

Beyond words: Sensory properties of depressive thoughts

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Verbal thoughts (such as negative cognitions) and sensory phenomena (such as visual mental imagery) are usually conceptualised as distinct mental experiences. The present study examined to what extent depressive thoughts are accompanied by sensory experiences and how this is associated with symptom severity, insight of illness and quality of life. A large sample of mildly to moderately depressed patients ($N = 356$) was recruited from multiple sources and asked about sensory properties of their depressive thoughts in an online study. Diagnostic status and symptom severity were established over a telephone interview with trained raters. Sensory properties of negative thoughts were reported by 56.5% of the sample (i.e., sensation in at least one sensory modality). The highest prevalence was seen for bodily (39.6%) followed by auditory (30.6%) and visual (27.2%) sensations. Patients reporting sensory properties of thoughts showed more severe psychopathological symptoms than those who did not. The degree of perceptuality was marginally associated with quality of life. The findings support the notion that depressive thoughts are not only verbal but commonly accompanied by sensory experiences. The perceptuality of depressive thoughts and the resulting sense of authenticity may contribute to the emotional impact and pervasiveness of such thoughts, making them difficult to dismiss for their holder.

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Depressive thoughts are usually defined as intrusive and bothersome cognitions. Unlike hallucinations, sensory properties are not a defining criterion. However, recent research indicates that the boundaries among thoughts, intrusive thoughts, mental imagery and hallucinations are not as clear-cut as traditionally presumed. Whereas the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines hallucinations as perception-like experiences that occur without an external stimulus, that are vivid and clear, with the full force and impact of normal perceptions (American Psychiatric Association, 2013, p. 87), the perceived authenticity of a hallucinatory experience is, in fact, variable (e.g., Moritz & Laroi, 2008). To illustrate, voice-hearers often acknowledge that their voices do not fulfil all the “4 A’s” that characterise real voices [i.e., alien (external agent), acoustic, autonomous (cannot be controlled), authentic; Moritz & Laroi, 2008]. Rather, hallucinatory external voices can often be partially controlled or do not seem very real, thus challenging the analogy with real voices.

Non-hallucinatory intrusive images, in turn, are often experienced as very vivid (Birrer, Michael, & Munsch, 2007; Brewin, Gregory, Lipton, & Burgess, 2010; de Silva, 1986; Holmes, Crane, Fennell, & Williams, 2007; Holmes & Mathews, 2010; Rachman, 2007). For example, a hallmark feature of post-traumatic stress disorder (PTSD) is visual mental images (Brewin et al., 2010; Ehlers, Hackmann, & Michael, 2004; Holmes, Grey, & Young, 2005) that can be experienced as very realistic (so-called pseudohallucinations; Brewin & Patel, 2010). Vivid visual negative imagery has also been observed in depression (Patel et al., 2007; Williams & Moulds, 2007) and linked with the pathogenesis of the disorder (Holmes, Lang, & Deeprose, 2009; Williams & Moulds, 2008). Mental imagery is also seen in patients with obsessive-compulsive disorder (OCD; de Silva, 1986; Rachman, 2007; Speckens, Hackmann, Ehlers, & Cuthbert, 2007), social phobia, as well as other disorders (Brewin et al., 2010; Holmes &

Mathews, 2010). These images often involve so-called “flash-backs” containing (pieces of) memory episodes. In addition, they can also be anticipatory and encompass feared future scenarios, vivid fantasies, imagined events (Rachman, 2007) or even one’s own death, which has been termed “flash-forwards” (Hales, Deeprose, Goodwin, & Holmes, 2011; Holmes et al., 2007). In spite of the fact that mental images and hallucinations cannot be fully discriminated according to their sensory properties, patients with hallucinations—unlike patients with depression, anxiety disorders and PTSD—usually attribute the perceptions to an external source and consider them veridical (for a liberal acceptance account of hallucinations see Moritz & Laroi, 2008).

Verbal thoughts are usually conceptualised as a mental experience that is different from imagery. However, patients often find it hard to disentangle these two types of thinking because they also experience “perceptually flavored” verbal thoughts; that is, their intrusive thoughts are accompanied by sensory experiences (e.g., Newby & Moulds, 2012; Pearson, Brewin, Rhodes, & McCarron, 2008). In a recent study on patients with OCD, we addressed the question whether automatic (intrusive) thoughts such as the obsessive urge to kill one’s children indeed contain such a “perceptual flavor” (Moritz, Claussen, Hauschildt, & Kellner, submitted). It was found that 73% of patients with OCD endorsed that their obsessions were accompanied by visual, auditory and other sensory features. Data also showed that the higher the degree of perceptuality, the lower the illness insight. The authenticity of the intrusive thoughts may make it harder for these individuals to dismiss them. Thus, these perceptual thoughts may share some features with mental images, which are also perceived as “more real” and elicit more emotions than (purely) verbal thoughts (Holmes, Mathews, Mackintosh, & Dalgleish, 2008; Mathews, Ridgeway, & Holmes, 2013). This ties in well with studies showing that perceptual mental images

elicit more anxiety than verbal thoughts (for a review see Holmes & Mathews, 2010), are considered less acceptable than mere thoughts (Parkinson & Rachman, 1981) and can prompt severe preoccupation (Hales et al., 2011). Observations in patient studies are complemented by findings in undergraduate students reporting a significant association between vividness of visual imagery and distress (Williams & Moulds, 2007).

The present study focuses on depression, a disorder characterised by symptoms such as negative mood and loss of interest and energy. We examined whether earlier findings obtained in OCD patients also hold for depression by investigating the sensory properties of depressive thoughts in a mildly to moderately depressed sample. As mentioned before, negative mental images are frequent in depression and may relate to the pathogenesis of the disorder (Holmes et al., 2009). However, there is little mention in the literature to what extent auditory or other perceptual qualities accompany such thoughts. A recent study by Holmes et al. (2007) on 15 patients with suicidal ideas found that all patients experienced detailed mental imagery (“Seeing myself from outside in bed, slitting wrists with a penknife”, p. 430) in addition to verbal thoughts. In two thirds of the individuals these images were experienced at least as half-real. Similar findings were found by Crane, Shah, Barnhofer, and Holmes (2012). Two other studies, again with rather small samples, indicated that rumination and memories in depression are frequently sensory in nature (Newby & Moulds, 2012; Pearson et al., 2008).

Furthermore, we examined whether sensory properties of depressive thoughts would be associated with depression severity, suicidality, decreased illness insight and lower quality of life. We investigated these associations in a large sample of mildly to moderately depressed participants who were recruited from different sources (e.g., hospitals, insurance companies and online forums). The main variables of interest were obtained via a self-report online assessment. Diagnostic status and depression severity were validated over telephone-administered interviews. We hypothesised that a large proportion of depressive patients would report

depressive thoughts that are accompanied by sensory sensations and—based on the results of our prior study on OCD—that this subgroup would be characterised by higher symptom severity, lower illness insight and decreased quality of life.

METHODS

The present manuscript is part of a large multi-centre trial comparing the effects of a psychological online intervention with a care-as-usual control condition (Klein et al., 2013). The trial aims to recruit a total of 1000 patients with depressive symptoms from different sources: psychiatric/psychosomatic hospitals, outpatient psychiatrists/psychotherapists or counsellors, general practitioners, self-help/internet forums, insurance companies and nonpsychiatric hospitals. The study targeted people with mild to moderate depression, as measured by the patient health questionnaire-9 (PHQ-9) (see below; score 5–14). People with higher or lower symptom severity were automatically excluded in the online survey. Further exclusion criteria were a history of psychosis or bipolar disorder, age beyond 18–65 years and acute suicidal tendencies.

To allow for low-threshold inclusion and minimise participation barriers, the study did not require direct face-to-face diagnostic interviews. Following informed consent, participants were asked to complete several questionnaires in an online survey and were then contacted for a diagnostic telephone interview including the Mini International Neuropsychiatric Interview (MINI) (see below). Subsequently, participants were randomly allocated to either an online depression intervention (deprexis, Meyer et al., 2009) or care as usual (participants in the latter group receive a voucher for the online programme at the end of the study, one year after baseline). All participants were free to seek any other help they desired, including pharmacological and psychological treatments. In total, four assessment time points are scheduled over the course of 12 months. The study was approved by the ethics

committee of the German Psychological Association (Berlin, Germany).

For the present study, only cross-sectional data collected at baseline were analysed. A present or former diagnosis of major depressive disorder or dysthymic disorder was verified using a set of diagnostic instruments or other diagnostically relevant information (i.e., MINI diagnosis of depression; Web screening questionnaire (WSQ) depression ratings; self-reported diagnosis of depression that was verified by a specialist).

Questionnaires

The following instruments were included in the study:

Mini International Neuropsychiatric Interview

An abbreviated version of the *MINI* (5th edition) was administered (Sheehan et al., 1998) to establish a diagnosis of either a current major depressive episode or dysthymia. It also served to exclude a manic episode (lifetime), psychotic episode/schizophrenia (lifetime) and acute suicidality.

Sensory Properties of Depressive Thoughts – Questionnaire (SPD)

The SPD is a variant of the *Sensory Properties of Obsessions Questionnaire* (Moritz et al., submitted), which has shown an acceptable test-retest reliability (4 weeks: $r = .74$) and good internal consistency (Cronbach's alpha: $.81$). Whereas the latter focuses on obsessive thoughts, the SPD deals with depressive thoughts. Participants were given the following explanatory text:

Depressive thoughts and ruminations are sometimes described by patients as very strong thoughts that are hard to get rid of but are still just perceived as strong thoughts. Some individuals also report sensory or bodily sensations associated with depressive thoughts and ruminations. An example of an auditory sensation would be that one perceives an "inner critic" who seems to have an actual voice and may call one a "loser". An example of a visual sensation would be that one literally sees (in the "mind's eye") how feared catastrophes take place. Tactile (=touch), bodily and olfactory sensations can also occur. Are your

depressive thoughts sometimes associated with such sensations?

No specific time frame was given for the assessment. Rather we wanted participants to base their answers on retrospective recall of any depressive cognitions they had experienced. Participants could then endorse whether or not and to what extent this applied on a five-point Likert scale (1–5; no, mild, medium, strong and extreme) for five modalities (visual, auditory, tactile (touch), somatic (i.e., bodily sensations), olfactory (smell) and other).

Web Screening Questionnaire

The WSQ is a 15-item self-report instrument screening for frequent mental disorders (Donker, van Straten, Marks, & Cuijpers, 2009). Evidence indicating adequate diagnostic validity has been reported for social phobia, panic disorder with agoraphobia, agoraphobia without panic disorder, OCD and alcohol abuse/dependence (sensitivity $.72$ – 1.00 ; specificity $.63$ – $.80$; Donker et al., 2009). Somewhat more modest psychometric properties have been reported for major depressive disorder, generalised anxiety disorder, PTSD, specific phobia and panic disorder without agoraphobia (sensitivity: $.80$ – $.93$; specificity: $.44$ – $.51$; Donker et al., 2009).

Hamilton Depression Rating Scale (HDRS) and Quick Inventory of Depressive Symptomatology (QIDS)

The 24-item version of the HDRS (Hamilton, 1960, 1967) was administered during the telephone interview. It is a clinician rated assessment of depressive symptom severity and encompasses psychological as well as somatic symptoms (scores range from 0 to 2 or 0 to 4). Using descriptive anchors, the clinician rates the severity of these symptoms based on the patient's report, his or her own observation and third-party observations. Telephone-administered versions of the HDRS have been used successfully in previous studies (Mohr et al., 2005). Subscales were composed based on factor analytic results (Grunebaum et al., 2005; Milak et al., 2005). The HDRS was complemented by the QIDS (clinician rated), which captures all of the DSM-IV diagnostic

criteria for a major depressive episode and assesses the severity of depressive symptoms during the last seven days (Rush et al., 2003).

Patient Health Questionnaire-9

The PHQ-9 is a self-report instrument derived from the Primary Care Evaluation of Mental Disorders (PRIME-MD). The PRIME-MD was developed to diagnose depressive, anxiety, somatoform, alcohol and eating disorders in medical populations in an efficient and brief way. The PHQ-9 is targeted at depressive symptoms and has been validated for detecting depression and monitoring depression severity (Kroenke, Spitzer, Williams, & Löwe, 2010).

Short-Form Health Survey-12 (SF-12)

The SF-12 is based upon the “Short-Form Health Survey”(SF-36). It is a generic instrument assessing the general health condition as well as pain, disabilities in daily life and mental problems. The SF-12 asks for the presence and severity of 12 symptoms over the course of the last four weeks. Its two subscales measure physical and mental aspects of health-related quality of life. Low scores reflect compromised well-being. The retest reliability is good and roughly equivalent to the long form (Ware, Kosinski, & Keller, 1996). We used the weighted scoring algorithm (Morfeld, Kirchberger, & Bullinger, 2011).

Suicide Behaviours Questionnaire-Revised (SBQ-R)

The SBQ-R assesses suicidal thoughts and behaviour (Osman et al., 2001). For the present study, we only assessed the (subjective) likelihood of future suicidal behaviour. The internal consistency in an adult inpatient sample was Cronbach’s alpha = .87 for the entire scale (Osman, et al., 2001).

RESULTS

Data on the SPD were available for 403 patients. Of these, 34 did not meet diagnostic criteria for lifetime or current major depressive disorder or dysthymic disorder, five met criteria for

schizophrenia and eight for bipolar disorder. Data of 356 individuals were thus retained for the final analysis. Of these 103 (28.9%) had a current diagnosis and 253 (81.1%) had a lifetime diagnosis of a depressive disorder.

Internal consistency of the SPD was acceptable (Cronbach’s alpha = .76). As many as 56.5% of the sample reported sensory properties of depressive thoughts. Table 1 shows that depressive thoughts were most often accompanied by bodily sensations (39.6%), followed by auditory (30.6%) and visual (27.2%) perceptions. Across all sensory channels, weak and medium intensities of perceptuality were most prevalent. Of these, 62% reported sensory-laden depressive thoughts across at least two sensory channels. When looking at the mean intensity scores of SPD items, a similar picture emerged: bodily sensations achieved the highest scores ($M = 1.76, SD = 1.09$) followed by auditory ($M = 1.53, SD = 0.86$), visual ($M = 1.46, SD = 0.92$), tactile ($M = 1.24, SD = 0.68$) and olfactory sensations ($M = 1.22, SD = 0.65$). All mean scores differed significantly from each other when computing uncorrected paired t -tests (at least $p \leq .01$), except for visual versus auditory ($p > .1$) and tactile versus olfactory sensations ($p > .5$) which were indistinguishable.

Table 2 shows demographic, psychometric and psychopathological characteristics of patients who reported at least one sensory property of depressive thoughts (56.5%) versus those who did not [43.5%; the most frequent scores on the SPD were 1 (10.1%) or two points (12.4%), extreme intensities were rare]. While the samples were

Table 1. Percentage of sensory perceptions as measured with the SPD questionnaire, split for sensory channel (in descending order of prevalence)

Sensory channel	None	Weak	Medium	Strong	Extreme
Bodily	60.4	15.4	13.5	9.3	1.4
Auditory	69.4	14.3	10.7	4.8	0.8
Visual	72.8	13.2	9.3	4.5	0.3
Tactile	86.2	7.6	2.8	3.1	0.3
Olfactory	87.4	6.7	3.4	2.0	0.6
Other	95.2	1.1	1.4	2.2	–

indistinguishable in terms of background variables, there were small but significant differences on the QIDS, the core psychological symptoms subscale of the HDRS and the number of depressive episodes: patients with sensory perceptions were more symptomatic, had slightly more depressive episodes and had been hospitalised more frequently than those without. The HDRS 24—total score, the HDRS psychosis/disturbed thinking and anxiety factors as well as the psychological well-being scale of the SF-12 differences were marginally significant in the same direction. Furthermore, a small but significant correlation was found for the psychosis/disturbed thinking subscale of the HDRS ($r = .15$, $p = .01$). Suicidality was

significantly higher in the sensory perceptions group according to the MINI but not the SBQ-R item (trend, see Table 2). Patients with a current versus lifetime diagnosis of depression did not differ on any SPD item or the total score, all $ps > .1$.

For exploratory purposes, we also looked at individual items of the SPD. As item-wise comparisons must be considered unreliable in face of multiple comparisons, we only report differences for similar phenomenological aspects that achieved significance for both self-report (PHQ-9) and the expert rating (HDRS). Patients with sensory perceptions achieved higher scores on agitation (item 9), $t(304) = 1.96$, $p = .05$; and retardation (item 8), $t(304) = 2.34$, $p = .02$, as well

Table 2. Differences between participants who did report sensory properties of depressive thoughts versus those who did not

Variable	No sensory properties ($n = 155$)	Sensory properties of thoughts ($n = 201$)	Statistics
<i>Background variables</i>			
Age in years	42.97 (11.15)	43.03 (11.02)	$t(354) = 0.05$, $p > .9$, $d = .01$
Gender (male/female)	48/107	58/143	$\chi^2(1) = 0.19$, $p > .6$
Number of prior depressive episodes (once/up to 5 times/up to 10 times/up to 20 times/more than 20 times)	30/72/30/11/12	31/79/46/26/19	$\chi^2(1) = 3.89$, $p = .05$
<i>Depressive symptoms</i>			
HDRS			
Psychic depression (items 1, 2, 3, 8, 22, 23, 24)	5.12 (3.25)	5.88 (3.40)	$t(304) = 2.00$, $p = .05$, $d = .23$
Loss of motivated behaviour (items 7, 12, 14, 16)	2.52 (1.80)	2.78 (1.99)	$t(304) = 1.19$, $p > .2$, $d = .14$
Psychosis/disturbed thinking (items 17, 19, 20, 21)	0.54 (0.92)	0.76 (1.20)	$t(304) = 1.83$, $p = .07$, $d = .21$
Anxiety (items 9, 10, 11, 15)	3.21 (2.31)	3.66 (2.32)	$t(304) = 1.69$, $p = .09$, $d = .19$
Sleep disturbance (items 4, 5, 6)	2.71 (1.76)	2.72 (1.72)	$t(304) = 0.09$, $p > .9$, $d = .01$
Total score (sum items 1–24)	16.57 (7.45)	18.06 (7.64)	$t(304) = 1.71$, $p = .09$, $d = .20$
QIDS total score	8.71 (4.00)	9.68 (4.07)	$t(305) = 2.08$, $p = .04$, $d = .24$
PHQ-9 total score	10.21 (2.61)	10.54 (2.30)	$t(354) = 1.26$, $p > .2$, $d = .13$
Suicidality			
SBQ-R item 4 (likelihood of future suicide)	0.88 (0.93)	1.08 (1.00)	$t(305) = 1.73$, $p = .08$, $d = .21$
MINI item suicide (ever tried to commit suicide)	18 (13.2%)	37 (21.6%)	$\chi^2(1) = 3.72$, $p = .05$
Well-being/quality of life			
SF-12 physical health	47.39 (10.15)	47.05 (9.32)	$t(341) = 0.32$, $p > .7$, $d = .03$
SF-12 mental health	31.54 (8.58)	30.05 (7.07)	$t(341) = 1.74$, $p = .08$, $d = .19$

as the corresponding PHQ-9 item 8 (retardation/agitation), $t(354) = 3.16, p = .002$.

DISCUSSION

Our study dealt with a neglected area of research: the sensory properties of depressive thoughts. Our investigation revealed that automatic negative thoughts are not only verbal but usually complemented by sensory experiences of diverse modalities. The most prevalent sensory perception was bodily, followed by auditory and visual perceptions. The results are in line with previous research from smaller studies (Newby & Moulds, 2012; Pearson et al., 2008). If replicated, vivid sensory colouring of negative thoughts may therefore be regarded as a common phenomenon affecting approximately half of depressed patients. It follows that, rather than focusing solely on verbal content, sensory properties of thoughts warrant greater consideration in depression.

While a prior report linked the intensity of sensory perceptions in OCD with low insight, in our study those with sensory perceptions showed higher scores on the HDRS psychosis subscale (which, among other aspects, also captures illness insight) only at trend level. However, a small but significant effect emerged when correlating the sum of sensory irritations with the psychosis/disturbed thinking subscale ($r = .15, p = .01$). Participants reporting sensory perceptions had slightly more depressive episodes, more core depressive symptoms on the HDRS, a higher QIDS total score and stronger suicidality (significant on one of two measures). At trend level, they also reported lower quality of life for mental but not somatic problems. A consistent pattern emerged for retardation and agitation, as assessed with PHQ-9 and HDRS. In sum, we found that perceptual thoughts seemed to be related with worse psychopathology. We need to acknowledge, however, that we have not adjusted for multiple comparisons.

Given their prevalence and their links to outcome variables, future clinical rating scales might be complemented by items asking for the sensory properties of depressive thoughts.

Although a number of scales tap into imagery and visual aberrations (Pearson, Deeprose, Wallace-Hadrill, Heyes, & Holmes, 2013), sensory phenomena are often overlooked as they are not included in standard clinical assessment instruments (de Silva, 1986; Di Simplicio, McInerney, Goodwin, Attenburrow, & Holmes, 2012).

Our study has several strengths. Whereas the SPD-assessment was conducted online, as in our study on OCD, we also carried out a thorough telephone assessment of the diagnostic status and symptom severity in this study. Patients with psychotic or bipolar diagnoses were excluded. This iterative process ensured that the risk of false diagnostic assignments was minimised (importantly, bipolar disorder has been associated with a high prevalence of mental imagery (Holmes, Deeprose, et al., 2011)). Second, we recruited a rather large sample from diverse sources. Internet recruitment allows researchers to reach the large group of individuals with mental health problems who need assistance but do not seek professional (face-to-face) contact. This rate has been estimated at approximately 54% in depression (Kohn, Saxena, Levav, & Saraceno, 2004).

At the same time, several limitations of the study warrant attention. We excluded patients with severe depression. Therefore, we cannot rule out that the prevalence of sensory perceptions was underestimated in our study; in part, perhaps, because of the resulting statistical restriction of range in depression severity. This, along with acute suicidality as an exclusion criterion, may be one reason why only weak relationships emerged with depression severity, suicidality and quality of life. Moreover, although the sample was rather large, inclusion was perhaps biased as we only included people interested in an online intervention. While we think it is unlikely that this impacted on results, it cannot be firmly ruled out.

We think the present findings are important not only with respect to the yet unfinished phenomenological understanding of depression but also with respect to diagnostic assessment and treatment. We found that depressive thoughts have sensory properties in a sizable group of patients. These sensory properties were weakly

but significantly associated with symptom severity and may be one reason why interventions that primarily target the verbal cognitive content often have surprisingly little effect (Dimidjian et al., 2006; Longmore & Worrell, 2007). Along with other phenomena, such as dysfunctional metacognitive beliefs (Wells, 2008), the sensory image-based properties of depressive thinking might contribute to the pervasiveness of depressive thoughts that is not explained by content alone. However, further studies are needed to substantiate this claim. Overall, however, it is important to note that the current study confirms that “negative automatic thoughts” are not only verbal thoughts (as may commonly be assumed clinically) but also include negative imagery.

There are interesting new approaches to turn a potential vulnerability factor into an asset by using vivid mental imagery in a positive way (for a review see Holmes, James, Blackwell, & Hales, 2011; Holmes & Mathews, 2010; Holmes et al., 2009). To illustrate, participants are instructed to imagine positive outcomes (prospective positive imagery; Blackwell et al., 2013; Morina, Deeproose, Pusowski, Schmid, & Holmes, 2011), vividly relive pleasant memories (Jacob et al., 2011), create the (self-compassionate) image of a close, helpful person (Gilbert, 2005; Jacob et al., 2011) or reshape (rescript) negative images (Brewin et al., 2009; Rachman, 2007). Preliminary evidence suggests that such strategies are helpful (e.g., Lang, Blackwell, Harmer, Davison, & Holmes, 2012). Positive mental imagery strategies may, for example, hold negative mental images in check by imparting the patients with a feeling of self-efficacy or change expectancies, thereby decreasing feelings of helplessness.

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