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Research paper

Self-disgust as a potential mechanism explaining the association between loneliness and depression

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ABSTRACT

Background: Loneliness and self-disgust have been considered as independent predictors of depressive symptoms. In the present study, we hypothesized that self-disgust can explain the association between loneliness and depression, and that emotion regulation strategies interact with self-disgust in predicting depressive symptoms.
Methods: Three hundred and seventeen participants (M = 29.29 years, SD = 14.11; 76.9% females) completed structured anonymous self-reported measures of loneliness, self-disgust, emotion regulation strategies, and depressive symptoms.
Results: One-way MANOVA showed that participants in the high-loneliness group reported significantly higher behavioural and physical self-disgust, compared to those in the middle and low-loneliness groups. Bootstrapped hierarchical linear regression analysis showed that self-disgust significantly improved predicted variance in depressive symptoms, after controlling for the effects of loneliness. Regression-based mediation modelling showed that both physical and behavioural self-disgust significantly mediated the association between loneliness and depression. Finally, moderated regression analysis showed that expressive suppression interacted with self-disgust in predicting depressive symptoms.
Limitations: A cross-sectional design was used, and our study focused on expressive suppression and cognitive reappraisal but not on other aspects of emotion regulation or the modulation of emotional arousal and responses.
Conclusions: We demonstrated, for the first time, that self-disgust plays an important role in the association between loneliness and depressive symptoms. Furthermore, variations in emotion regulation strategies can explain the association between self-disgust and depressive symptoms.

1. Introduction

Depression is the leading cause of disability and one of the most common mental health problems worldwide (World Health Organization (WHO), 2017). More than 300 million people of all ages are currently living with depression, with a sharp increase in prevalence of over 18% from 2005 to 2015. At its worst, depression can become lethal, particularly in young adults (15–29 years) as more than 800.000 people die each year from suicidal depression, and from depression-related cardiovascular disease (Nemeroff and Goldschmidt, 2012; WHO, 2017). Understanding the factors that trigger depressive symptoms and lead to clinical states of depression is important for informing theories of depression, as well as clinical practice and treatment. Research has shown that, amongst other antecedents, risk factors for depression include psychological characteristics, such as perceived loneliness/social isolation (e.g., Cacioppo et al., 2010), self-blaming emotions (Zahn et al., 2015), and maladaptive emotion regulation strategies (Joormann and Gotlib, 2010). Although these factors have been independently associated with depression, it remains unknown how they are interrelated with depressive symptomatology.

1.1. Loneliness as a risk factor for depression

Loneliness is defined as the perceived discrepancy between a person's social needs and the degree to which these needs are satisfied through meaningful social interactions (Cacioppo and Hawkley, 2009; Rokach 2011). Approximately 15–30% of the general population experience feelings of loneliness as a chronic condition (Heinrich and Gullone, 2006) with considerable consequences for physical and psychological wellbeing. Longitudinal data indicate that loneliness predicts

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morbidity and mortality across different age groups (Caspi et al., 2006; Eaker et al., 1992; Hawkley et al., 2003; Penninx et al., 1997; Thurston Kubzansky, 2009). Moreover, loneliness has been associated with psychological disorders including depression (Cacioppo et al., 2006; Cacioppo et al., 2010; Luo et al., 2012; Neeleman and Power, 1994; Weeks et al., 1980). Although loneliness and depression were once thought to reflect the same psychological condition (Peplau and Perlman, 1979; Weiss, 1973), evidence (Weeks et al., 1980) showed that loneliness and depression were psychometrically distinct but correlated constructs; they were both stable over time; and that they may share some common causal origins (e.g., salience of personal problems). Longitudinal studies have demonstrated that loneliness is a risk factor for depressive symptoms over and above differences in age and gender, life stressors, negative affectivity, and social support in young and older adults (Cacioppo et al., 2010; Luo et al., 2012), and that childhood loneliness is a prospective risk factor for depressive symptoms in adolescence (Qualter et al., 2010). In fact, loneliness has been found to predict depressive symptoms longitudinally even after controlling for baseline measures of depressive symptoms and socio-demographic factors in both older (Cacioppo et al., 2006) and younger adults (Wei et al., 2005), but loneliness was not found to longitudinally predict depressive symptoms (Cacioppo et al., 2010).

Several studies have shown that feeling socially isolated induces negative affective states characterized by hypervigilance and attentional bias towards threatening stimuli, and the tendency to misperceive social encounters as threatening to the self (i.e., social threats; Cacioppo et al., 2015; Cacioppo and Hawkley, 2009; Hawkley and Cacioppo, 2010). Brain imaging studies have also shown that individuals with higher loneliness scores perceive and remember social information as more threatening, as compared to non-social stimuli (e.g., Cacioppo et al., 2009, 2014). Cacioppo et al. (2006, 2015) suggested that, if left untreated, the effects of loneliness on cognition and emotion progressively lead to greater social withdrawal and isolation, contributing to the development of negative thoughts (e.g., rumination) towards social interactions, and potentially lead to the development of depressive symptoms.

Evidence has particularly supported the notion that lonelier individuals experience negative thoughts and feelings towards themselves, characterized by self-blame, low self-worth, dysphoria, and lower self-esteem, which then feed into greater loneliness, social isolation, and mental health problems including depression (Cacioppo et al., 2006; Masi et al., 2011). In support of this argument, Beck (1967) suggested that negative evaluations of the self were core to the development of depressive symptomatology (Beck, 1967). Barry (1962) also discussed depression as "a delusional idealisation regarding the worth of the self, marked by self-loathing" (p. 582), but there was little empirical support for this argument at the time. In more recent studies, loneliness has been said to lead to depression by eliciting self-focused negative emotions. In particular, Heinrich and Gullone (2006) discussed the affective features of loneliness and showed that self-deprecation, negative attitudes towards the self, and negative self-conscious affective states were common among individuals with higher loneliness scores.

1.2. Self-disgust and depression

Self-disgust is a negative self-conscious emotion schema that reflects disgust directed towards the self (physical self-disgust; e.g., "*I find myself repulsive*") or towards one's actions (behavioural self-disgust; e.g., "*I often do things I find revolting*"; Overton et al., 2008). Self-disgust has been associated with several mental disorders and related symptoms, including social anxiety (e.g., Amir et al., 2010), eating disorders (Fox, 2009), obsessive-compulsive disorder (Olatunji et al., 2015), and psychoticism (Ille et al 2014), and with reduced psychological well-being (Azlan et al., 2017; Brake et al., 2017).

Power and Dalgeish (2008) argued that self-disgust contributes to the genesis of depressive symptomatology. Different studies confirmed this hypothesis by showing that self-disgust mediated the association between dysfunctional thoughts and depressive symptoms in cross-sectional and cross-lagged longitudinal studies (Overton et al., 2008; Powell et al., 2013; Simpson et al., 2010). Another study found that self-disgust was more commonly reported than shame and guilt among individuals diagnosed with major depressive disorder (Zahn et al., 2015).

Given that loneliness and self-disgust appear are independently associated with the development of depressive symptoms both cross-sectionally and longitudinally (see Cacioppo et al., 2006, 2010; Overton et al., 2008; Powell et al., 2013), and assuming that loneliness elicits negative thoughts and aversive self-conscious feelings, such as low self-worth and self-loathing (e.g., Heinrich and Gullone, 2006), then it is sensible to argue that lonelier individuals may also experience more self-disgust as compared to less lonely ones. Furthermore, loneliness is said to induce negative thoughts about the self that perpetuate into ruminations and, eventually, lead to depressive symptoms (Vanhalst et al., 2012; Zawadzki et al., 2013), one of which encompasses self-disgust (i.e., "*I am disgusted with myself*") when depressive symptomatology is measured with Beck's depression inventory (Beck et al., 1961). Moreover, Overton et al. (2008) suggest that ruminations and negative thoughts precede self-disgust experiences, and self-disgust (and lower self-esteem) mediate the association between negative thoughts and depressive symptoms (see also Simpson et al., 2010). In light of this evidence, it is plausible that loneliness precedes the experience of self-disgust, and that self-disgust mediates the association between loneliness and depressive symptoms. Still, no study has yet addressed the association between loneliness and self-disgust, and their interrelationship in predicting depressive symptoms.

1.3. Emotion regulation and depression

Emotion regulation is defined as automatic or controlled processes that people use to reach a goal (Aldao et al., 2010; Gross, 2013; Webb et al., 2012) by increasing (up-regulation) or decreasing (down-regulation) the magnitude or the duration of their emotional responses (Gross, 2013). Gross and Thomson (2007) suggested that emotion regulation can happen before or after an emotional response and that cognitive reappraisal and expressive suppression represent two distinct emotion regulation strategies. Cognitive reappraisal is an antecedent-focused strategy (i.e., happens before the emotional response) and involves the cognitive re-interpretation of events to alter the emotional response and reduce its impact. Suppression is a response-focused strategy (i.e., happens after the emotional response) that helps regulate or inhibit a negative emotional response by actively suppressing it (Gross, 2013, 2015). At a social level, suppression has been associated lower liking ratings from others (Butler et al., 2003; Gross and John, 2003), while at an affective level, expressive suppression decreases positive emotional experiences and leaves negative ones unchanged (Gross and John, 2003; Gross and Thompson, 2007). Finally, expressive suppression has been positively associated with higher scores in mental health symptoms, such as anxiety, PTSD, and depression (Moore et al., 2008). Joormann and Gotlib (2010) found that individuals with depression and formerly depressed individuals both exhibited more rumination, less inhibition for negative stimuli and greater use of expressive suppression strategies, and suggested that depression can be explained as a disorder of emotion dysregulation characterized by the inability to inhibit negative thoughts and feelings. Another study found that cognitive reappraisal moderated the effects of higher stress scores in depressive symptoms, and it was suggested that cognitive reappraisal may act protectively against depression (Troy et al., 2010). Ehring et al. (2010) suggested that individuals, which were more vulnerable to depression (i.e., had experienced at least one episode of depression in the past) used emotion suppression more frequently than non-vulnerable individuals, when exposed to a sadness-inducing film. Considering the