultimately stem from the subjective internalization of groups and social relations into one's identity (Sani *et al.*, 2012). The effect of social identification on well-being should therefore go beyond the effects of "objective" indicators of group memberships such as the number of relationships or the frequency of social contact (Haslam *et al.*, 2014; Sani *et al.*, 2012). Moreover, the effects of these objective indicators and the associated secondary benefits (such as increased social

<sup>1</sup>Social identification was originally conceived by Tajfel (1978); as the positive emotional valuation of the relationship between self and ingroup (see Postmes, Haslam, & Jans, 2013, p. 3). As explained in Postmes *et al.* (2013), this is subtly but importantly different from Tajfel's definition of social identity as "the individual's knowledge that he [or she] belongs to certain social groups together with some emotional and value significance to him [or her] of the group membership" (Tajfel, 1972, p. 31).

support) are, according to this approach, dependent on whether people subjectively perceive themselves as part of the group. Finally, the well-being consequences of group membership should be positive irrespective of group size or amount of (intimate) contact with group members—identification with large social categories can also have benefits for health (or at least help buffer negative consequences of discrimination, cf. Branscombe, Schmitt, & Harvey, 1999).

### Empirical Evidence and the Need for a Meta-analysis

A considerable literature examines the link between social identification and depressive symptoms (Cruwys, Haslam, Dingle, Haslam, et al., 2014; for a recent review). Quite a few studies appear to support the idea that lower social identification is associated with increased risk of depression. Several correlational studies have shown that identification with meaningful groups is associated with lower levels of depression (e.g., Arbona & Jimenez, 2014; Bizumic, Reynolds, Turner, Bromhead, & Subasic, 2009; Sani et al., 2010; Savicki & Cooley, 2011; Walker, Wingate, Obasi, & Joiner, 2008), although the overall magnitude of the effect remains unclear. A few experiments have shown that identification, when manipulated, predicts changes in levels of depression and well-being (Cruwys et al., 2015; Haslam, Cruwys, Haslam, Dingle, & Chang, 2016; Haslam, Cruwys, Milne, et al., 2016). It has also been found that identification with multiple groups is related to lower levels of depression (Iyer, Jetten, Tsivrikos, Postmes, & Haslam, 2009). Finally, research suggests that social identification may act as a catalyst in interventions for depression as it may promote social support (Cruwys, Haslam, Dingle, Jetten, et al., 2014). Accordingly, recent reviews have concluded that social identity plays a key role in depression (Cruwys, Haslam, Dingle, Haslam, et al., 2014; Haslam et al., 2009).

Even though these findings appear to be supportive of the social identity approach to depression, there are some apparent inconsistencies that previous reviews have not adequately described or explained yet. At face value, there seems to be a high variability in effect sizes between individual studies (as the present meta-analysis shall confirm). Even though correlations between social identity and depression appear to be negative in some large studies (e.g., Sani et al., 2010), a few studies found non-significant correlations or even positive correlations between social identity and depression (e.g., Ai, Nicdao, Appel, & Lee, 2015; Chang, Jetten, Cruwys, & Haslam, 2017). To describe the magnitude of this heterogeneity, and to seek to explain it, is a prime goal for a meta-analysis that integrates these findings. Using meta-analytic techniques, one can assess how much of this heterogeneity is not attributable to random fluctuations, and if possible, assess what factors can explain this heterogeneity

(e.g., Cooper, Hedges, & Valentine, 2009). Several factors might be considered here.

First, different studies have assessed depression in quite different ways. Depression has been conceptualized as depressive mood (e.g., Haslam, O'Brien, Jetten, Vormedal, & Penna, 2005), as an emotion (e.g., Iyer et al., 2009), as a set of symptoms measured on a continuous scale (e.g., Arbona & Jimenez, 2014), or as a psychological disorder either present or not (e.g., Ai et al., 2015; Branscombe & Wann, 1991). Different scales have been employed to measure these different aspects of depression. As a consequence, it would be beneficial to systematically examine whether the relationship between social identification and depression differs across operationalizations of depression.

Second, studies vary in the instruments they use to measure social identification. Some studies use items from a unidimensional measure of social identification originally developed by Doosje, Ellemers, and Spears (1995; e.g., Sani et al., 2012). However, other studies use multidimensional measures of social identification, such as Cameron's (2004) tripartite model of social identity or the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). Although intercorrelations between different identification measures tend to be high, it cannot be assumed that all of these scales measure the same construct (for a discussion, see Postmes et al., 2013; Reysen, Katzarska-Miller, Nesbit, & Pierce, 2013). Examining this systematically is one of the goals of this meta-analysis.

Third, studies vary in what groups are being studied and what groups are mentioned in the social identification questionnaires. Many studies focused on identification with ethnic categories, such as Chinese or Filipino (Ai et al., 2015). Other studies have looked at social identification with schools (e.g., Bizumic et al., 2009), sports teams (Branscombe & Wann, 1991), sexual minorities (Boyle & Omoto, 2014), depression patients (Cruwys & Gunaseelan, 2016) or friends and family (Haslam et al., 2005). Across this broad variety of groups, we believe that one should not expect that identification with all these groups is equally beneficial in buffering against depression (cf. Crabtree, Haslam, Postmes, & Haslam, 2010; Cruwys & Gunaseelan, 2016; Jetten et al., 2014). Specifically, identification with groups that are *socially stigmatized* or groups that endorse or promote harmful norms can become *detrimental* to mental health and well-being (Crabtree et al., 2010; Cruwys & Gunaseelan, 2016; Cruwys, Haslam, Dingle, Haslam, et al., 2014). To investigate this hypothesis, the present meta-analysis will distinguish between stigmatized groups and non-stigmatized groups.

Another relevant difference between the groups being studied is that interactive groups can be associated with quite different effects than more abstract social categories. There is a large literature on the nature of the differences between these types of groups (e.g., Lickel, Hamilton, Wieczorkowska, Lewis, Sherman & Uhles, 2000; Wilder & Simon, 1998), and some

have argued that although identification is a relevant factor in both, the identifications in interactive groups tend to be based entirely on the strength of interpersonal relations (Prentice, Miller, & Lightdale, 1994). From a social identity perspective, it has been pointed out that these distinctions between interactive groups (e.g., families, friends) and social categories (e.g., racial identity, gender identity) are to some extent related to group size: Interactive groups tend to be smaller than social categories (Postmes, Haslam, & Swaab, 2005). Moreover, the extent to which the individual member derives a social identity from their membership tends to be more clear-cut in larger social categories (where one can say “I am female” or “I am black”). However, recent research has also shown that group members can derive strong social identities from small interactive groups too, and that these identities are not just based on interpersonal bonds but also on bottom-up inferences about “us” that are made on the basis of individuals’ actions (e.g., Jans, Postmes, & Van der Zee, 2012; Koudenburg, Postmes, Gordijn, & van Mourik Broekman, 2015; Postmes, Spears, Lee, & Novak, 2005; Swaab, Postmes, & Spears, 2008). The net result is that empirical research has shown that people can identify as much with social categories as with interactive groups. For this reason, according to the social identity approach identification *both* with small interactive groups *and* with large and relatively impersonal social categories can be beneficial to well-being. In theory, both could be equally beneficial.

However, there are many approaches that predict that group affiliation is associated with better health that mainly focus on benefits that can accrue from membership of smaller interactive groups. They predict that interactive groups would have stronger benefits for psychosocial health (and social categories very little or none). This is because according to these other theories, the benefits of group membership stem from, for example, the social capital that personal connections bring (De Silva, McKenzie, Harpham, & Huttly, 2005) or from the social support that such relations provide (Chu, Saucier, & Hafner, 2010). In large social categories, such benefits that stem from personal connections or from social support should be weaker. In this meta-analysis we shall therefore devote particular attention to group characteristics in order to gain more insight into the mechanisms underlying the relationship between social identification and depression.

### The Current Meta-analysis

In view of the variations in methods and results we believe there are good reasons to synthesize current findings that relate depression and social identification and to investigate which moderators play a role. To this end, this article reports a meta-analysis that sets out to answer the following questions. First, what is the central tendency of the strength of the relationship between social identification and depression across studies?

Second, what is the degree of variability of the effects of different studies in this field? Third, what factors can explain this variability, or, in other words, what moderating variables influence the relationship between social identification and depression? Based on previous research, we hypothesize specifically that systematic differences between groups help explain when identification is a particularly effective buffer against depression.

## Method

### Literature Search and Inclusion Criteria

We used the following criteria to determine whether studies could be included in the current meta-analysis. First, only studies that used measures that were explicitly focused on the constructs of interest, namely social identification and depression as defined in the introduction, were included. Studies that only focused on objective indicators of group membership such as frequency of contact were excluded. Studies that focused on aspects related to depression such as anxiety or self-esteem were also not considered.

Second, studies had to quantify both depression and social identification. Moreover, this relationship had to be expressed in one of the following measures of association: Pearson’s  $r$ , Spearman’s rho, or Kendall’s tau (Kendall, 1970). When studies measured both constructs quantitatively, but did not provide the underlying correlations upon which analyses were based (e.g., because they reported regressions or structural equation models), we contacted the author(s) and asked them to provide the necessary statistics. In this way we contacted authors of 14 papers, of whom 8 were able to provide us with the necessary statistics (a response rate of 57%).

A literature search was conducted that accumulated papers from multiple sources. Our starting point was the review paper by Cruwys, Haslam, Dingle, Haslam, et al. (2014). The authors present an overview of 16 studies from 10 published papers. One paper from this overview was not included, namely the study by Branscombe et al. (1999). We excluded this study, because it did not measure depression, but only included measures of negative affect. Therefore, we included 15 studies from 9 papers from this review.

Next, a search was conducted in the databases PsycINFO, Web of Science, and Scopus. In this search, use of the words *depression* or *well-being* in the title of the paper or in the keywords was combined with the following search terms: *Social identification*, *social identity*, *group identification*, *group identity*, *ethnic identity*, *belonging* and *social connectedness*. Figure 1 displays the selection process of the publications. The literature search led to the additional inclusion of 59 studies from 47 papers.

Finally, a search was conducted in EBSCOhost and ProQuest to retrieve unpublished studies from PhD theses. We found 2 studies from 2 theses that could be accessed and that met our inclusion criteria. In total,

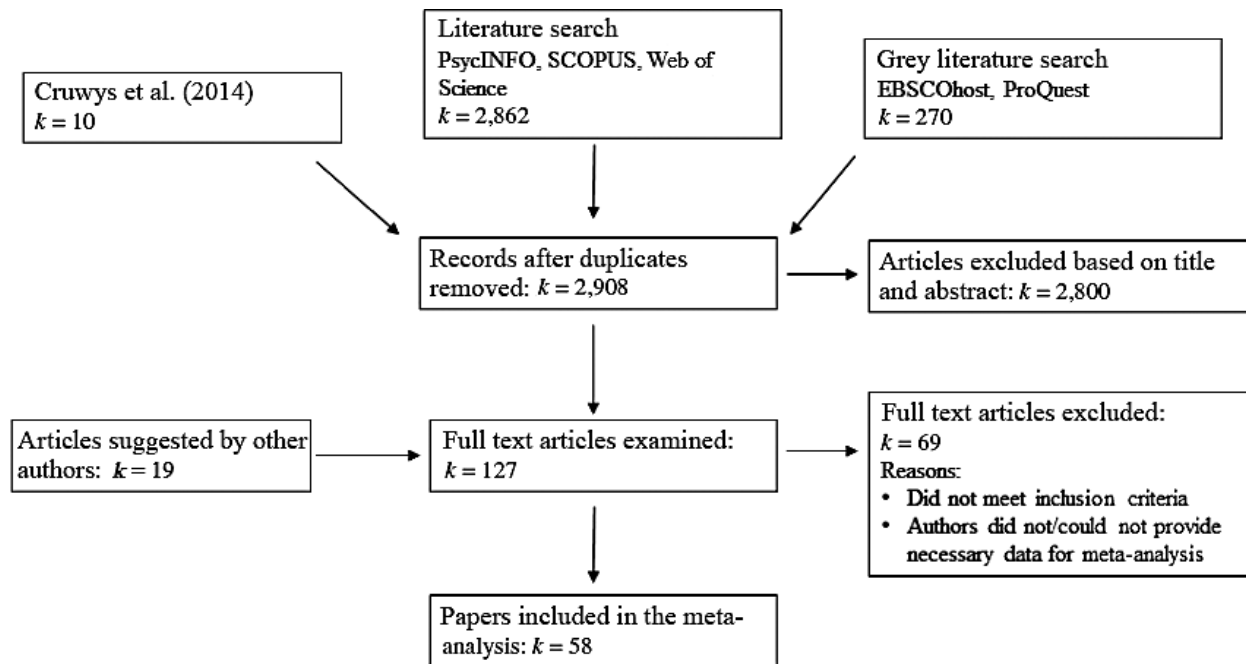


Fig. 1: Selection process of included publications

76 studies from 59 papers were included in the current meta-analysis.

### Data Coding

We coded each potential moderating variable described in the introduction. Coding was done by three authors (LW, AV, and HH). First, we coded which measure of depression each study used. We coded for the following frequently used measures: Centre for Epidemiology Studies—Depression (CES-D; Radloff, 1977), Beck's Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), Brief Symptoms Inventory-Depression subscale (BSI-D; Derogatis & Melisaratos, 1983), Depression Anxiety Stress Scale—Depression subscale (DASS-21; Lovibond & Lovibond, 1995), and Hospital Anxiety and Depression Scale—Depression subscale (HADS; Zigmond & Snaith, 1983). We coded revised or short-form versions of measures under the same category as the original measure. We coded any studies that used a different type of measurement instrument as "other". To determine inter-rater agreement between the three coders, we calculated Cohen's (1960) kappa for each pair of coders and took the median of these numbers as the estimate of agreement between the coders (Wirtz & Caspar, 2002). The median of Cohen's  $k = .87$  indicates a high percentage of agreement between the coders on this variable.

Next, we coded which measure of social identification was used in each study. We identified the following measures that were used frequently: Multi-Ethnic Identity Measure (MEIM; Phinney, 1992), the 4-item measure of social identification developed by Doosje *et al.* (1995) which, with adaptation, has been referred to as the four-item social identification scale (FISI,

Postmes *et al.*, 2013), the identity subscale of the Collective Self-Esteem scale (CSE, Luhtanen & Crocker, 1992), Karasawa's (1991) group identification scale, and the Multidimensional Inventory of Black Identity (MIBI; Sellers, Rowley, Chavous, Shelton, & Smith, 1997). Note that, as with the depression measures, we also coded revised or short-form versions under the same category as the original measure. We coded any studies that used a different type of measure as "other". Overall, interrater agreement on this factor was  $k = .69$ , reflecting a substantial rate of agreement.

Next, we coded whether studies focused on identification with a stigmatized or non-stigmatized group. We coded all groups that face negative prejudice or discrimination in a society as stigmatized (e.g., Jewish people, immigrants, women, members of the LGBT community). We explicitly considered the societal context in which the research was set when coding this variable, and closely examined whether the group was described as stigmatized in the introduction of each article. For example, one study describes how people from southern Italy are discriminated by their northern counterparts (Latrofa, Vaes, Pastore, & Cadinu, 2009). This group was thus coded as a stigmatized group. Examples of identities that were not coded as stigmatized include schools, families, and groups of friends. Overall, interrater agreement on this factor was  $k = .94$ , indicating an almost perfect agreement between the coders on this variable.

We also coded whether studies focused on interactive groups or social categories. As a guideline, we defined an interactive group as a group in which people interact frequently with the other members and in which it is plausible that you personally know most or all other members. For example, we coded identification with therapy groups, friends, and families as interactive

groups, while identification with demographic groups (e.g., nationality, ethnic identity, gender identity, sexual identity) were all coded as social categories. Some groups can feature in people's life as both an abstract social category (for example religion) and as smaller interactive groups (for example a church congregation or a bible studies group). In such cases, we informed our decision based on the content of the items measuring social identification, which by their nature reveal which type of group the respondents were focused on when answering the identification questions. Overall, interrater agreement on this factor was  $k = .84$ , reflecting a substantial rate of agreement.

In addition to these factors, we also coded for the following three variables; the mean age of participants, the percentage of women in the sample, and whether or not the study was conducted with students.

## Analysis

Effect sizes analyzed in this meta-analysis were obtained through the following procedures. First, we converted all non-Pearson correlations to Pearson correlations. That is, we converted Kendall's tau to Pearson's  $r$  using the following formula (Rupinski & Dunlap, 1996):

$$r = \sin(.5\pi\tau)$$

Similarly, Spearman's rho was converted to Pearson's  $r$  using the following formula (Walker, 2003):

$$r = 2\sin\left(\frac{\pi}{6}r_s\right)$$

For studies that reported multiple correlations, for example between two subscales of a social identity scale and depression, we took the average of all relevant correlations (Cooper et al., 2009). Similarly, for the eight studies that reported longitudinal data, we took the average of all correlations between social identification and depression calculated at each time point. We also included three experimental studies. The two studies reported in Cruwys, Haslam, Dingle, Jetten, et al. (2014) studied the effect of group therapy on depression. These studies measured social identification only at T2. Therefore, we took the correlations between depression and social identification and depression at T2. There was no control group to consider. Furthermore, Haslam, Cruwys, Haslam, et al. (2016) and Haslam, Cruwys, Milne, et al. (2016) also studied the effect of group therapy on depression. Again, we only considered the relationship between social identification and depression at T2. Since the control group did not complete measures of social identification, we did not include this group.

Next, all correlations were transformed to Fisher's  $z$  using the following formula (Borenstein, 2009):

$$r_z = 0.5 * \ln\left(\frac{1+r}{1-r}\right)$$

The transformed values are used in all statistical analyses below. Because of the broad variety of the methods and characteristics of the samples in the 76 included studies, the estimation of the average effect was based on a random-effects model, in accordance with current best practices in the field (Cooper et al., 2009). All analyses were conducted in R (version 3.4.3; R Core Team, 2016) using the *metafor* package (version 2.0.0; Viechtbauer, 2010).

## Results

### Descriptive Characteristics

Across the 76 studies, the total number of participants was  $N = 31,016$ , of which 58.5% ( $SD = 24.6$ ) were female. The mean age of the participants was 27.48 ( $SD = 13.67$ ) years. The ethnicity and backgrounds of the participants were highly diverse, including European, Latino, African-American, European-American, First Nation, various Asian countries and so forth.

### Central Tendency and Variability

Overall, the 76 studies included in the meta-analysis had a significant average weighted effect size of  $r_z = -.15$  (95% CI  $[-0.20, -0.11]$ ,  $Z = 6.95$ ,  $p < .001$ , see Figure 2). This result indicates that there is a small to moderate (Cohen, 1992) negative relationship between social identification and depression. Higher identification is associated with lower levels of depression. As can be seen in Figure 2 and in Figure 3, there is considerable heterogeneity between studies. Indices of heterogeneity between studies are substantial ( $Q(75) = 882.45$ ,  $p < .001$ ,  $\tau^2 = .030$  [.018;.042]), but in themselves such indices of heterogeneity are not easily interpretable. As explained by Higgins and Thompson (2002), one useful index of heterogeneity is  $I^2$ , which in the current meta-analysis was considerable ( $I^2 = 91.25\%$ ). We can conclude from this that 91% of the variability between studies is due to non-random between-study differences. More readily interpretable is the prediction interval, which estimates where the true effects are to be expected for 95% of similar studies that might be conducted in the future (e.g., Higgins, Thompson, & Spiegelhalter, 2009). In the present meta-analysis, the prediction interval ranges from  $r_z = -.50$  to  $.19$  (see Figure 2).

The statistics for heterogeneity suggest that it would be premature to conclude that results uniformly support the social identity approach. The amount of heterogeneity is perhaps best appreciated by inspecting the funnel graph of study effect sizes (Figure 3). This shows that variability is substantially larger than expected on the basis of chance alone. The triangular shape in the middle of Figure 3 indicates the range where effects are expected, based on the estimated average effect size. Of the 76 effect sizes, 47 are inside of this area. Based on chance alone, one would expect

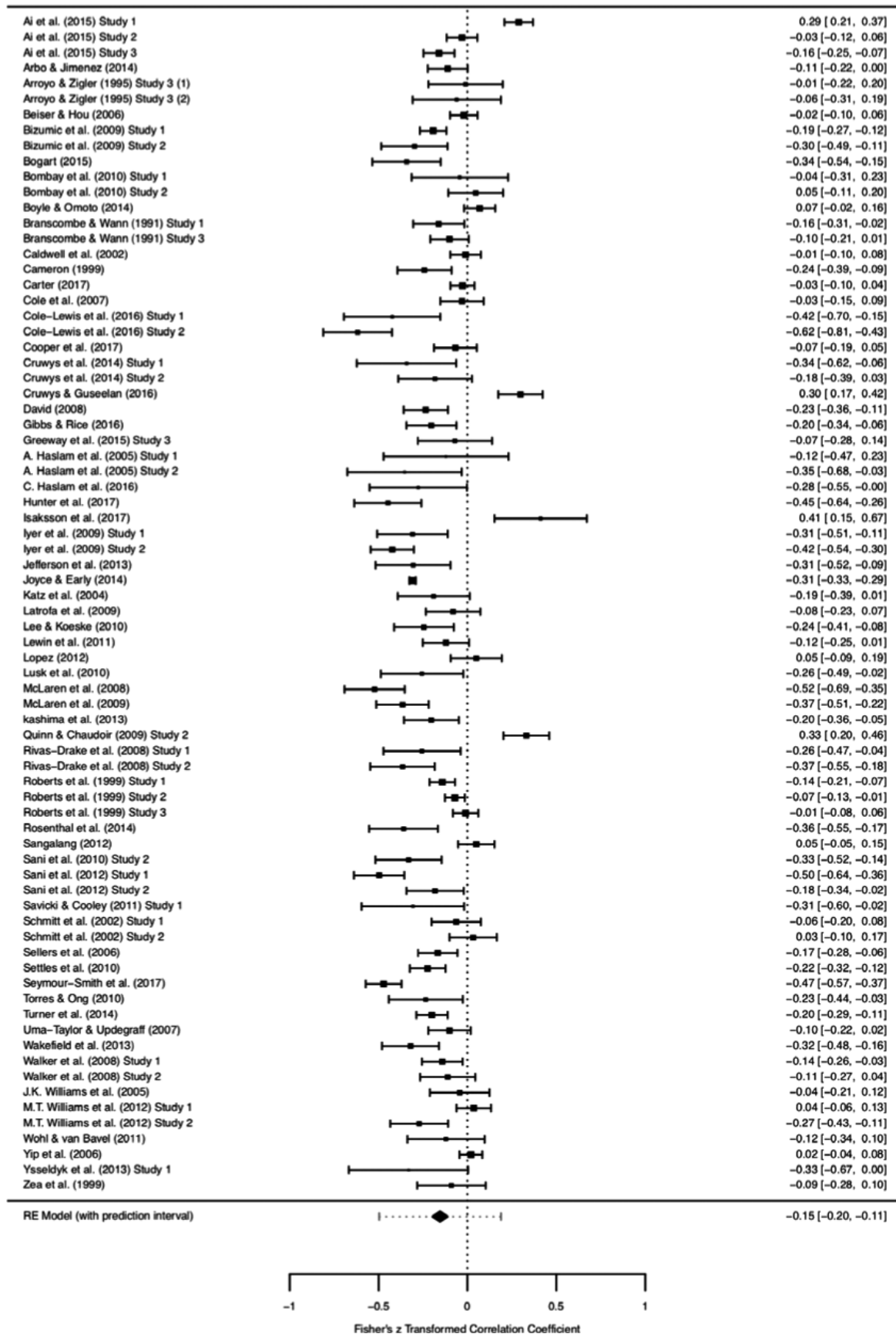


Fig. 2: A forest graph representing the average weighted effect size of social identification on depression and the effect sizes and confidence intervals per individual study



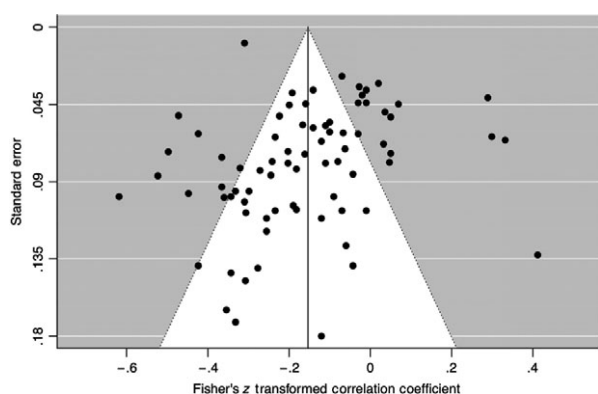


Fig. 3: Funnel plot for the effect of social identification on depression

a maximum of 5% of the total number (about four studies) to be outside of that area; the actual number of studies outside the area is 29. Figure 3 is also revealing because it shows that some quite large studies (i.e., studies with small standard errors) fall outside this area. In sum, statistics and visual inspection alike suggest that results are considerably more variable than would be expected on the basis of random variation alone.

In sum, it can be concluded that we cannot be certain of the overall central tendency. The relationship between social identification and depression appears to be heterogeneous across studies and thus more complex than previously assumed. Some studies show moderate to strong support for the social identity hypothesis. Others show none. Four studies show evidence in favor of the opposite hypothesis: Identifying more highly is associated with elevated levels of depression.

### Assessment of Publication Bias and Influential Data Points

In tandem with assessing the overall effects, it is good practice to check the distribution of results for possible publication biases and other distortions due to outliers. Duval and Tweedie's (2000) trim-and-fill method is a simple method to inspect problems related to publication bias in meta-analysis. This method assumes that at any fixed level of  $\sigma^2$ , studies will be normally distributed around the true mean effect size. If the selected studies on which the meta-analysis is performed indeed suffer from publication bias, this will be revealed through an asymmetric distribution of the studies around the mean effect. This asymmetry can be inferred either informally through inspecting the funnel plot or more formally by using Egger, Smith, Schneider, and Minder's (1997) regression test for funnel plot asymmetry. In our meta-analysis, some asymmetry can indeed be seen in the funnel plot (see Figure 4). There appears to be a lack of studies reported on the right side of the funnel plot. Egger et al.'s (1997) regression test corroborates this suggestion ( $Z = -2.57$ ,  $p = .01$ ).<sup>2</sup> This indicates that some

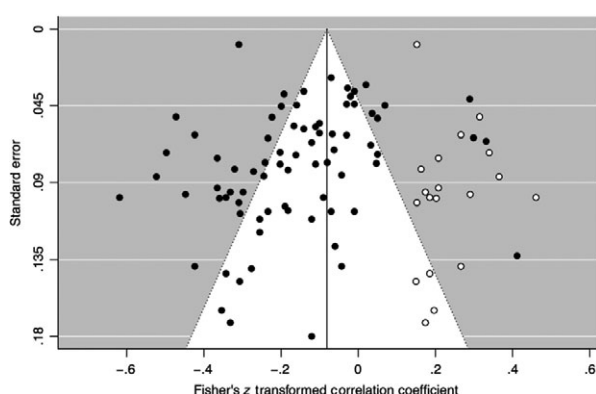


Fig. 4: Funnel plot with imputed values

degree of publication bias might be influencing our results.

Because asymmetry suggests that studies appear to be missing from the right side of the funnel plot, this could influence our estimation of the central tendency, which is a small negative relationship between depression and social identification. It may be so that this effect is only observed because the studies that show no relationship are missing due to publication bias. Using Duval and Tweedie's (2000) trim-and-fill method, eight values were imputed to simulate the unpublished studies (see Figure 4). The central tendency was then re-calculated based on the included studies and the imputed data. This reveals that the overall effect is still significant ( $r_z = -.08$ ,  $p = .001$ ,  $CI = [-0.13; -0.03]$ ), even though this value is smaller than the originally estimated effect size. Hence our main effect appears to be robust and remains significant even if there would be some publication bias.

The funnel plot with imputed values (Figure 4) shows that the heterogeneity of the results between studies would further increase if unpublished studies were included. Including the imputed values increases the heterogeneity index  $I^2$  to 95.05%, with a 95% prediction interval of  $r_z = -.51$  to  $.35$ . This supports our previous conclusion that the relationship between depression and social identification is highly variable. Additional analyses contained in the supplementary materials (Figure S1) suggest that the imputed values are not due to underrepresentation of effects with non-significant results: Many of the imputed values would have been significantly different from zero. We suggest that the reason for the asymmetry of the plot may be a different one: It is possible that the samples which show positive effects come from populations which are non-mainstream groups and which are thus more difficult to collect data from. We will elaborate on this in the discussion.

Finally, we also conducted outlier and influential case analyses. Results suggested that there were no influential data points. We conclude that there is no reason to assume that the results reported here are caused by individual studies or effects.

<sup>2</sup>Egger et al.'s (1997) test employs an  $\alpha$ -level of .10.

## Moderation Effects

Due to the sizable variability that is observed, we conclude that the relationship between depression and social identification is not straightforward but rather complex. To somewhat clarify the observed variability in the relationship, mixed-effects analyses were performed to test if some of the heterogeneity in effect sizes could be accounted for by the possible moderators, as discussed in the introduction.

Table 1 summarizes the effects of the continuous moderators that were coded. None of the study characteristics explained a significant amount of variance. There was no significant relationship between effect sizes and sample size ( $Q = 0.42, p = .67$ ), the percentage of women ( $Q = 0.33, p = .74$ ), mean age of the participants ( $Q = 0.79, p = .43$ ), or the year of publication ( $Q = 1.13, p = .26$ ).

Table 2 summarizes the effects of the categorical moderators. Results suggest that the heterogeneity in results cannot be accounted for by the measure of depression that was used ( $Q = 3.88, p = .56$ ). Differentiating between student and non-student samples also did not explain significant variability ( $Q = 0.62, p = .54$ ). But the other moderators did explain substantial amounts of variability between studies. What measure of social identification was used made a substantial difference to the average effect size found ( $Q = 17.13, p = .004$ ). This explained 18.96% of the total heterogeneity. Inspection of the effects in Table 2 shows that studies using the four-item identification scale FISI originally proposed by Doosje et al. (1995) and adjusted by Postmes et al. (2013) obtained relatively strong effects ( $r = -.38, p < .001, CI [-0.51; -0.24]$ ). Studies using the identity subscale of the CSE scale (Luhtanen & Crocker, 1992) reported relatively small effects ( $r = .02, ns, CI [-0.12; 0.17]$ ). Notably, a large group of studies used Phinney's (1992) multi-group ethnic identity measure, with an average effect somewhere in between these extremes ( $r = -.13, p = .002, CI [-0.22, -0.05]$ ). In assessing this result, it should be taken into account that the MEIM scale is used for ethnic minority samples only and this effect may therefore be confounded with the nature of the group it has been administered to.

Two group characteristics were coded and these also explained a sizable amount of variance. The nature of the group, whether it was an interactive group or a

social category, was a significant moderator ( $Q = 12.76, p < .001$ ). This explained 16.84% of the total heterogeneity. Studies focusing on identification with interactive groups had an average weighted effect size of  $r_z = -.29, 95\% CI [-0.37, -0.20]$ , and studies focusing on identification with social categories had an average weighted effect size of  $r_z = -.11, 95\% CI [-0.16, -0.07]$ . Thus, studies that focused on interactive groups report a stronger negative relationship between social identification and depression than studies focusing on social categories.

Furthermore, the degree to which the group was stigmatized or not also had a sizable impact on the study results ( $Q = 9.94, p = .002$ ). This explained 13.45% of the variance. In groups that were not stigmatized there was quite strong support for the social identity hypothesis, with an average effect size of  $r_z = -.24 [-.31, -.17]$ . In stigmatized groups, the effect was substantially smaller, although still significantly different from zero,  $r_z = -.10 [-.16, -.05]$ .

In principle it would be possible to assess the combined impact of moderators that explained part of the heterogeneity (identification measure, group type and stigma) to see how much variance they, together, can account for. However, in doing so it is worth checking the cell sizes of the combined model. Based on this inspection, we decided against including the identification measure as a moderator in this multivariate model: Because so many different measures were used, cell sizes would become too small.

Inspection of the model combining group type and stigma revealed that they jointly explained slightly more variance (18.56%) than each factor on its own did (16.84% and 13.45%, respectively). This analysis is complicated by the fact that nearly all studies of stigmatized groups measured social identification at the level of the entire social category ( $k = 41$ ) and almost none measured identification with stigmatized groups that are interactive ( $k = 3$ ). Due to this small number of studies in one of the "cells" when these two factors are combined, the joint impact of these two variables cannot be disentangled well with the present dataset. Moreover, the small number of studies in one cell means that the stability of the findings cannot be guaranteed.

Nevertheless, it is descriptively interesting to examine the average effect sizes for the four subsets of studies separately. Effect sizes in the  $k = 12$  studies of non-stigmatized social categories were stronger ( $r = -.20, CI [-0.30; -0.10]$ ) than effects in the  $k = 41$  studies of stigmatized social categories ( $r = -.09, CI [-0.15; -0.04]$ ). Effect sizes in the  $k = 16$  studies of non-stigmatized interactive groups were also very slightly stronger ( $r = -.29, CI [-0.38; -0.20]$ ) than effects in the  $k = 3$  studies of stigmatized interactive groups ( $r = -.26, CI [-0.50; -0.04]$ ), but as signalled by the very wide confidence interval there are really not enough studies in this cell to make inferences possible yet. In sum, we conclude that no statistical

**Table 1.** Moderation tests for quantitative moderators, influencing the relation between social identification and depression

Moderator	$Q$	$p$	$F^2$ (%)
Sample size	0.42	.67	.00
Percentage of women	0.33	.74	.00
Age	0.79	.43	.00
Year of publication	1.13	.26	.07

Note:  $Q$  = test of moderator effect (chi-sq distributed) and  $F^2$  = percentage of heterogeneity accounted for.

**Table 2.** Moderation tests for categorical moderators, influencing the relation between social identification and depression

Moderator	$r_z$	95% CI	$k$	$Q$	$p$	$R^2$ (%)
Total	-.15***	[-.20; -.11]	76	882.45	<.001	
Depression measure						
CES-D	-.14**	[-.22; -.05]	21	3.88	.56	0.00
BDI	-.11*	[-.20; -.01]	16			
DASS21	-.23**	[-.36; -.09]	8			
BSI depression subscale	-.16	[-.39; .07]	3			
HADS	-.33*	[-.61; -.06]	2			
Others	-.16***	[-.24; -.09]	26			
Social identification measure						
MEIM	-.13**	[-.22; -.05]	17	17.13	.004	18.96
FISI	-.38***	[-.51; -.24]	8			
CSE	.02	[-.12; .17]	6			
MIBI	-.14*	[-.28; -.01]	6			
Group identification scale	-.11	[-.35; .13]	2			
Other	-.15***	[-.21; -.09]	36			
Group type						
Social categories	-.11***	[-.16; -.07]	56	12.76	<.001	16.84
Interactive groups	-.29***	[-.37; -.20]	19			
Group stigma						
Not stigmatized	-.24***	[-.31; -.17]	29	9.94	.002	13.45
Stigmatized	-.10***	[-.16; -.05]	44			
Students vs. non-students						
Students	-.14***	[-.20; -.08]	36	0.62	.54	0.00
Non-students	-.17***	[-.23; -.11]	40			

Note: BDI, Beck Depression Inventory; BSI, Brief Symptom Inventory; CI, confidence interval; CES-D, Center for Epidemiologic Studies Depression Scale; CSE, identification subscale of the Collective Self-Esteem scale (Luhtanen & Crocker, 1992); DASS21, Depression, Anxiety and Stress Scales short form; FISI, Four-item social identification measure (Postmes et al., 2013, adapted from Doosje et al., 1995); HADS, Hospital Anxiety and Depression Scale;  $k$ , number of studies; MEIM, Multigroup Ethnic Identity Measure (Phinney, 1992); MIBI, Multidimensional Inventory of Black Identity (Sellers et al., 1997);  $p$ ,  $p$ -value;  $Q$ , test of between-group differences;  $R^2$ , percentage of heterogeneity accounted for by moderator;  $r_z$ , correlation between SI and depression for level of moderator (Fisher's  $Z$  transformed).

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

inferences can be drawn from the multivariate analysis yet. Descriptively, the pattern of results is consistent with the conclusion that identification is associated with lower levels of depression particularly in interactive groups and in non-stigmatized groups and that the results of these two appear to be additive.

## Discussion

Research linking social identification and depression can have important implications for the way in which depression is understood and subsequently treated. This study is the first to synthesize findings from this literature using meta-analytic techniques. Overall, the central tendency of our results indicates that there is a negative relationship of a small size between these two constructs. Therefore, this meta-analysis provides evidence to support the claim that social identification and depression are connected, as suggested by the social identity approach (Cruwys, Haslam, Dingle, Haslam, et al., 2014).

However, the results also suggest that there is substantial variability between studies. While a small negative relationship was observed overall, this effect did not consistently appear across all studies considered in the meta-analysis. Effect sizes ranged from strongly negative to medium positive. Even studies with

relatively large sample sizes showed sizable amounts of variability. This suggests that the observed variability is not likely to be due to random fluctuations. Additionally, the assessment of publication bias indicated that positive effects may be underrepresented in the current analysis. While the trim-and-fill method showed that this does not invalidate our estimation of the central tendency, it does further strengthen the conclusion that the heterogeneity between studies is considerable. Therefore, we conclude that the relationship between depression and social identification is highly heterogeneous. It would be erroneous to conclude that identification and depression are always related. Rather, this conclusion appears to be contingent on other variables and contextual factors.

To gain more insight into potential reasons for the heterogeneity of results, several moderators were tested. Various moderators had no substantial influence. These included the sample size, the average age of the participants, the percentage of women in the sample, whether the study was conducted with students, and what measures were used to assess depression. More consequentially, the operationalization of social identification played a substantial role. Most of the identification measures used showed a small to moderate relationship. There were two exceptions. The largest effects tend to be obtained in studies using the Four-Item Social Identification scale (FISI, Postmes

et al., 2013) that was originally proposed by Doosje et al. (1995) and has since undergone slight modifications (e.g., Leach et al., 2008). In the meta-analysis, the subset of six studies using Luhtanen and Crocker's (1992) identification subscale of the CSE scale had the smallest overall effect (which was essentially zero).

We inspected study characteristics to find reasons why FISI could have had stronger effects than CSE, but we did not find any obvious reasons for this. For example, one possible reason we explored is the hypothesis that the studies which measured CSE tended to use qualitatively different samples, such as heavily stigmatized groups. But on this point we did not find very clear-cut differences between the groups. Although several studies measuring CSE have sampled relatively rare and "specialized" groups (e.g., young sexual minority women in Boyle & Omoto, 2014; students with a concealed identity in Quinn & Chaudoir, 2009) others did not (e.g., Katz, Swindell, & Farrow, 2004; measured identification with women in a college sample). Moreover, the subset of studies measuring identification with the FISI scale also contained several studies which sampled relatively specialized groups (e.g., transgender women in Jefferson, Neilands, & Sevelius, 2013; young African American mothers in Lewin, Mitchell, Rasmussen, Sanders-Phillips, & Joseph, 2011). Thus, a more likely explanation is that FISI and CSE tap into somewhat different aspects of social identification; indeed a recent paper documented that the interrelation between the two tends to be in the region of  $r = .50$ , suggesting these measures have substantial unique variance (Reysen et al., 2013). But ultimately, without further in-depth systematic investigation of the reasons why FISI has much stronger effects than CSE, we can only speculate about the reasons for this.

More central to the current meta-analysis is the fact that there were significant effects of the two moderators related to the nature of groups under investigation. One important finding was that, as predicted by the social identity approach, the beneficial effects of social identification are particularly strong for non-stigmatized groups (average weighted  $r = -.24$ ). The benefits for stigmatized groups are much smaller (although significantly different from zero,  $r = -.10$ ). This finding is consistent with various suggestions in the literature that identification with stigmatized groups can have a mixture of positive and more negative consequences for well-being (Crabtree et al., 2010; Jetten et al., 2014).

Another variable that explains a considerable amount of variance is whether the groups were interactive groups or social categories. Consistent with a broad range of meta-theoretical assumptions about social influence, intimacy, and interdependence, the association between identification and (lower) depression was stronger in small interactive groups (average weighted  $r = -.29$ ). But at the same time, it was striking that even for large social categories, social identification still is associated with depression in the way that the social

identity approach suggests it should be ( $r = -.11$ ). This is therefore a theoretically important finding that can be interpreted in two non-exclusive ways. On the one hand, the findings show that, overall, identification with (larger, abstract) social categories is associated with lower levels of depression—a finding which is not easily attributed to the benefits of social capital or social support and which therefore speaks to the additional benefits that identification may bring with respect to meaning and the satisfaction of psychological needs (cf. Haslam et al., 2009). On the other hand, the finding shows that small interactive groups are more likely to have a direct and strong impact. This is something which future research in this domain will need to devote special attention to, because in those small groups it is no longer clear that identification per se is the main driver of these effects, completely independently of the benefits such as social support or being physically involved and included that person-to-person social interaction may bring. In other words, in social contexts such as these it becomes more important to isolate the specific contribution of social identity to depression.

A final consideration with respect to the impact of interactive groups versus larger social groups is that a recent meta-analysis suggests that with respect to the health benefits of organizational identification there is no difference between identification with one's work team and identification with the entire organization (Steffens, Haslam, Schuh, Jetten, & van Dick, 2017). This points to the possibility that identification with an entire social category might be qualitatively different from identification with one's organization. We speculate that the main reason for this may be that people tend to view their organization as positive (and if they do not, they can attempt to exit). As noted above, there are many social categories which carry stigma and which are not as easily left behind; and as shown above, stigma explains part of the variance in the current meta-analysis.

### Strengths and Limitations of this Meta-Analysis

This review represents a first effort to systematically examine the literature on the relationship between social identification and depression using meta-analysis. We believe that the results are robust and reliable, partly due to the statistical power and reduced standard error (Fagard, Staessen, & Lutgarde, 1996). Moreover, we draw confidence from the fact that not only were we able to assess that there was considerable variability between studies, but we were also able to identify several factors that account for part of this variance (Cooper et al., 2009). Our confidence in the results is strengthened by the outlier analysis (Viechtbauer & Cheung, 2010) and the fact that the trim-and-fill procedure (Duval & Tweedie, 2000) indicated that the estimated central tendency was not influenced by possible publication bias or due to a few particularly influential data points.

This review also has some limitations. Since this review included mostly correlational studies, we can make no assertions about the causality between depression and social identification. Moreover, the review did not consider studies that looked at identification with multiple groups (e.g., Sani, Madhok, Norbury, Dugard, & Wakefield, 2015). Additionally, because this research included only three experimental studies, it was not possible to conduct an in-depth analysis of the differences between correlational and experimental studies.

### Recommendations for Research

While this meta-analysis could account for some of the heterogeneity between studies, a sizable amount remained unexplained. This reflects the state of the current research and indicates that much remains unknown about the relationship between social identification and depression. The following section will outline some suggestions for future research.

First, there are overarching observations that stem not so much from the meta-analysis as from the literature search that preceded it. It is noticeable that the majority of studies in this search have been published since 2008 and nearly all of the studies that could have been included in the meta-analysis were correlational studies. Given the fact that so many studies have now examined these associations with correlational designs and given the fact that we can gain a decent picture of the mean tendency and spread of effects, we suggest that future research should focus on other than correlational designs (in particular longitudinal and experimental ones) in order to assess causal relations and processes involved in a more systematic and thorough way.

Moreover, also in relation to the characteristics of the studies that were found, we were struck that each of those studies targeted a specific social group and social context (e.g., identification with fellow nationals, women, students or some minority group) and assessed the hypothesis that differences in group identification *within* those contexts might account for differences in well-being and depression. But since we have demonstrated, in this meta-analysis, that there is considerable between-study variability which can only be partly attributed to methodological differences, we conclude that future research should focus more on differences *between groups*. Identification with one group may not have the same effects as identification with the other. This means that future study designs should employ a multilevel setup where between-group differences in identification effects can be assessed at the same time as within-group differences in levels of identification (e.g., see Jans, Leach, Garcia, & Postmes, 2015).

Second, there are a series of implications for research that follow from the findings of the review more specifically. This meta-analysis found that group

characteristics such as stigma and group type explained a considerable amount of between-study difference. This suggests that future research would do well to examine these factors more closely. Whilst the social identity approach is well-equipped to explain why group identification endows group members with cognitive resources that buffer against depression (Cruwys, Haslam, Dingle, Haslam, et al., 2014), it is not so well-equipped to explain these between-group differences. For example, from the vantage point of social identity theory and self-categorization theory, it cannot easily be explained why the structure of groups (interactive or categorical) should make any difference for the strength of the relationship between social identification and depression. Similarly, prior work in this tradition has assumed that identification with stigmatized groups can have benefits for well-being (Branscombe et al., 1999). The present findings can be explained by proposing that these benefits may cease (or identities may even become toxic) in those cases where the identity content of stigmatized groups is such that high identifiers come to see *themselves* as bad or unworthy people.

We believe that in order to make advances in these two domains, future research would do well to consider the moderating impact of the structure and identity content of groups more closely. The objective should be to integrate such factors into a more holistic model of social identification and depression. Such a model can potentially help to explain under which circumstances the relationship between social identification and depression is maximal, and under what conditions it becomes zero or even negative. Developing such a model could take into account recent attempts to account for structural differences between groups (e.g., Postmes, Haslam, et al., 2005; Postmes, Spears, et al., 2005; Lickel et al., 2000) as well for differences in identity content (e.g., Turner-Zwinkels, Postmes, & van Zomeren, 2015). Third, it is noticeable that most studies included in this meta-analysis have not yet been able to find strong evidence for the processes by which social identification has beneficial effects for depression. Cruwys, Haslam, Dingle, Haslam, et al. (2014) outline four different mechanisms by which social identification could affect depression and well-being. It remains unclear which of these mechanisms is most important, how these mechanisms may interact in bringing about mental health benefits, and how contextual factors can influence this. Therefore, it is critical to study specifically what the “active ingredients” of social identification are that might play a role in depression (Haslam et al., 2014). Clearly, future research would do well to delve deeper than the superficial relationships between identification and depression to ask why, in the cases where the relationship between the two is there, the two are related.

Finally, we suggest that it could be enlightening if future studies consider using depression measures that tap into a wider scope of symptoms, such that

not only depression and mood states are assessed, but also the more specific social functioning impairments associated with depression (Kupferberg *et al.*, 2016). Using more specific measures of depression might contribute to understanding what aspects of depression are influenced by social identification, and thereby shed additional light on the process by which identification can help buffer individuals from depression.

### Recommendations for Practice

The current results offer some indication that social identities play a role in depression. Looking beyond a person's inter-individual functioning and considering group identification can increase understanding of their experience of depression (Smith & Silva, 2011). Additionally, a person might be unaware of the role that social identities can play in their well-being. Informing them of the effect of perceptions of group membership on well-being may increase a person's knowledge about depression and increase their sense of control. Research suggests that this can support patients in identifying personal sources of depression and ultimately help to overcome depression (Gabriel & Violato, 2011). Recently, the "groups 4 health" intervention has been developed to make people aware of the relevance of social identities and help them develop a network of supportive social identities (Haslam, Cruwys, Haslam, *et al.*, 2016).

Some caution is also in order: This review found that the relationship between depression and social identification is highly variable across studies, and that it is therefore not a reliable "cure" in all social contexts. For example, one study found that stronger social identification positively related to depression for Chinese participants living abroad (Ai *et al.*, 2015). Promoting social identification may thus potentially backfire for some groups. This might limit the usability in practice of this approach, since it is still unclear what contextual factors might influence the relationship between social identification and depression. Therefore, more theoretical development is required before steps are taken towards designing and testing *generic* treatment programmes.

Nevertheless, this review also provides indications for the ways in which such treatment programmes are likely to become effective. One central finding is that for interactive groups, the negative relationship between social identification was more pronounced. This is important information regarding the inclusion of social identification strategies in current therapy programmes. The use of treatment groups for depression patients might be particularly effective if such a group is kept small and concrete. Another central finding is that effects were smaller for stigmatized groups. This implies that treatment programmes may be more effective if a clinical condition or problematic identity

is not at the heart of the social identity of the group that is being formed.

An alternative suggestion might therefore be to promote patients' identification with other, already existing groups, whether they revolve around sports, music, arts and crafts, meditation, bird watching, religion, politics, neighborhood activities or any other shared interests or activity (Jetten *et al.*, 2014). Again, such an intervention should ideally be aimed at increasing identification with concrete groups. It must be kept in mind, however, that the current results were obtained from studies that mostly used subclinical populations. The actual effectiveness of such interventions cannot yet be guaranteed for depression patients. Therefore, developing such treatment programmes that are aimed at increasing social identification may be an important next step in research, but it may be premature to develop large-scale interventions yet.

### Conclusions

Based on 76 studies published in 59 papers, this meta-analysis indicated that, overall, there is a small and negative relationship between social identification and depression. The relationship was found across different participant groups and different conceptualizations of depression and social identification. However, this result needs to be interpreted carefully, as the relationship between depression and social identification is neither straightforward nor uniform. Our results indicate that substantial variability exists across studies. Part of this variability can be accounted for by distinguishing between interactive groups and social categories, and between stigmatized and non-stigmatized groups. This confirms that the structure of the group and its identity content may play a key role in the relationship between social identification and depression. This suggests new insights that the social identity approach can, in future, incorporate in the development of this promising approach. In conclusion, the social identity approach to depression receives considerable support, but also requires further theoretical developments in order to realize its full potential in preventing and treating depression.

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### Conflicts of Interest

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web-site. References included in the meta-analysis can be found in the Supporting Information.

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