

## Letter to the Editors

### On knowing and judging smells: Identification and hedonic judgment of odors in schizophrenia

Dear Editors,

Olfactory identification deficits in schizophrenic patients are associated with negative symptoms and reduced social functioning (see Moberg et al., 1999 for a review; Brewer et al., 1996; Geddes et al., 1991; Malaspina et al., 2002; Malaspina and Coleman, 2003). Both olfactory deficits and negative symptoms of schizophrenia, such as anhedonia and social/interpersonal impairments, may reflect dysfunctions of the circuitry mediated by the orbitofrontal cortex (OFC). Thus, it would be helpful to further elucidate the relationship between olfactory identification and hedonic processing in relation to symptoms in schizophrenia.

The University of Pennsylvania Smell Identification Test (UPSIT) (Doty et al., 1984), which is a standardized, 40-item forced-choice task, was administered to 17 schizophrenia outpatients (SZ) and 14 matched healthy controls (CO). See Table 1 for demographic information. For each UPSIT stimulus, participants were asked to identify it and rate the pleasantness of the odor using a 5-point rating scale ( $-2$ =highly unpleasant,  $-1$ =somewhat unpleasant,  $0$ =neither pleasant nor unpleasant,  $+1$ =somewhat pleasant,  $+2$ =highly pleasant). The Scale for the Assessment of Positive Symptoms (SAPS; Andreasen, 1984b) and the Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1984a) were used to assess symptoms. Social function was estimated by the Zigler Social Competence Scale (Zigler and Levine, 1981).

The results of olfactory identification and hedonic judgment are presented in Table 2. ANOVA showed that SZ made more UPSIT errors than did CO ( $F$

( $1,29$ )=4.99,  $p<0.05$ ), replicating previous studies (Brewer et al., 1996; Geddes et al., 1991; Kopala et al., 1992, 1995; Malaspina et al., 2002; Malaspina and Coleman, 2003; Minor et al., 2004; Seidman et al., 1992). For the hedonic judgment, SZ gave more positive ratings (i.e., more pleasant) overall than CO ( $F$  ( $1,29$ )=7.38,  $p=0.01$ ). This could mean either SZ experience odors as more pleasant than CO overall or SZ might have difficulties experiencing unpleasantness. Pleasantness rating was positively correlated with the affective flattening subscale from the SANS ( $r=0.68$ ,  $p=0.01$ ) such that SZ with flat affect tended to judge odorants as more pleasant. These results suggest that the ability to express emotions seems unrelated to hedonic judgments. Decoupling of experiential from expressive aspects of emotion in schizophrenia has been demonstrated previously (Kring and Neale, 1996).

SZ had a reduced range of pleasantness ratings compared with CO ( $F$  ( $1,29$ )=5.38,  $p=0.02$ ). CO's hedonic judgment spanned the entire 5-point rating

Table 1  
Mean (s.d.) of demographic information

	Control subjects ( $n=14$ )	Schizophrenic subjects ( $n=17$ )
Education (years)	14.0 (1.8)	12.7 (2.1)
Age	33.8 (10.7)	37.0 (9.8)
WAIS IQ Score <sup>a</sup>	103.2 (12.7)	93.4 (12.7)
SANS	N/A	27.5 (17.3)
SAPS	N/A	27.1 (23.6)
CPZ equivalent <sup>b</sup>	N/A	56.8 (111.5)
Illness duration	N/A	14.9 (10.1)
Zigler score <sup>c</sup>	5.6 (1.6)	2.5 (1.2)

<sup>a</sup> Wechsler Adult Intelligence Scale—Third Edition (Wechsler, 1997).

<sup>b</sup> Chlorpromazine dose equivalent (milligrams per day).

<sup>c</sup> Zigler Score of Social Functioning (Zigler and Levine, 1981).

Table 2  
Mean (s.d.) scores for olfactory identification and pleasantness ratings

	Control subjects ( <i>n</i> = 14)	Schizophrenic subjects ( <i>n</i> = 17)
UPSIT errors	4.14 (2.21)	6.65 (3.67)
Pleasantness ratings	3.26 (0.36)	3.54 (0.44)
Pleasantness ratings for correct items	3.32 (0.33)	3.63 (0.45)
Pleasantness ratings for incorrect items	2.46 (0.55)	2.98 (0.53)
Range of ratings	4.93 (0.27)	4.41 (0.79)

scale whereas SZ tended to use a more restricted range that was shifted towards the pleasant end. The range of ratings was negatively correlated with SANS ( $r = -0.54, p = 0.03$ ). Thus, SZ with increased negative symptoms had a narrower range of pleasantness ratings, which perhaps suggests a reduction in experiential range.

Lastly, we observed that olfactory identification accuracy was related to pleasantness ratings. UPSIT items that were correctly identified were also judged to be more pleasant by both groups ( $F(1, 29) = 93.25, p < 0.001$ ). In general, familiarity is associated with liking and this transcends sensory modalities (Royet et al., 2001). Our results may reflect this general tendency.

To summarize, SZ showed deficits in olfactory identification compared with the CO and a significantly different pattern of pleasantness ratings. SZ gave more positive pleasantness ratings overall and had a more restricted range of hedonic judgment that was clustered around pleasantness rather than unpleasantness. Thus, in addition to olfactory identification deficits, some components of olfactory hedonic judgment may be altered in schizophrenia. However, these results should be interpreted with caution because of the small sample size. Further studies are necessary to elucidate the nature of hedonic judgment in schizophrenia.

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