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The impact of negative affect on reality discrimination

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ABSTRACT

Background and objectives: People who experience auditory hallucinations tend to show weak reality discrimination skills, so that they misattribute internal, self-generated events to an external, non-self source. We examined whether inducing negative affect in healthy young adults would increase their tendency to make external misattributions on a reality discrimination task.
Methods: Participants ($N = 54$) received one of three mood inductions (one positive, two negative) and then performed an auditory signal detection task to assess reality discrimination.
Results: Participants who received either of the two negative inductions made more false alarms, but not more hits, than participants who received the neutral induction, indicating that negative affect makes participants more likely to misattribute internal, self-generated events to an external, non-self source.
Limitations: These findings are drawn from an analogue sample, and research that examines whether negative affect also impairs reality discrimination in patients who experience auditory hallucinations is required.
Conclusions: These findings show that negative affect disrupts reality discrimination and suggest one way in which negative affect may lead to hallucinatory experiences.

1. Introduction

The process of differentiating between internal, self-generated events and external, non-self-generated events is sometimes referred to as reality monitoring (Bentall, 1990) or reality discrimination (Varese, Barkus, & Bentall, 2011; here we will use the latter term, as the term reality monitoring is more often used in source memory research, e.g., Johnson & Raye, 1981). Cognitive models of auditory hallucinations (AH) suggest that AH occur when internal events (e.g., intrusive thoughts, inner speech) are misattributed to an external agent (e.g., Bentall, 1990; Frith, 1992; Hoffman, 1986). Thus, patients who experience AH should show weak reality discrimination abilities. One way in which reality discrimination abilities are commonly measured in patients with AH is through an auditory signal detection task (SDT; e.g., Barkus, Stirling, Hopkins, McKie, & Lewis, 2007). In the SDT, participants must try to detect a signal (typically 1 s of neutral, non-emotional speech) in an ambiguous auditory stimulus (typically 5 s of white noise). On some trials the speech is present, on other trials the speech is absent. Reality discrimination errors occur when a participant makes a false alarm—that is, when they perceive speech to be present in the white noise when it is absent. Presumably, when a false alarm occurs, participants have mistaken their internal, self-generated representation of the speech for the external, 'real' speech. Consistent with current models, when performing a SDT, patients who experience AH show an externalizing bias, whereby they are more likely than controls to report that speech is present in the noise, even when it is absent (e.g., Bentall & Slade, 1985; Brookwell, Bentall, & Varese, 2013; Varese et al., 2012; Vercammen, de Haan, & Aleman, 2008).

At present, it is unclear why people who experience AH show this externalizing bias. Studies that have examined the antecedents or triggers of AH may suggest some variables that elicit this bias, as presumably problems in reality discrimination peak at times when a person experiences an AH. In Nayani and David's (1996) study of the phenomenology of AH, the majority of voice-hearers reported that some form of negative affect preceded the onset of hallucinations. These findings have been supported by studies that have employed experience sampling methods (ESM), which can assess the antecedents and correlates of psychotic experiences in "the flow of daily life" (Myin-Germeys & van Os, 2007, p. 411). In one ESM study, participants reported that AH tended to occur in the context of negative affect (Delespaul, de Vries, & van Os, 2002).

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Importantly, as these cross-sectional associations might reflect the influence of AH upon mood, Delespaul et al. (2002) also reported that negative affect increased before the onset of AH. This suggests that negative affect may play a causal role in the development of AH. As noted by Freeman and Garety (2003), while a number of authors have proposed that negative affect may play a role in the development of AH, these accounts tend to focus on how affect influences the content or appraisal of AH (e.g., Morrison, 1998), rather than on how affect might modulate the cognitive processes that can trigger AH. There is, therefore, no theoretical account of how emotion might influence reality discrimination, nor any account of how emotion might influence apparently related processes such as self-monitoring.

Feelings of loneliness may also modulate reality discrimination. Loneliness is the perception that one's interpersonal relationships are unsatisfying (Peplau & Perlman, 1982), and it has been shown to be related to, but distinct from, depression and other forms of negative affect (Cacioppo et al., 2006). For example, Cacioppo et al. (2006) reported that factor analysis of questionnaire items that assess depression and loneliness load onto two separate, but correlated factors. Psychotic patients have reported that feelings of loneliness (Delespaul et al., 2002) or being alone (Nayani & David, 1996; Tarrier, 1987) precede the onset of AH. Feelings of loneliness tend to elicit high levels of negative affect (Cacioppo, Hawkley, & Thisted, 2010) and this may be one way in which loneliness affects reality discrimination. However, it is possible that loneliness also influences reality discrimination through an additional mechanism. Hoffman (2007) has proposed that social isolation (a concept related, but not identical, to loneliness; see de Jong Gierveld, 1998) can lead to a bias where a person begins to attribute social meaning to non-social events and that, in this way, social isolation might play a causal role in the development of AH. For example, high levels of isolation, or intense feelings of loneliness, might encourage an internal, self-generated event, such as inner speech, to be misinterpreted as an external, social event (i.e., as speech directed at you by another person) and this erroneous attribution could form the basis of an AH. Through this bias, as well as by eliciting negative affect, loneliness may make a person struggle to differentiate internal, self-generated from external, other-generated events.

Therefore, in this study we examined whether experimentally-induced feelings of loneliness, or negative affect more generally, could impair participants' reality discrimination abilities. A mood induction procedure that has been widely used to examine the impact of loneliness on social cognition (e.g., by Pickett, Gardner, & Knowles, 2004) was employed to do this. In this procedure, three inductions are used. All involve participants recalling and writing about an autobiographical memory. One induction requires participants to write about their journey from home to the laboratory and aims to elicit a neutral mood. One induction involves participants recalling a time when they failed at an academic task; this has been shown to elicit negative affect (Pickett et al., 2004). The third induction involves participants recalling a time when they felt intensely lonely; this manipulation has been shown to elicit negative affect and feelings of loneliness (Chen, Williams, Fitness, & Newton, 2008; Pickett et al., 2004). In previous studies, the loneliness induction has influenced a variety of behaviours related to social cognition (such as prosody processing and a desire to listen to the disclosure of emotional information by friends), but the failure induction has not influenced these behaviours (Hackenbracht & Gasper, 2013; Pickett et al., 2004). These findings have been used to support arguments that feelings of loneliness elicit a set of cognitive biases independent of negative affect. Employing this design in the present study allowed us to examine whether there was any effect of negative affect on reality discrimination, and to explore the possibility of an effect of feelings of loneliness on reality discrimination that could be either (a) independent of negative affect, if the failure induction did not influence reality discrimination, or (b) in addition to negative affect, if the failure induction influenced reality discrimination, but to a smaller extent than did the loneliness induction.

In the SDT, several different parameters can be calculated. These include hits (trials where participants correctly report that speech was present in the white noise), false alarms (trials where participants incorrectly report that speech was present in the white noise), sensitivity (which indicates participants' ability to discriminate between trials when speech is present and trials when speech is absent), and response bias (which indicates participants' tendency, across all trials, towards responding that speech is present in the noise). We predicted that participants who received the two negative inductions would make more false alarms, but not more hits, than participants who received the neutral induction. This pattern of results should correspond to lower levels of sensitivity and a more liberal response bias in participants who received the two negative inductions in comparison to participants who received the neutral induction. We also predicted that participants who received the loneliness induction would make more false alarms, demonstrate lower sensitivity, and show a more liberal response bias on the SDT than participants who received the failure induction, as the loneliness induction could elicit an increase in external misattributions via both negative affect and the bias described by Hoffman (2007).

2. Method

2.1. Participants

Participants were 54 university students (45 women; mean age = 22.08 years, $SD = 5.9$), who received course credit in return for their time. Participants were native English speakers, had normal (or corrected-to-normal) vision, and had no history of hearing problems.

2.2. Mood induction

The mood induction described in study two of Pickett et al. (2004) was employed here. Participants were randomly assigned to one of three induction groups: a loneliness induction, a failure induction, and a neutral induction. In the loneliness induction, participants were asked to recall and write down an account of a time when they felt intensely lonely. In the failure induction, participants were asked to recall and write down an account of a time when they experienced an academic failure. In the neutral induction, participants were asked to recall and write down an account of their journey to the department that day. Participants were asked to spend a minimum of 5 min and a maximum of 8 min on this task. Participants who completed the task in less than 5 min were asked to try to recall more details about their recalled event, and to write about these details. Previous studies have reported that the failure induction effectively elicits negative affect and that the lonely induction effectively elicits both negative affect and feelings of loneliness (Bernstein, Young, Brown, Sacco, & Claypool, 2008; Chen et al., 2008; Maner, DeWall, Baumeister, & Schaller, 2007; Pickett et al., 2004; Wilkowski, Robinson, & Friesen, 2009).

2.3. Reality discrimination task

A signal detection task (SDT) similar to that described by Barkus et al. (2007) was employed to assess reality discrimination. This task consisted of 60 trials, with each trial consisting of 5 s of white