ESTUDI SOBRE LA FUNCIÓ OLFACTÒRIA EN EL TRASTORN D'ANGOIXA

Tesi Doctoral

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Original

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EROL scale: A new behavioural olfactory measure and its relationship with anxiety and depression symptoms

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Introduction: The main objective of this study was to develop and validate a new olfactory measure that assesses the influence of olfaction on several emotional, behavioural, and cognitive issues: The Relational Scale of Olfaction (EROL). A secondary objective was to explore the relationship between the olfactory function and the anxiety and depression symptoms by means of EROL and the Hospital Anxiety and Depression Scale (HADS). A positive relationship between anxiety symptoms and the olfactory function was hypothesized. Regarding depressive symptoms, a significant relationship with the olfactory scores was not expected.

Method: Psychometric properties of EROL scale and correlations between HADS and EROL were tested in a sample from the general population.

Results: EROL showed an adequate level of test-retest reliability (ICC=.748) and good internal consistency (Cronbach's alpha=.761). Convergent validity with other olfactory measures was satisfactory. A one-factor solution was found for the scale. HADS showed a significant relationship with EROL (r=.280, p<.01), but the analysis through dimensions revealed that only the anxiety subscale correlated significantly and moderately with the olfactory measure (r=.325, p<.001), whereas the correlation with the depression subscale was non-significant (r=.146, p>.05).

Conclusions: Given that EROL displayed good psychometrical properties, it appears as a suitable tool to assess the olfactory function in general population. The relationship between this olfactory scale and anxiety symptoms found in this study is an interesting issue that requires further research.

Key words: Olfaction, Scales, Reliability, Validity, Anxiety

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La escala EROL: Una nueva medida olfatoria conductual y su relación con los síntomas ansiosos y depresivos

Introducción: El objetivo principal de este estudio fue desarrollar y validar una nueva escala olfatoria que evalúa la influencia del olfato en diferentes cuestiones emocionales, conductuales y cognitivas: La escala relacional sobre el olfato (EROL). El objetivo secundario consistió en explorar la relación entre la función olfatoria y los síntomas de ansiedad y depresión mediante la escala EROL y la Escala Hospitalaria de Ansiedad y Depresión (HADS). Se hipotetizó una relación positiva entre los síntomas de ansiedad y la función olfatoria. En cambio, no se esperó ningún tipo de relación significativa entre los síntomas depresivos y la medida olfatoria.

Metodología: Se evaluaron las propiedades psicométricas de la escala olfatoria y se calcularon las correlaciones entre EROL y HADS en una muestra de la población general.

Resultados: EROL mostró un nivel adecuado de fiabilidad test-retest con un coeficiente de correlación intraclase de 0.748. El alfa de Cronbach de 0.761 indicó una buena consistencia interna. La validez convergente con otras escalas olfatorias fue satisfactoria. El análisis factorial presentó una solución unidimensional. Se halló una relación significativa entre las escalas EROL y HADS (r=0.280, p<0.01), pero el análisis por subescalas reveló que sólo la dimensión de ansiedad correlacionaba significativamente y de forma moderada con la medida olfatoria (r=0.325, p<0.001), mientras que la correlación con la de depresión no fue significativa (r=0.146, p>0.05).

Conclusiones: Las adecuadas propiedades psicométricas de la escala EROL indican que es un instrumento útil para valorar la función olfatoria en la población general. La relación que se ha hallado entre esta escala y los síntomas de ansiedad es un tema que requiere más investigación.

Palabras clave: Olfacción, Escalas, Fiabilidad, Validez, Ansiedad

INTRODUCTION

Data from animal models and human studies currently imply numerous and complex effects of smell on behaviour, cognition, and specially on emotional responses.[1-3] The sense of smell differs from most other senses in its heavy affective loading. The reason for this emotional predominance is that the olfactory system has direct anatomic and phylogenetic linkages to the limbic system, making it the sensory system most closely related to parts of the brain which appear to mediate emotion.[4,5] However, several studies suggested that odours do not affect everybody in the same way, neither in the same magnitude.[6,7] This variability may pertain to psychobiological propensities controlled by genetic determinants, individual exposure effects, gender, development or health, or to more general influences linked to cultural biases or expertise.[8]

Taking into account the impact of odours in our lives and the existence of these individual differences, at a research level, it's very useful to have at our disposal instruments that allow us to measure it. There are several questionnaires in which adult people give self-reports related to their sense of smell,[6,7,9-11] but there are interesting olfactory issues and some shades that the existing olfactory scales do not cover. The incorporation of these topics would contribute to increase the content validity of the set of instruments assessing the olfactory construct. Taking this into account, a new scale was developed by the authors of the present study: The Relational Scale of Olfaction (original Spanish name: *Escala Relacional sobre el Olfato* (EROL)). These items were developed taking into account the phylogenetic function of olfaction on mating behaviour[12], safety and attractiveness that odours can provide[13], as well as the reported influence of olfactory stimuli on space perception[14].

The main purpose of this study was to develop and validate this new olfactory scale (EROL). In addition to this aim, another issue was also addressed. Taking into account the close relationship between the emotions and the sense of smell, the secondary objective of this study was to assess the relationship between the olfactory function and emotional states as anxiety and depression at the symptomatic level. It must be noted that since the study has been developed in the general population, the link between the olfactory function and mental diseases such as anxiety or affective disorders was not approached. Olfactory function has been the object of several investigations in clinical and general population[15,16], but to our knowledge, there is no study assessing the relationship between these emotional states and self-reported measures as EROL scale. It was hypothesized that there would be a positive relationship between anxiety symptoms and the influence of odors on the emotional, behavioural and cognitive aspects assessed by EROL scale. Thus, participants with higher anxiety symptoms would score higher on the olfactory measure for several reasons: firstly, some studies reported lower olfactory detection thresholds in neurotic individuals[15] and faster detection of emotionally valenced odours in neurotic and anxious individuals, as well as a stronger perception of these odorants in women high in trait anxiety[17]. Secondly, several studies suggested that neurotic and anxious people could be more sensitive and reactive to sensorial stimuli such as loud noise, unpleasant visual stimuli, bitter taste and pain than stable and calm people.[18-22] Thus, it is possible that olfaction could be another sensorial modality to which these people could be more sensitive. Regarding the depressive sphere, the data in the clinical and general population are conflicting: some studies showed a reduced sensitivity[16,23-28], others a normal sensitivity[29-33], and only one study reported an increased response[29]. Taking these data into account, we did not expect a significant relationship between the olfactory scores and depressive symptoms.

METHOD

Participants and procedure

The sample consisted of 100 Caucasian adult subjects (41 female and 59 male) between 19 and 45 years (mean age of 30.81 years and standard deviation of 7.27 years). The recruited subjects were from Barcelona's province (Catalonia, Spain), and their socioeconomic and cultural status was middle. The sample size was calculated according to the recommended 10:1 ratio of number of subjects to number of test items[34], so about 100 patients were necessary. The inclusion criteria in our study were that participants should be between 18 and 45 years, and should be physically and psychologically able to complete the questionnaires. The upper age limit was established as the probability of suffering some conditions that could alter the olfactory function increases strongly from 45 years onwards[35,36]. According to the literature on possible causes of olfactory dysfunction[16,37,38], the exclusion criteria were the following: (1) any condition that could alter the airflow to the olfactory receptors, (2) any condition that could damage the olfactory membrane or the central nervous system structures involved in olfaction, (3) systemic disturbances that could alter the sense of smell, and (4) psychiatric conditions such as schizophrenia and major depressive disorder. From the initial sample of 106 participants, 6 were excluded as they met one or more of these exclusion criteria (i.e., 1 epilepsy, 1 diabetes, 1 nasal polyposis, and 3 smoking more than 10 cigarretes a day).

Participants were recruited by word of mouth from authors and took part in the study voluntarily and without receiving economical compensation. The questionnaires were introduced as ones of odours and mood, whose purpose it was to learn about the role of the odours in our lives, and how people perceive them in their environment. All

Table 1 EROL scale

1.-	Does smelling good or wearing cologne help you to cope with tense situations? [a]
2.-	Can you identify your partner by the way he/she smells? [a]
3.-	Can the odours stimulate your sexual behaviour? [a]
4.-	Can the odours brake your sexual behaviour? [a]
5.-	Have you ever noticed your sense of smell becoming sharper in any situations? (For example, when you are hungry, anxious, when you go through your periods, ...) [a]
6.-	Do you feel less self-assured when you don't wear cologne/perfume? [b]
7.-	Do you feel more attractive when you wear cologne/perfume? [c]
8.-	Dou you feel less self-assured when you don't wear deodorant? [b]
9.-	Do you feel more attractive when you wear deodorant? [c]
10.-	Can some odours make you feel the space smaller than it is? [a]
11.-	Can some odours make you feel the space wider than it is? [a]

Choices: [a] never, seldom, sometimes, often and always (range 0-4); [b] about the same self-assurance, a little less self-assurance, and a lot less self-assurance (range 0-2); and [c] about the same attractive, a little more attractive, and a lot more attractive (range 0-2).

participants read and signed an informed consent form after study procedures had been fully explained. Sociodemographic data, including age, sex, race, ethnic group, and cultural and socioeconomic status were recorded. The anonymity of the participants' answers was preserved. The protocol for the study was reviewed and approved by the Ethics Committee of Clinical Investigation of the Parc de Salut Mar. This study was carried out in Catalonia (Spain) during 2009/2010. It was coordinated by the Department of Psychiatry of the Parc de Salut Mar in Barcelona, Spain.

Concerning the construction of EROL, the authors held discussions on the topic of odours to generate the items of the scale. An exhaustive literature review on the olfactory scales was performed and the items were designed according to the olfactory issues and shades that the existing olfactory scales do not cover. The content of the 11 items of the scale was related to topics such as the degree of self-assurance and attractiveness that odour masking products can provide, the impact of odours on sexual behaviour, the familiarity of certain odours (partner), the influence of odours on the space perception, and some situations in which the olfactory acuity could be higher. The EROL score was calculated as the sum of the 11 items, with higher scores indicating more influence of odours on the emotional, behavioural and cognitive aspects that the scale assesses. Table 1 shows the items content and the response format for each one of them.

Instruments

In addition to EROL scale, other olfactory measures were administered to the participants in order to assess the convergent validity of the scale: The Affective Impact of Odors scale (AIO)[6] and the Odor Awareness Scale (OAS)[7]. They were selected according to their good psychometrical properties in their original and Spanish versions.[39]

The AIO scale is an 8-item scale that asks about the impact of liked and disliked smells on reactions to new foods, new places, new cosmetic/health products and new persons. The response format for these 8 items is a four-point scale (scored 0-3). The AIO scale is calculated taking the mean of 8 items, with higher scores indicating more impact of odours on liking the aforementioned topics.

The OAS is a 32-item scale designed to assess self-reported awareness of odours in the environment. Thus, OAS captures a person's tendency to notice, pay attention to, or attach importance to odours in the environment, covering situations like food and drink, civilization, nature, and man. Response categories are not always the same, but vary considerably. Five-point scales are used in most cases. Higher scores indicate higher odour awareness. The OAS score is calculated as the sum of the items.

As previously mentioned, the relationship between the olfactory measure and anxiety and depression symptoms was studied. Thus, the Hospital Anxiety and Depression Scale (HADS)[40] was administered to the participants for this purpose. In the review of Bjelland et al.[41] about the validity of the scale, it was found that HADS performed well in assessing the symptom severity and caseness of anxiety disorders and depression in both somatic, psychiatric and primary care patients, and also in the general population. The HADS is a 14-item questionnaire: 7 items constitute the anxiety subscale (HADS-A) and 7 constitute the depression subscale (HADS-D). For each question, the patient is asked to choose a response ranging from 0 points (no symptoms) to 3 points (maximum

Table 2 Item descriptive and reliability data for EROL scale

Item	Mean	Standard deviation	Item-total correlations	ICC
1	1.78	1.17	.533	.681
2	2.93	1.11	.342	.836
3	2.45	.99	.529	.778
4	2.39	.97	.461	.698
5	1.52	1.21	.263	.792
6	.47	.61	.518	.727
7	.81	.66	.538	.689
8	1.14	.73	.311	.724
9	.59	.70	.411	.556
10	.86	.92	.374	.426
11	.95	1.03	.417	.608

impairment), considering his or her emotional state over the past 7 days. Thus, higher scores indicate greater levels of distress. The caseness is usually defined by a score of 8 or above on the HADS-A and 8 or above on the HADS-D. By the sum of the items of every subscale, three scores can be obtained: HADS-A, HADS-D, and HADS-total. In this study, the translated and validated Spanish version of HADS was used.[42,43]

Statistical analysis

Data were analyzed using SPSS for Windows, version 18. Descriptive data on mean, standard deviation and range were used for the sociodemographic characteristics and the questionnaires scores.

In the light of a documented higher olfactory performance in women on tests of olfactory function[44-46], *t* Student test for independent samples was used to compare the scores between both sexes. Since it has been observed that olfactory function changes with age[44,47,48], correlations between this variable and the olfactory scales were tested by Pearson coefficient correlation. HADS measures were also evaluated according to gender (*t* Student test) and age (Pearson coefficient correlation).

Four were the evaluated psychometric properties of the questionnaires. First, the internal consistency of the scale was calculated with Cronbach's alpha coefficient.[49,50] Second, test-retest reliability analysis was assessed by means of intraclass correlation coefficient (ICC).[51,52] The interval between test and retest was of one week. Three, convergent validity was evaluated by calculating the Pearson correlation coefficient between EROL and the other olfactory instruments. Four, for the internal structure analysis, an exploratory factor analysis was conducted. A principal axis analysis was performed over the correlation matrix of EROL scale. Decisions regarding factor retention were based on (1) ratio between eigenvalues, (2) the theoretical interpretability of factors, and (3) the scree test.[50,53] Finally, the relationship between EROL and HADS scale (total/anxiety/depression) was assessed by Pearson correlation coefficient and the partial correlation coefficients (controlling for the other subscale). Prior to the analysis we assumed the conventional criteria on the interpretation of correlation coefficients as effect size measurement: correlations of .1 indicate a small effect size, .3 a medium effect size, and .5 or above a large effect size.[54]

RESULTS

Scale descriptives

The mean and standard deviation for EROL total score was 16.46 ± 6.21, with a range between 3-36. Item descriptive data are shown in Table 2. Women scored significantly higher than men (t(98)=2.232, p=.028), while there was no significant relationship between age and EROL scale (r=.133, p=.18).

Mean scores and standard deviation of HADS-total were 9.93 ± 5.57. Scores were higher for anxiety (6.68 ± 3.52) than for depression subscale (3.26 ± 2.85). There were no significant differences for gender on HADS (HADS Total: t(98)=0.177, p=.860; HADS-A: t(98)=0.396, p=.693; HADS-D: t(98)=0.807, p=.422), but a significant and negative correlation was found between age and the anxiety subscale (HADS-A: r=-.260, p=.009; HADS-D: r=-.027, p=.791; HADS-Total: r=-.181, p=.071).

Psychometric properties of the scale

Reliability

Cronbach's alpha coefficient was .761, indicating good internal consistency. Item-total correlations ranged from .263 to .538. ICC for total score was .748, showing a good agreement between test and retest scores. The value of ICC for items ranged from .426 to .836. Information related to the contribution of each item to the reliability of the scale can be seen in Table 2.

Convergent validity

EROL scale was significantly and highly correlated (p<.001) to both AIO (r=.534) and OAS (r=.625) scores. These correlations suggested a good level of convergent validity.

Internal structure analysis

Theoretical and empirical reasons supported the retention of a single factor: The scale was constructed assuming unidimensionality of the construct; the ratio between the first and the second eigenvalue was over 2 and the same decision should be taken according to the scree test. So, we considered that the internal structure of the scale could be satisfactorily explained with a one-factor solution. The percentage of explained variance was 26.53%. All the items loaded on this factor above .3 except item 5 (Table 3).

Table 3 Factor loadings of the items of EROL scale and the percentage of explained variance (%)

1	.647
2	.395
3	.593
4	.539
5	.224
6	.654
7	.701
8	.434
9	.559
10	.319
11	.360
Explained variance (%)	26.53

HADS and olfactory scale

EROL correlated positively and significantly with HADS total scores (r=.280, p<.01). However, the analysis through subscales showed that the relationship between the olfactory scale and HADS was moderated in magnitude and significant for anxiety (r=.325, p<.001), whereas for the depression dimension the relationship was non-significant (r=.146, p>.05). We computed the correlation of EROL with the two subscales when controlling for the other one. The partial correlation of EROL with HADS-A adjusted for HADS-D was almost unchanged (r=.295; p=.003). For the depression subscale, when controlling for anxiety, the correlation dropped to almost zero (r=.028, p=.779).

DISCUSSION AND CONCLUSIONS

The main aim of the present study was to develop and validate EROL scale, a new olfactory measure. Likewise, a secondary objective was to study the relationship between the olfactory function and anxiety and depression symptoms. This work was conducted in the general population.

The available data support that EROL scale meets psychometric criteria for establishing validity and reliability. Cronbach's alpha coefficient was of .761, suggesting that items of EROL were globally interdependent and homogeneous in terms of the construct they measured. Item-total correlations also gave support to an adequate level of internal consistency of the scale. However, there was a low consistent element in the scale (item 5: Have you ever noticed your sense of smell becoming sharper in any situations?) which also showed a low factor loading. It could be explained by the content differences regarding the other items. Item 5 asks about situations in which the olfactory acuity could be higher while the other items ask about the influence of olfaction on emotions, behavior and cognition. In spite of this, item 5 was not deleted from the scale as it was considered interesting with regard to the content.

Likewise, ICC for the total scale score (.748) showed that test-retest reliability was adequate, pointing out that EROL displayed a good stability with an interval of one week. Even so, there was a low stable element in this scale (item 10: Can some odors make you feel the space smaller than it is?). One possible explanation could be that the influence of olfaction on space perception is an unknown phenomenon for most people and therefore it is difficult to respond to this question. Item 11 asks about the same information but in relation to a wider space perception and it was one of the three items with the lowest stability.

Convergent validity was good since EROL scale correlated substantially and positively with both olfactory scales used as external criteria. As regards the internal structure, factor analysis extracted only one dimension for the scale. It suggests that items of EROL can be satisfactorily described as an unidimensional factor that includes questions linked to the relationship between olfaction and emotional, behavioural and cognitive aspects.

Data were analyzed according to age and gender. There was no significant relationship between age and EROL scale. However, there was a slight trend towards a negative relation. It has been largely observed that olfactory function changes with age and markedly decreases above the 55-60 years.[44,47,48] However, some studies reported that above 35 years, this function begin to decrease.[47,48] In our sample of participants aged by 19 to 45 years, the results partially supported these data since the trend was present, but not reach statistical significance. Concerning gender, our results agree with the literature since many studies showed a higher performance in women on tests of olfactory function.[44-46]

A secondary aim of this study was to analyze the relationship between HADS and EROL scales. Results

pointed out a positive link between both measures. In people scoring high on HADS, the olfaction had a greater influence on situations that EROL collected. However, the analysis through subscales showed that, as it was hypothesized, the relationship between both measures was significant for anxiety, but not for depression subscale. One tentative and provisional explanation would be that compared to individuals with depressive symptoms, those with anxiety could be more sensitive or more affected at emotional, behavioural and cognitive level by odours. There are several studies suggesting that neurotic and anxious people could be more sensitive and reactive to sensorial stimuli, such as loud noise, unpleasant visual stimuli, bitter taste and pain than stable and calm people.[18-22] It is possible that olfaction could be another sensorial modality to which these people could be more sensitive. Pause et al.[15] reported that neuroticism was a predictor of a higher olfactory sensitivity and according to Eysenck's theory, anxiety correlates highly with neuroticism[55]. Chen and Dalton[17] observed faster detection of neurotic and anxious individuals to emotionally valenced odours (pleasant/unpleasant) as compared to neutral odours. In addition, women high in trait anxiety perceived the emotionally valenced odorants as stronger, compared to the neutral one. Concerning the depressive subjects, the data in the clinical and general population are discrepant.[16,23-33] For example, Pause et al.[23,24] found a reduced sensitivity in major depressive disorder and these findings were replicated later by other researchers[25,26]. Pollatos et al.[28] reported a negative correlation between olfactory sensitivity and depressive symptoms in a sample from the general population. By contrast, other studies showed that olfactory measures did not differ between depressive subjects and healthy controls.[29-33] To our knowledge, only one study found a higher olfactory sensitivity in depressive patients[29]. These inconsistent data could explain the non-significant relationship between HADS-D and EROL in our study. Finally, the low scores on HADS depression subscale in this sample, could also explain the lack of relationship between this subscale and the olfactory measure. Mean scores of HADS depression subscale were lower than those of anxiety subscale and far from the cut-off point. Thus, it is possible that if participants in this study had very low depressive symptoms, no significant relationship could have been established between depression subscale and the olfactory measure, if this relation exists.

This study had several limitations. Firstly, potential participants who suffered some conditions that could alter markedly the olfactory sense were excluded through standard interview, without exploring these conditions in depth. Secondly, the sample size of this study was small. Future research could be addressed to study this olfactory scale with larger sample sizes, in order to test its psychometric properties again. Thus, data will be statistically highly robust and it will allow the inspection of the less satisfactory items and also a more complex factor analysis. And thirdly, the low depressive symptoms in this sample has not make possible to ascertain in a conclusive manner the relationship between the olfactory measure and depression sphere.

In view of the results of this study, it would be interesting to assess how patients with anxiety disorders score on this scale and also to test them by objective methods. So far, scientific research has paid little attention to the olfactory function in the anxiety sphere, not only in general population, but also in clinical settings. In the psychiatric field, schizophrenia and depressive disorders have been the object of many investigations about this sense[16], but anxiety disorders are often neglected. Taking into account the third limitation of this study, it would be worth assessing again the relationship between the olfactory measure and depressive symptoms in a sample from the general population with higher depressive symptomatology.

This study has yielded the following conclusions: EROL is a new olfactory scale that displayed good psychometrical properties. Thus, it appears as a suitable research tool to assess the olfactory function. Participants with higher scores on HADS anxiety subscale were more influenced by olfaction in situations collected by EROL. Although it may be too soon to draw conclusions, it seems that olfaction could have a greater importance among subjects with anxiety symptoms. Thus, it is necessary to conduct more investigations in anxious individuals to carefully study the olfactory function in this population.

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Olfaction in Affective and Anxiety Disorders: A Review of the Literature

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Key Words
Olfactory function · Affective disorders · Anxiety disorders · Review

Abstract
Background: Olfaction and its relation to mental health is an area of growing interest. Brain areas linked to olfaction partially overlap with brain areas involved in psychiatric disorders; consequently, the study of olfactory function allows us to explore the integrity of these brain areas with a non-invasive and effective method. Accordingly, the aim of this paper is to review olfactory function in affective and anxiety disorders. ***Methods:*** For this purpose, an extensive literature review of English-language studies on olfactory function in patients with the aforementioned pathologies was performed using several online databases. A manual search of relevant journals and books as well as reference lists from selected papers was also performed. ***Results:*** The available data show that depressed patients are usually characterised by preserved olfactory function, except for detection threshold, where contrasting reports have been found. Bipolar disorder has been studied to a lesser extent, but the findings have shown a lack of impairment in most cases. Research on seasonal affective disorders is scant, and future studies are needed to make conclusions. Anxiety disorders have been scarcely approached, but the results note identification deficits in obsessive-compulsive and posttraumatic stress disorders. ***Conclusions:*** Olfactory assessment appears to be a complementary, valuable research tool in the study of psychiatric disorders. However, further investigation is needed to improve our understanding of olfactory function in these disorders.
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Introduction

A growing body of research documents the existence of olfactory deficits in psychiatric disorders [1–3]. This research is motivated by the assumption that there is a partial overlap between brain areas involved in olfactory processing and brain areas implicated in the pathophysiology of psychiatric disorders, such as the limbic system and prefrontal structures [4–8]. Given this close neuroanatomical connection, the assessment of olfactory function in psychiatric disorders may provide information regarding the integrity of the aforementioned brain areas using a non-invasive and effective method. In addition, it is logically expected that these disorders may be accompanied by olfactory dysfunction. Thus, many studies have recently been performed to investigate olfactory function in psychiatric disorders [1–3].

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The aim of this study is to provide a systematic review of the olfactory findings in affective and anxiety disorders by attending to the olfactory levels described by Martzke et al. [3], namely the peripheral level (acuity or detection threshold) and the central level (identification, discrimination, memory, familiarity, intensity and hedonicity). Similarly, available data on neuroimaging and neurophysiological studies will be reviewed.

Methods

To address the aforementioned issues, an extensive literature review of English-language studies on olfactory function in mood and anxiety disorders published through December 2010 was conducted using online databases (MEDLINE and Science Direct). The following key words were used for the search: depression, bipolar disorder (BD), obsessive-compulsive disorder (OCD), posttraumatic stress disorder (PTSD), panic disorder (PD), anxiety, olfaction, odour and olfactory dysfunction. A manual search of relevant journals and books was also performed. Additional papers were selected by checking the reference lists from selected papers. No limits were placed on the demographics, such as geography, gender, age or size of the study population.

Results

Affective Disorders

Olfactory deficits in affective disorders have been investigated for three main reasons. Firstly, olfactory processing at the brain level recruits areas whose functioning is altered in depression and BD, such as the orbitofrontal cortex (OFC), the amygdala and the anterior cingulate [8–10]. Secondly, following bilateral bulbectomy, behavioural, neurotransmitter, endocrine and immunological changes in the rat strikingly parallel the changes in depressive patients [11]; most of these changes can be attenuated by chronic (but not acute) treatment with antidepressants, suggesting that part of the abnormalities observed in depression could be related to abnormalities of the neural olfaction pathways and its projections. Thirdly, stress, which mimics depressive-like phenotypes, induces a decreased cell proliferation or neurogenesis in the hippocampus [12].

In this section, we will review the olfactory function in major depressive disorder (MDD), seasonal affective disorder (SAD) and BD.

Peripheral Level

Several studies have assessed olfactory acuity in patients with MDD, with conflicting results (table 1). Olfactory thresholds in MDD were increased [13–16], reduced [17] or unchanged [17–21]. Whereas some authors found a correlation between olfactory and clinical measures of depression [13], others did not [17]. The inconclusive nature of these findings may be attributable to methodological matters, such as differences in the olfactory test used, the odours studied, the presentation of odours, sample size, age and gender distributions, medication and time of testing as well as clinical differences between subjects. Although there is a concern that could be of great interest when attempting to investigate the olfactory function in MDD, few studies have taken this concern into account; namely, it appears important to discriminate between testing patients with acute depression and patients in a state of remission. In fact, the two studies that performed several olfactory measures at different phases of the disease showed changes in olfactory acuity depending upon the clinical phase [13, 17]. Thus, future studies should consider this concern by taking additional measurements after the acute phase. In addition, it would be valuable to discriminate between medicated and unmedicated patients; to our knowledge, there is only one study that assessed drug-free patients [18] and one study that tested patients before and during antidepressant treatment [17]. Finally, we also want to stress an inherent difficulty in the threshold detection measurement that could explain part of the discrepancy amongst the studies. The reliability of threshold determination, while acceptable, is lower than for other olfactory measures [22]. In addition, odours need to be replaced regularly, as they become weaker or, as in the case of n-butanol, oxidise or otherwise change their character over time [23]. According to Pause et al. [24], it is important to test different odours to obtain valid data on olfactory thresholds. Their study demonstrated that single odour measurement may produce accidental results. In fact, odorant-specific hyposmia is well documented [25, 26] and must be taken into account when olfactory acuity is measured. It should be noted that in many studies on olfactory acuity in MDD, only one odorant was used.

Regarding SAD, Postolache et al. [27, 28] reported inconsistent results. In their first study [27], they found no difference in olfactory sensitivity between the controls and patients before and after light treatment. In their second study [28], they reported that patients with SAD exhibited a more acute sense of smell than healthy controls, regardless of the season during which they were studied. In both studies, the patients were unmedicated (table 1).

Table 1. Olfactory detection threshold in affective disorders

Study	Number of patients and diagnosis	Mean age ± SD or range, years	Males/ females, n	Severity	Odorants	Performance
Pause et al., 2001 [13]	24 MDD 24 C	P: 48.4 ± 13.2 C: 44.2 ± 12.6	P: 9/15 C: 9/15	BDI: 28.5 ± 11.4	eugenol and PEA	acute state: P < C remission state: P = C
Pause et al., 2003 [14]	25 MDD 24 C	P: 47.2 ± 10 C: 48.8 ± 11.9	P: 9/16 C: 9/15	BDI: 25.7 ± 9.4 HAM-D: 21.8 ± 8.9	PEA and isobutyraldehyde	P < C
Lombion-Pouthier et al., 2006 [15]	49 MDD 58 C	P: 43.4 ± 17.54 C: 38.4 ± 13.96	P: 14/35 C: 22/36	BDI: 23.75 ± 5.74	L-carvone and tetrahydrothiophene	P < C
Negoias et al., 2010 [16]	21 MDD 21 C	P: 36.86 ± 10.13 C: 39.62 ± 11.39	P: 4/17 C: 6/15	BDI: 29.67 ± 10.84	PEA (Sniffin' Sticks Test)	P < C
Serby et al., 1990 [18]	9 MDD 9 C	P: 50–59 C: 50–59	P: 9/0 C: 9/0	HAM-D: 19.9 ± 1.6	geraniol	P = C
Thomas et al., 2002 [21][1]	16 MDD 16 C	i.i.	i.i.	BDI: 23.8 ± 9.5	12-component mixture	P = C
Gross-Isseroff et al., 1994 [17]	9 MDD 16 C	P: 49.00 ± 4.56 C: 49.11 ± 4.82	P: 1/8 C: 1/8	HAM-D: 24.11 ± 1.17 (day 0) 11.67 ± 1.13 (week 3) 6.44 ± 0.58 (week 6)	isoamyl acetate and androstenone	drug-free and after 3 weeks of treatment: P = C after 6 weeks of treatment: P > C (only for isoamyl acetate)
Striebel et al., 1999 [19]	19 ADwP 20 Adw/oP 16 C	ADwP: 45.05 ± 11.43 ADw/oP: 45.45 ± 11.39 C: 33.56 ± 9.23	ADwP: 10/9 Adw/oP: 11/9 C: 13/3	i.i.	pyridine	P (all groups) = C
Swiecicki et al., 2009 [20][2]	20 RDD 21 BD 5 FE 30 C	P: 38.2 ± 2.1 C: 35.4 ± 2.1	P: 16/30 C: 10/20	BDI: 26.1 ± 1.7 HAM-D: 14.8 ± 0.9 (all patients)	n-butanol (Sniffin' Sticks Test)	all patients = C RDD = BD = C
Postolache et al., 1999 [27]	24 SAD 24 C	P: 42.8 ± 9.7 C: 42.1 ± 11.8	P: 7/17 C: 7/17	SIGH-SAD: i.i.	PEA	P = C
Postolache et al., 2002 [28]	14 SAD 16 C	P: 42.3 ± 11.5 C: 39.0 ± 10.8	P: 7/7 C: 7/9	SIGH-SAD: i.i.	PEA	P < C
Krüger et al., 2006 [29]	7 ETE BD 9 No-ETE BD	ETE: 33.9 ± 46.1 No-ETE: 46.1 ± 11.6	ETE: 6/1 No-ETE: 4/5	ETE: HAM-D 0.8 ± 1.0 SRMI-S 0.8 ± 1.2/ No-ETE: HAM-D 0.4 ± 0.7 SRMI-S 1.4 ± 1.0	PEA (Sniffin' Sticks Test)	ETE > No-ETE

For performance: = Indicates a comparable performance; > indicates a better performance; < indicates a lower performance. ADwP = Affective disorder with psychosis; ADw/oP = affective disorder without psychosis; RDD = recurrent depressive disorder; FE = first lifetime episode of depression; BDI = Beck's Depression Inventory; HAM-D = Hamilton Depression Rating Scale; SIGH-SAD = Structured Interview Guide for the Hamilton Depression Rating Scale-SAD version; SRMI-S = Self-Report Manic Inventory; ETE = event-triggered episodes; No-ETE = non-event-triggered episodes; P = patients; C = controls; PEA = phenyl ethyl alcohol; i.i. = incomplete information.

[1] Controls were matched to patients according to age and gender.

[2] 'All patients' refers to RDD, BD and FE patients. Authors did not perform a separate analysis on the FE.

With regard to BD, the available studies found no impairment in olfactory acuity among patients, regardless of whether they required antipsychotic medication [19, 20]. Krüger et al. [29] reported that euthymic BD patients with a history of event-triggered episodes had a lower olfactory threshold than BD patients without such a history; however, there was no healthy control group (table 1).

Central Level

Most studies found that olfactory identification abilities in affective disorders were intact [15, 16, 18, 20, 27, 30–34] (table 2). However, some studies revealed reduced olfactory identification performance in MDD patients [18, 35, 36], BD patients [37] and a group of affective disorder patients (MDD and BD), but only in those with psy-

Table 2. Olfactory identification in affective disorders

Study	Number of patients and diagnosis	Mean age ± SD or range, years	Males/ females, n	Severity	Odorants	Performance
Lombion-Pouthier et al., 2006 [15]	49 MDD 58 C	P: 43.4 ± 17.54 C: 38.4 ± 13.96	P: 14/35 C: 22/36	BDI: 23.75 ± 5.74	16 odorants (Test Olfactif)	P = C
Negoias et al., 2010 [16]	21 MDD 21 C	P: 36.86 ± 10.13 C: 39.62 ± 11.39	P: 4/17 C: 6/15	BDI: 29.67 ± 10.84	16 odorants (Sniffin' Sticks Test)	P = C
Swiecicki et al., 2009 [20][1]	20 RDD 21 BD 5 FE 30 C	P: 38.2 ± 2.1 C: 35.4 ± 2.1	P: 16/30 C: 10/20	BDI: 26.1 ± 1.7 HAM-D: 14.8 ± 0.9 (all patients)	16 odorants (Sniffin' Sticks Test)	all patients = C RDD = BD = C
Serby et al., 1990 [18]	9 MDD 9 C	P: 50–59 C: 50–59	P: 9/0 C: 9/0	HAM-D: 19.9 ± 1.6	task 1: 40 odorants (UPSIT) task 2: 20 odorants	task 1: P < C task 2: P = C
Amsterdam et al., 1987 [31][2]	51 MDD/BDII 51 C	P (m): 49 ± 14 P (f): 43 ± 13 C: i.i.	P: 17/34 C: i.i.	HAM-D: 18–37 (range)	40 (UPSIT)	P = C
Kopala et al., 1994 [32]	21 MDD 77 C	i.i.	i.i.	i.i.	UPSIT	P = C
Atanasova et al., 2010 [35]	30 MDD 30 C	P: 36.4 ± 11.1 C: 33.4 ± 9.9	P: 18/12 C: 18/12	MADRS: 36.3 ± 6.3	16 stimuli (vanillin, butyric acid and combined concentrations of both odorants)	P: vanillin (pleasant) < butyric acid (unpleasant) C: vanillin = butyric acid
Clepce et al., 2010 [36][2]	37 MDD 37 C	P (m): 48.31 ± 11.95 P (f): 47.52 ± 11.33 C: i.i.	P: 16/21 C: i.i.	BDI and SHAPS: i.i.	16 odorants (Sniffin' Sticks Test)	acute state: P < C remission state: P = C
Pentzek et al., 2007 [34]	20 DD 30 C	P: 73.45 ± 5.61 C: 77.07 ± 6.81	P: 5/15 C: 6/24	HAM-D: 19.05 ± 7.57	16 odorants (Sniffin' Sticks Test)	P = C
Postolache et al., 1999 [27]	24 SAD 24 C	P: 42.8 ± 9.7 C: 42.1 ± 11.8	P: 7/17 C: 7/17	SIGH-SAD: i.i.	20 odorants (UPSIT)	P = C
Oren et al., 1995 [33]	21 SAD 21 C	P: 38 ± 9 C: 38 ± 9	P: 9/16 C: 9/16	SIGH-SAD: 29 ± 6	40 odorants (UPSIT)	P = C
Hurwitz et al., 1988 [30]	11 BD/1 PERSD 10 C	P: 33.2 (18–50) C: 33.6 (21–43)	P: 2/9 C: 7/3	i.i.	40 odorants (UPSIT)	P = C
Cumming et al., 2011 [37]	20 BD 22 C	P: 34.6 ± 11.3 C: 35.5 ± 9.8	P: 10/10 C: 10/10	BPRS: 16.3 ± 9.5 HAM-D: 11.2 ± 5.7 YMRS: 9.9 ± 8.0	40 odorants (UPSIT)	P < C
Striebel et al., 1999 [19]	19 ADwP 20 ADw/oP 16 C	ADwP: 45.05 ± 11.43 ADw/oP: 45.45 ± 11.39 C: 33.56 ± 9.23	ADwP: 10/9 Adw/oP: 11/9 C: 13/3	BDI and SHAPS: i.i.	40 odorants (UPSIT)	P (both groups) < C ADwP < Adw/oP = C
Krüger et al., 2006 [29]	7 ETE BD 9 No-ETE BD	ETE: 33.9 ± 46.1 No-ETE: 46.1 ± 11.6	ETE: 6/1 No-ETE: 4/5	ETE: HAM-D 0.8 ± 1.0 and SRMI-S 0.8 ± 1.2 No-ETE: HAM-D 0.4 ± 0.7 and SRMI-S 1.4 ± 1.0	16 odorants (Sniffin' Sticks Test)	ETE = No-ETE

For performance: = Indicates a comparable performance; < indicates a lower performance. ADwP = Affective disorder with psychosis; ADw/oP = affective disorder without psychosis; RDD = recurrent depressive disorder; BDII = BD type II; FE = first lifetime episode of depression; PERSD = personality disorder; DD = depressive disorder; BDI = Beck's Depression Inventory; HAM-D = Hamilton Depression Rating Scale; MADRS = Montgomery-Asberg Depression Rating Scale; SHAPS = Snaith-Hamilton Pleasure Scale; SIGH-SAD = Structured Interview Guide for the Hamilton Depression Rating Scale-SAD version; BPRS = Brief Psychiatric Rating Scale; YMRS = Young Mania Rating Scale; SRMI-S = Self-Report Manic Inventory; UPSIT = University of Pennsylvania Smell Identification Test; ETE = event-triggered episodes; No-ETE = non-event-triggered episodes; P = patients; C = controls; i.i. = incomplete information; [1] 'All patients' refers to RDD, BD and FE patients. Authors did not perform a separate analysis on the FE. [2] Controls were matched to patients according to age and gender.

Table 3. Olfactory intensity, discrimination and familiarity in affective disorders

Study	Number of patients and diagnosis	Mean age ± SD years	Males/ females, n	Severity	Odorants	Performance
Olfactory intensity						
Pause et al., 2001 [13]	24 MDD 24 C	P: 48.4 ± 13.2 C: 44.2 ± 12.6	P: 9/15 C: 9/15	BDI: 28.5 ± 11.4	10 odorants	acute and remission state: P = C
Thomas et al., 2002 [21][1]	16 MDD 16 C	i.i.	i.i.	BDI: 23.8 ± 9.5	8 odorants	acute and remission state: P = C
Lombion-Pouthier et al., 2006 [15]	49 MDD 58 C	P: 43.4 ± 17.54 C: 38.4 ± 13.96	P: 14/35 C: 22/36	BDI: 23.75 ± 5.74	16 odorants (Test Olfactif)	P = C
Pause et al., 2008 [40]	9 MDD 9 C	P: 55.1 ± 4.5 C: 44.4 ± 10.6	P: 9/0 C: 9/0	BDI: 22.9 ± 9.0 HAM-D: 40.3 ± 16.4	PEA and isobutyraldehyde	P = C
Clepce et al., 2010 [36][1]	37 MDD 37 C	P (m): 48.31 ± 11.95 P (f): 47.52 ± 11.33 C: i.i.	P: 16/21 C: i.i.	BDI and SHAPS: i.i.	16 odorants (Sniffin' Sticks Test)	acute and remission state: P = C
Atanasova et al., 2010 [35]	30 MDD 30 C	P: 36.4 ± 11.1 C: 33.4 ± 9.9	P: 18/12 C: 18/12	MADRS: 36.3 ± 6.3	16 stimuli (vanillin, butyric acid and combined concentrations of both odorants)	vanillin (pleasant): P < C butyric acid (unpleasant): P > C
Olfactory discrimination						
Negoias et al., 2010 [16]	21 MDD 21 C	P: 36.86 ± 10.13 C: 39.62 ± 11.39	P: 4/17 C: 6/15	BDI: 29.67 ± 10.84	16 triplets (Sniffin' Sticks Test)	P = C
Atanasova et al., 2010 [35]	30 MDD 30 C	P: 36.4 ± 11.1 C: 33.4 ± 9.9	P: 18/12 C: 18/12	MADRS: 36.3 ± 6.3	16 stimuli (vanillin, butyric acid and combined concentrations of both odorants)	P: only discriminated for butyric acid (unpleasant) C: right performance for both odorants
Krüger et al., 2006 [29]	7 ETE BD 9 No-ETE BD	ETE: 33.9 ± 46.1 No-ETE: 46.1 ± 11.6	ETE: 6/1 No-ETE: 4/5	ETE: HAM-D 0.8 ± 1.0 and SRMI-S 0.8 ± 1.2/ No-ETE: HAM-D 0.4 ± 0.7 and SRMI-S 1.4 ± 1.0	16 triplets (Sniffin' Sticks Test)	ETE = No-ETE
Olfactory familiarity						
Thomas et al., 2002 [21][1]	16 MDD 16 C	i.i.	i.i.	BDI: 23.8 ± 9.5	8 odorants	acute and remission state: P = C
Atanasova et al., 2010 [35]	30 MDD 30 C	P: 36.4 ± 11.1 C: 33.4 ± 9.9	P: 18/12 C: 18/12	MADRS: 36.3 ± 6.3	16 stimuli (vanillin, butyric acid and combined concentrations of both odorants)	P = C

For performance: = Indicates a comparable performance; < indicates a lower intensity rating; > indicates a higher intensity rating. BDI = Beck's Depression Inventory; HAM-D = Hamilton Depression Rating Scale; MADRS = Montgomery-Asberg Depression Rating Scale; SRMI-S = Self-Report Manic Inventory; SHAPS = Snaith-Hamilton Pleasure Scale; ETE = event-triggered episodes; No-ETE = non-event-triggered episodes; C = controls; P = patients; i.i. = incomplete information; PEA = phenyl ethyl alcohol.

[1] Controls were matched to patients according to age and gender.

chotic symptoms who required maintenance of antipsychotic medication [19]. The usual lack of impairment in identification performance in MDD is consistent with several studies that compared MDD patients with Alzheimer's disease patients [38, 39]. These studies confirmed the lowered olfactory identification ability in Alzheimer's disease with depressive patients as the reference group. BP patients with and without a history of event-triggered episodes performed similarly on the identification task [29].

Discrimination ability and intensity ratings of various odours did not differ between MDD patients and control subjects in the majority of the studies [13, 15, 16, 21, 35, 36, 40] (table 3). BP patients with and without a history of event-triggered episodes did not exhibit differences in the discrimination task [29].

Regarding hedonic ratings, Lombion-Pouthier et al. [15] reported that MDD patients over-evaluate the pleasantness of odours, which appears surprising as depressive subjects usually experience emotional cues negatively.

Table 4. Olfactory hedonicity in affective disorders

Study	Number of patients and diagnosis	Mean age ± SD years	Males/ females, n	Severity	Odorants	Performance
Lombion-Pouthier et al., 2006 [15]	49 MDD 58 C	P: 43.4 ± 17.54 C: 38.4 ± 13.96	P: 14/35 C: 22/36	BDI: 23.75 ± 5.74	13 odorants	patients over-evaluated the pleasantness of odours
Pause et al., 2001 [13]	24 MDD 24 C	P: 48.4 ± 13.2 C: 44.2 ± 12.6	P: 9/15 C: 9/15	BDI: 28.5 ± 11.4	10 odorants	acute state: P = C, except for citral which was perceived as more pleasant by patients remission state: P = C
Pause et al., 2008 [40]	9 MDD 9 C	P: 55.1 ± 4.5 C: 44.4 ± 10.6	P: 9/0 C: 9/0	BDI: 22.9 ± 9.0 HAM-D: 40.3 ± 16.4	PEA and isobutyraldehyde	P = C
Thomas et al., 2002 [21][1]	16 MDD 16 C	i.i.	i.i.	BDI: 23.8 ± 9.5	8 odorants	acute and remission state: P = C
Swiecicki et al., 2009 [20][2]	20 RDD 21 BD 5 FE 30 C	P: 38.2 ± 2.1 C: 35.4 ± 2.1	P: 16/30 C: 10/20	BDI: 26.1 ± 1.7 HAM-D: 14.8 ± 0.9 (all patients)	16 odorants (Sniffin' Sticks Test)	all patients = C RDD and BD = C RDD rated fewer olfactory stimuli as pleasant compared to BD
Atanasova et al., 2010 [35]	30 MDD 30 C	P: 36.4 ± 11.1 C: 33.4 ± 9.9	P: 18/12 C: 18/12	MADRS: 36.3 ± 6.3	16 stimuli (vanillin, butyric acid and combined concentrations of both odorants)	patients perceived the unpleasant odorant as more unpleasant than controls
Clepce et al., 2010 [36][1]	37 MDD 37 C	P (m): 48.31 ± 11.95 P (f): 47.52 ± 11.33	P: 16/21	BDI and SHAPS: i.i.	16 odorants (Sniffin' Sticks Test)	acute and remission state: P = C
Cumming et al., 2011 [37]	20 BD 22 C	P: 34.6 ± 11.3 C: 35.5 ± 9.8	P: 10/10 C: 10/10	BPRS: 16.3 ± 9.5 HAM-D: 11.2 ± 5.7 YMRS: 9.9 ± 8.0	40 odorants (UPSIT)	BD rated the odorants as more pleasant than controls

For performance: = Indicates a comparable performance. RDD = Recurrent depressive disorder; FE = first lifetime episode of depression; BDI = Beck's Depression Inventory; HAM-D = Hamilton Depression Rating Scale; MADRS = Montgomery-Asberg Depression Rating Scale; SHAPS = Snaith-Hamilton Pleasure Scale; BPRS = Brief Psychiatric Rating Scale; YMRS = Young Mania Rating Scale; UPSIT = University of Pennsylvania Smell Identification Test; P = patients; C = controls; PEA = phenyl ethyl alcohol; i.i. = incomplete information.

[1] Controls were matched to patients according to age and gender.

[2] 'All patients' refers to RDD, BD and FE patients. Authors did not perform a separate analysis on the FE.

The authors suggested that a functional consequence of brain processes underlying depressive states could explain this result. An alternative hypothesis proposed by the authors involved dysfunctions in the OFC, which was described as a secondary olfactory cortex, in hedonic odour evaluation tasks [41]. Pause et al. [13] observed a trend for differences in valence ratings only for 1 (citral) out of 10 studied odours that was perceived as more pleasant by depressive patients in an acute state and not by the control subjects. The authors explained this observation as being linked to the relaxing properties of the lemon-like odour [42, 43]. Several studies [21, 36, 40] reported that hedonicity ratings of MDD patients were comparable with those of the healthy controls. Recently, Atanasova et al. [35] found that MDD patients perceived unpleasant odorants as significantly more unpleasant than the controls, suggesting that patients showed negative olfactory alliesthesia. Swiecicki et al. [20] demonstrated that hedonic ratings of olfactory stimuli did not differ between control and depression groups (unipolar and bipolar depression). However, unipolar depression patients tended to rate fewer olfactory stimuli as pleasant compared with the bipolar patients. Cumming et al. [37] reported that BD patients rated odours to be more pleasant than did healthy controls (table 4).

Many of the aforementioned studies showed that patients with MDD and BD gave similar or higher pleasantness ratings for olfactory stimuli compared with healthy controls. Consistent with this finding, some studies reported that hedonic ratings of taste stimuli were not diminished in depressed individuals [20, 31, 44, 45]. For example, Berlin et al. [44] reported that pleasantness rat-

ings of sucrose did not differ between the control and depression group; these findings were replicated by Dichter et al. [45] and Swiecicki et al. [20]. In another study, Amsterdam et al. [31] found that depressive patients gave higher pleasantness ratings to high-sucrose solutions than the controls did, and this difference was due to higher pleasantness responses of non-melancholic patients (i.e. control and melancholic subjects did not differ in their hedonic ratings). Tremblay et al. [46] consistently demonstrated that severely depressed patients experienced a greater degree of dextroamphetamine rewarding effects compared with the controls, whereas patients with moderate depression did not differ from the controls.

The findings of these studies argue against any major deficit of neural circuits generating pleasant sensations in response to chemosensory stimuli in depressed individuals. Contrary to the clinical picture, anhedonia does not appear to occur at the level of chemosensory perception but appears to be a more complex construct of disturbed central processing. It has been suggested that the anhedonia reported by patients refers to motivational and/or cognitive abnormalities, making these subjects unable to identify and seek pleasant stimuli [20]. However, the methods used in these studies do not reflect all aspects of olfactory and gustatory function in real-life conditions. Depressed patients were passively exposed to rewarding stimuli in laboratory settings that eliminated voluntary reward-related actions and provided some novel contextual cues. Therefore, these findings may be context-specific and may not be generalised to patients' responses in real-life conditions.

Only a few studies have explored olfactory familiarity, demonstrating no differences between depressed patients and control groups [21, 35] (table 3).

To our knowledge, there is no study assessing odour memory in affective disorders.

Neuroimaging and Neurophysiological Findings

Pause et al. [14] found that at the beginning of therapy, MDD patients responded to odours with frontally reduced amplitudes of P2 and P3-1 peaks. After successful medical treatment, event-related potentials no longer differentiated between patients and healthy controls. In a later study, the same authors [40] found that MDD patients and healthy controls showed comparable olfactory event-related potentials. Krüger et al. [29] reported that BD patients with event-triggered episodes exhibited shorter early latencies of olfactory event-related potentials in comparison to those without such episodes. In terms of neuroimaging data, the only available study [16] reported that patients with acute MDD showed smaller olfactory bulb volume compared with that of the controls. There was a positive correlation between this volume and olfactory acuity and a negative correlation with depression scores. The authors suggested that these results might be related to reduced neurogenesis in MDD that could also be reflected at the level of the olfactory bulb.

Anxiety Disorders

Olfactory function has also been studied in anxiety disorders, but the research is scarce. Investigations have focused on OCD, PTSD and, to a lesser extent, PD, with attention to the overlap between areas involved in olfaction and areas implicated in the pathophysiology of these disorders, such as the OFC, the amygdala, the hippocampus, the insula and so on [47–49]. These data are summarised in table 5.

Peripheral Level

To the best of our knowledge, detection threshold in anxiety disorders has only been studied in OCD. The available data showed that OCD patients did not exhibit any impairment in olfactory acuity [17, 50].

Central Level

Goldberg et al. [51] conducted a case series study of women with high levels of obsessiveness (but not clinical OCD), finding identification deficits when compared with the healthy controls. Barnett et al. [52] described impaired performance in an identification test as well as deficits in spatial memory in OCD patients. Given that the OFC has been repeatedly associated with olfactory identification ability [53, 54], this finding of abnormal identification is consistent with the hypothesis of disrupted processing at the level of the OFC in OCD [55]. Fenger et al. [56] found that patients and controls showed no differences in this domain. The authors suggested that these divergent outcomes from previous studies [51, 52] could be explained by the olfactory test. Goldberg et al. [51] and Barnett et al. [52] used the long 40-item version of the smell test (University of Pennsylvania Smell Identification Test), whereas Fenger et al. [56] used the short 12-item version. The 40-item version may be more sensitive to olfactory impairments.

Two studies [57, 58] demonstrated that PTSD patients exhibited olfactory identification deficits compared with healthy controls. In one study [58], this low performance was a significant predictor of aggression and impulsivity. According to the authors, these findings support the hy-

Table 5. Olfactory function in anxiety disorders

Study	Number of patients and diagnosis	Mean age ± SD or range, years	Males/ females, n	Severity	Odorants	Performance
Detection threshold						
Gross-Isseroff et al., 1994 [17]	14 OCD 16 C	P: 38.46 ± 3.06 C: 36.21 ± 3.47	P: 4/10 C: 4/10	Y-BOCS: 26.86 ± 1.47 (day 0) 24.79 ± 1.96 (week 3) 21.64 ± 2.17 (week 6)	isoamyl acetate and androstenone	drug-free, after 3 and 6 weeks of treatment: P = C
Hermesh et al., 1999 [50]	16 OCD 16 C	P: 33.4 ± 2.5 C: 33.4 ± 2.3	P: 3/13 C: 3/13	Y-BOCS: 26.7 ± 1.3	isoamyl acetate	P = C
Identification						
Goldberg et al., 1991 [51][1]	5 obsessional 5 C	P: 26–45 C: 26–45	P: 0/5 C: 0/5	Y-BOCS: 15.6 ± i.i. MOCI: 14.4 ± i.i.	40 odorants (UPSIT)	P < C
Barnett et al., 1999 [52]	20 OCD 23 C	P: 37.65 ± 14.5 C: 37.34 ± 12.2	P: 8/12 C: 10/13	Y-BOCS: 24.24 ± 8.7	40 odorants (UPSIT)	P < C
Fenger et al., 2004 [56]	15 OCD 17 C	P: 39 ± 15.6 C: 32.8 ± 10.4	P: 7/8 C: 8/9	Y-BOCS: 27.2 ± 6.2	12 odorants (UPSIT)	P = C
Vasterling et al., 2000 [57]	(a) 26 PTSD (b) 25 (c) 17	(a) 50 ± 3.7 (b) 51.4 ± 5.3 (c) 47 ± 4.7	(a) 26/0 (b) 25/0 (c) 17/0	M-PTSD: 128.27 ± 24.33 (a)	40 odorants (UPSIT)	P < C
Dileo et al., 2007 [58]	31 PTSD 31 C	P: 58.23 ± 2.56 C: 56.84 ± 7.24	P: 31/0 C: 31/0	PCL: 61.23 ± 9.57	40 odorants (UPSIT)	P < C
Vermetten et al., 2007 [60]	8 PTSD 8 C	P: 47.5 ± 10.7 C: 41.3 ± 10.8	P: 8/0 C: 8/0	CAPS: 75.5 ± 27.7	40 odorants (UPSIT)	P = C
Kopala and Good, 1996 [61]	10 PD 10 C	i.i.	P: 3/7 C: i.i.	GAF: 64.0 ± 6.7	40 odorants (UPSIT)	P = C
Discrimination						
Hermesh et al., 1999 [50]	16 OCD 16 C	P: 33.4 ± 2.5 C: 33.4 ± 2.3	P: 3/13 C: 3/13	Y-BOCS: 26.7 ± 1.3	isoamyl acetate, citral and eugenol	P = C severe OCD > moderate OCD
Hedonicity						
Vermetten et al., 2007 [60]	8 PTSD 8 C	P: 47.5 ± 10.7 C: 41.3 ± 10.8	P: 8/0 C: 8/0	CAPS: 75.5 ± 27.7	vanilla, diesel and sulfur	P = C except for diesel (patients rated this smell as unpleasant while controls did not)

For performance: = Indicates a comparable performance; > indicates a better performance; < indicates a lower performance. Y-BOCS = Yale-Brown Obsessive Compulsive Scale; MOCI = Maudsley Obsessive Compulsive Inventory; M-PTSD = Mississippi Scale for Combat-related PTSD; PCL = PTSD Checklist; CAPS = Clinician Administered PTSD Scale; GAF = Global Assessment of function. P = Patients; C = Controls.

(a) Deployed PTSD; (b) Deployed/Non-PTSD; (c) Non-deployed veterans; i.i. = incomplete information.

[1] Patients were highly obsessional subjects, but did not suffer from OCD.

pothesis of fronto-limbic abnormalities in PTSD and, in particular, implicate involvement of the orbitofrontal lobe [59]. In contrast, Vermetten et al. [60] found no differences between PTSD patients and controls in the odour identification test.

Kopala and Good [61] showed that medicated patients with PD performed similarly to the healthy controls on the identification task.

Hermesh et al. [50] explored olfactory quality discrimination in OCD patients, finding no significant differences in this task between the patients and healthy controls.

Vermetten et al. [60] exposed combat veterans with and without PTSD to a set of odours and assessed their hedonic tone. The results showed that there were no differences between the groups except for one odour. PTSD veterans rated the odour of diesel (related to traumatic memories of combat) as unpleasant, while combat controls did not. The exposure to diesel resulted in an increase of PTSD symptoms and anxiety in patients.

To our knowledge, intensity, memory and familiarity domains have not been assessed in anxiety disorders.

Neuroimaging and Neurophysiological Findings

In the study by Locatelli et al. [62], temporal lobe electroencephalogram activity was quantitatively analysed in OCD patients and healthy controls while subjects were at rest and during olfactory stimulation. Differences between the groups were detectable in the slower beta frequencies during olfactory stimulation; control subjects showed a power increase, whereas OCD patients showed no modification or a slight decrease. The same group [63] reported that PD patients without depersonalisation and derealisation showed an increase in fast activity and a decrease in slow activity regardless of odour stimulation. PD patients with depersonalisation and/or derealisation showed an increase in slow activity and a bilateral lack of responsiveness in the fast alpha frequency band during odour stimulation. In the aforementioned study by Vermetten et al. [60], combat veterans with and without PTSD were exposed to a set of odours in conjunction with positron emission tomography. The results indicated that the exposure to diesel (rated as unpleasant and distressing by PTSD veterans) resulted in an increase in regional blood flow (rCBF) in the amygdala, insula, medial prefrontal cortex and anterior cingulated cortex as well as decreased rCBF in the lateral prefrontal cortex compared with the combat controls. In addition, combat veterans without PTSD showed less rCBF change with any odour and did not show amygdala activation upon diesel exposure. The authors concluded that these data supported the hypothesis that in PTSD patients, trauma-related smells can serve as strong emotional reminders.

Discussion

This paper has provided a review of olfactory function in affective and anxiety disorders. The following observations were made. (1) Studies assessing detection threshold in MDD have reported contrasting results, showing reduced, unchanged and increased thresholds. Olfactory identification, intensity, familiarity and discrimination abilities were intact in most studies on these topics. Surprisingly, and in contrast to the clinical picture, the available data showed that MDD patients did not exhibit alterations in hedonic judgement of odours; even higher ratings of pleasantness have been found in some cases. Neuroimaging and neurophysiological data are scarce. One study reported a reduced olfactory bulb volume in these patients, whereas two additional works on stimuli processing showed conflicting results. (2) Regarding BD, the few available studies concerning the detection threshold, identification and hedonicity domains showed a preserved olfactory function in most cases. (3) SAD has been scarcely approached and further studies are needed to draw conclusions. (4) Anxiety disorders have been studied to a lesser extent than affective disorders, and several olfactory domains have not been explored. Some studies showed impairments in odour identification tasks in both OCD and PTSD patients. These data support the critical role of the OFC described in both disorders. In PTSD, changes in the fronto-limbic areas have been reported when patients are exposed to distressing smells. With regard to PD, the data are scarce, and the only available study shows that these patients do not display deficits in odour identification tasks.

Although some studies reported olfactory deficits in affective and anxiety disorders, other psychiatric diagnoses, such as schizophrenia, have been more strongly associated with olfactory impairment. In fact, numerous studies have consistently demonstrated that schizophrenic patients show olfactory deficits, especially in the identification domain [1–3]. Several studies aimed to compare the olfactory function in different populations of psychiatric patients [18, 19, 30, 32, 37]. Some of the studies reported a lower performance in schizophrenia and an equivalent performance between controls and other psychiatric patients (MDD, BD, personality disorders and eating disorders) [19, 30, 32]. When a deficit was found in these other patients, it was lower than that of schizophrenics in most cases [18, 19, 37]. Olfactory identification impairment in schizophrenia appears to be independent from the clinical state, schizophrenia subtype, ethnicity or socioeconomic status [64]. In their meta-analytic review, Moberg et al. [2] found substantial olfactory deficits across all domains in these patients. The influences of gender, medication and smoking history were not significant. The authors suggested that these data supported the hypothesis of primary dysfunction in the olfactory system in schizophrenia. Based on the findings in affective and anxiety disorders, it is unlikely that olfactory deficits reported by some studies could be attributable to a primary dysfunction in the olfactory system. Presumably, motivational, cognitive and emotional processes related to these disorders could explain these deficits. However, affective disorders were not consistently associated with olfactory abnormalities, and some studies found that olfactory function was normalised or even enhanced when patients achieved clinical remission [13, 17, 36]. In anxiety disorders, further investigation is needed, but the fact that odours act as cues for increased

PTSD symptoms argues against any primary olfactory deficit in these patients [60].

This review has focused on olfactory function in affective and anxiety disorders, but other sensory systems have also been explored in these diagnoses, and abnormal performance has been found in several cases [20, 31, 44, 45, 65–68]. In this regard, the reduced performance in some gustatory tasks in affective patients is worth mentioning. Although some studies reported intact gustatory thresholds and intensity ratings [20, 45], most of the available data in affective disorders showed reduced performance in these domains [31, 44, 65, 66]. For example, Steiner et al. [65] reported that severely depressed subjects had decreased sensitivity to all basic taste modalities, especially sweetness. Confirming these results, Berlin et al. [44] found a reduced acuity to sweet taste stimuli in MDD patients relative to the controls. In another study by Amsterdam et al. [31], depressive subjects gave similar intensity ratings to lower sweet concentrations but lower intensity ratings to higher sucrose concentrations compared with the controls. SAD patients showed a lower sensitivity to sweet, salty and bitter tastes during the winter, while taste thresholds normalised during the summer, except for salty taste [66]. One possible explanation for these disturbances may be related to antidepressant treatments. Several studies reported that antidepressant drugs had an impact on taste perception, inducing, in some cases, hypogeusia and dysgeusia. In fact, Schiffman et al. [69, 70] found that these drugs (in the tricyclic class) not only have a taste of their own but can also significantly alter the intensity of other tastants. Xerostomia can occur as a symptom of depression and because of the anticholinergic properties of the tricyclic class drugs and may also contribute to distortions in taste perception [71, 72]. Hedonic judgements of gustatory stimuli contrast with threshold and intensity measures in affective disorders (see central level data in the Affective Disorders section).

In conclusion, olfactory assessment appears to be a promising tool in the study of the central nervous system. Future research will benefit from further characterisation and deeper understanding of olfactory function in these psychiatric disorders to help elucidate their pathophysiological mechanisms and to guide the development of new therapeutic modalities. It is obvious that it is necessary to perform further investigations concerning anxiety disorders, exploring in detail all domains of olfactory processing and its neural correlates. For example, given that trauma may create hyperexcitability of fear circuits in the amygdala and a propensity for odour sensitivities [73], it would be interesting to conduct psychophysical studies exploring olfactory acuity in patients with PTSD and PD. Affective disorders, especially MDD, have been studied to a greater extent, but additional studies in cerebral imaging are needed to define the neural correlates of olfactory function in these disorders.

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ANNEXOS

Els diversos annexos d'aquest treball estan formats pel protocol de l'estudi:

- **Annex I.** Instruments utilitzats per a la selecció dels participants de l'estudi: entrevista estructurada dissenyada per aquest estudi i entrevista MINI.
- **Annex II.** Exploració de la síndrome d'hiperlaxitud articular: criteris de l'Hospital del Mar.
- **Annex III.** Escales clíniques: HADS, STAI, PAS i LSAS.
- **Annex IV.** Escales olfactòries: Test d'Sniffin' Sticks, OAS, AIO i EROL.
- **Annex V.** Informació i consentiment informat.

Annex I. Instruments utilitzats per a la selecció dels participants de l'estudi: entrevista estructurada dissenyada per aquest estudi i entrevista MINI.

ENTREVISTA DE SELECCIÓ DELS PARTICIPANTS

DADES SOCIODEMOGRÀFIQUES

- Edat:
- Sexe:
  □ femení □ masculí
- Escolarització:
  □ sense estudis □ primària □ secundària □ mòduls / FP
  □ batxillerat □ universitaris
- Estat civil / parella :
  □ solter/a i sense parella □ solter/a i amb parella □ casat/da
  □ separat/da o divorciat/da □ vidu/a
- Fills (nombre):
- Lloc de residència i telèfon:

DADES CLÍNIQUES

- Hàbit tabàquic: □ sí □ no
  - Nombre de cigarretes/dia :
  - Temps que fa que manté l'hàbit :
- Exfumadors :
  - Temps que fa que ha deixat l'hàbit :
  - Nombre de cigarretes de tabac al dia (habitual):
  - Temps durant el qual va mantenir la quantitat anterior:

CRITERIS D'INCLUSIÓ

- Edat entre 18 i 45 anys:
  □ sí □ no
- Escolarització bàsica (mínim):
  □ sí □ no
- Pacients: diagnòstic de trastorn de pànic amb o sense agorafòbia segons criteris DSM-IV-TR (entrevista MINI):
  □ sí □ no

CRITERIS D'EXCLUSIÓ

- Tr psiquiàtrics : □ sí □ no
  - pacients : altres trastorns de l'eix I (actuals o presents en els darrers 2 anys).
  - controls: qualsevol trastorn psiquiàtric de l'eix I (actual o passat).
- Tr neurològics: □ sí □ no
  - malatia d'Alzheimer, malaltia de Parkinson, esclerosi lateral amiotròfica, esclerosi múltiple, paràl.lisi supranuclear progressiva, traumatisme cranioencefàlic, afeccions intracraneals tipus accident vascular, abscessos, meningitis, aneurismes, neoplàsia i/o tumors benignes cerebrals, epilèpsia i migranya.
- Tr endocrins i metabòlics: □ sí □ no
  - insuficiència renal, cirrosi, hepatitis viral aguda (actual), síndrome de Cushing, malaltia d'Addison, diabetis mellitus, alteracions tiroïdals actives (hipotiroïdisme, hipertiroïdisme i hipoparatiroïdisme) amenorrea primària, síndrome de Kallmann, malaltia de Graves-Basedow i síndrome de Turner.
- Alteracions del flux aeri: □ sí □ no
  - pòlips nasals, hipertròfia adenoïdal, artrèsia de coanes o qualsevol massa que pugui bloquejar la cavitat nasal, deformació severa del tabic nasal, laringectomia i traqueotomia. En el cas de procesos infecciosos i inflamatoris de les vies respiratòries (refredat, grip, sinusitis, rinitis, asma, bronquitis o pneumònia), els candidats poden ser acceptats però, només podran ser avaluats quan aquests processos hagin remès en la seva totalitat.
- Tr reumatològics: □ sí □ no
  - síndrome de Sjögren, lupus sistèmic eritematós, sarcoidosi, síndrome de Churg Strauss, granulomatosi de Wegener, arteritis de Horton, artropaties, dorsopaties i osteopaties.
- Tractaments mèdics: □ sí □ no
  - amiodarona, amlodipino, carbimazol, ciprofloxacino, enalapril, interferon, metoprolol, metotrexato, verapamilo clorhidrato (pres durant els tres mesos previs a l'exploració).
  - tractament radioactiu al cap o al coll (en aquest cas, no es considerarà la temporalitat i s'exclouran tots els casos).

- Consum de tòxics: □ sí □ no
  - hàbit tabàquic actual superior a 10 cig/dia.
  - abús o dependència de substàncies com alcohol, cocaïna, cannabis, inhalants i al.lucinògens (actual i/o passat).
  - exposició habitual a agents industrials (cadmi, níquel, crom, guix, brom, plom, diòxid de silicona, …) i a tòxics químics (benzè, disolvents per a pintures, amoníac, àcid sulfúric, tricloretilè,…) en els darrers 10 anys.

- Altres: □ sí □ no
  - embaràs o alletament, dèficits nutricionals (vitamina A, B6, B12, zinc o desnutrició), infeccions cròniques de l'oïda mitjana i/o bucals presents en el moment de l'exploració, cirurgia nasal, anòsmia congènita, síndrome de Bardet-Biedl, síndrome d'immunodeficiència adquirida i síndrome de sensibilitat química múltiple.

Nombre del paciente: _____ Número de protocolo: _____
Fecha de nacimiento: _____ Hora en que inició la entrevista: _____
Nombre del entrevistador: _____ Hora en que terminó la entrevista: _____
Fecha de la entrevista: _____ Duración total: _____

	Módulos	*Período explorado*	*Cumple los criterios*	*DSM-IV*	*CIE-10*
A	EPISODIO DEPRESIVO MAYOR	Actual (2 semanas)	☐	299.20-296.26 episodio único	F32.x
	(EDM)	Recidivante	☐	296.30-296.36 recidivante	F33.x
	EDM CON SÍNTOMAS MELANCÓLICOS (opcional)	Actual (2 semanas)	☐	296.20-296.26 episodio único 296.30-296.36 recidivante	F32.x F33.x
B	TRASTORNO DISTÍMICO	Actual (últimos 2 años)	☐		
C	RIESGO DE SUICIDIO	Actual (último mes)	☐	300.4	F34.1
		Riesgo: ☐ leve ☐ moderado ☐ alto	☐		
D	EPISODIO MANÍACO	Actual	☐	296.00-296.06	F30.x-F31.9
		Pasado	☐		
	EPISODIO HIPOMANÍACO	Actual	☐	296.80-296.89	F31.8-F31.9/F34.0
		Pasado	☐	300.01/300.21	F40.01-F41.0
E	TRASTORNO DE ANGUSTIA	Actual (último mes)	☐		
		De por vida	☐	300.22	F40.00
F	AGORAFOBIA	Actual	☐		
G	FOBIA SOCIAL *(Trastorno de ansiedad social)*	Actual (último mes)	☐	300.23	F40.1
H	TRASTORNO OBSESIVO-COMPULSIVO	Actual (último mes)	☐	300.3	F42.8
I	ESTADO POR ESTRÉS POSTRAUMÁTICO (opcional)	Actual (último mes)	☐	309.81	F43.1
J	DEPENDENCIA DE ALCOHOL	Últimos 12 meses	☐	303.9	F10.2x
	ABUSO DE ALCOHOL	Últimos 12 meses	☐	305.00	F10.1
K	DEPENDENCIA DE SUSTANCIAS (no alcohol)	Últimos 12 meses	☐	304.00-.90/305.20-.90	F11.1-F19.1
	ABUSO DE SUSTANCIAS (no alcohol)	Últimos 12 meses	☐	304.00-.90/305.20-.90	F11.1-F19.1
L	TRASTORNOS PSICÓTICOS	De por vida	☐	295.10-295.90/297.1	F20.xx-F29
		Actual	☐	297.3/293.81/293.82 293.89/298.8/298.9	
	TRASTORNO DEL ESTADO DEL ÁNIMO CON SÍNTOMAS PSICÓTICOS	Actual	☐	296.24	F32.3/F33.3
M	ANOREXIA NERVIOSA	Actual (últimos 3 meses)	☐	307.1	F50.0
N	BULIMIA NERVIOSA	Actual (últimos 3 meses)	☐	307.51	F50.2
	ANOREXIA NERVIOSA TIPO COMPULSIVA/PURGATIVA	Actual	☐	307.1	F50.0
O	TRASTORNO DE ANSIEDAD GENERALIZADA	Actual (últimos 6 meses)	☐	300.02	F41.1
P	TRASTORNO ANTISOCIAL DE LA PERSONALIDAD (opcional)	De por vida	☐	301.7	F60.2

MINI 5.0.0 (1 de enero de 2000)

Annex II. Exploració de la síndrome d'hiperlaxitud articular: criteris de l'Hospital del Mar.

EXPLORACIÓ DE LA SHA

CRITERIS DIAGNÒSTICS DE L'HOSPITAL DEL MAR	DRETA	ESQ
1. Aposició passiva del polze a la cara flexora de l'avantbraç < 21mm		
2. Articulació metacarpofalàngica 90º		
3. Hiperextensió activa del colze que sobrepassi els 10º		
4. Rotació externa de l'espatlla 85º		
5. Abducció de malucs 85º		
6. Hipermobilitat de les ròtules		
7. Hipermobilitat dels turmells		
8. Angle metatarsofalàngic 90º		
9. Hiperflexió del genoll		
10. Equimosi		
PUNTUACIÓ TOTAL		

SHA = si edat ≤ 40 anys: Homes: p ≥ 4 punts / Dones: p ≥ 5 punts.

SHA = si edat > 40 anys: Homes: p ≥ 3 punts / Dones: p ≥ 4 punts.

El/la participant compleix criteris per al diagnòstic de la SHA:

□ sí □ no

Annex III. Escales clíniques: HADS, STAI, PAS i LSAS.

ESCALA H.A.D.

		Este cuestionario ha sido confeccionado para reflejar cómo se siente usted afectivamente o emocionalmente. No preste atención a los números que aparecen en el margen izquierdo. Lea cada pregunta y **subraye** la respuesta que usted considere que coincida con su propio estado emocional en la **última semana**. No es necesario que piense mucho tiempo cada respuesta; en este cuestionario las respuestas espontáneas tienen mayor valor que las que se piensan mucho.
	A	**Me siento tenso/a nervioso/a:**
	3	Casi todo el día
	2	Gran parte del día
	1	De vez en cuando
	0	Nunca
D		**Sigo disfrutando con las mismas cosas de siempre:**
0		Ciertamente igual que antes
1		No tanto como antes
2		Solamente un poco
3		Ya no disfruto con nada
	A	**Siento una especie de temor como si algo malo fuera a suceder:**
	3	Sí y muy intenso
	2	Sí, pero no muy intenso
	1	Sí, pero no me preocupa
	0	No siento nada de eso
D		**Soy capaz de reírme y ver el lado gracioso de las cosas:**
0		Igual que siempre
1		Actualmente algo menos
2		Actualmente mucho menos
3		Actualmente en absoluto
	A	**Tengo la cabeza llena de preocupaciones:**
	3	Casi todo el día
	2	Gran parte del día
	1	De vez en cuando
	0	Nunca
D		**Me siento alegre:**
3		Nunca
2		Muy pocas veces
1		En algunas ocasiones
0		Gran parte del día
	A	**Soy capaz de permanecer sentado/a tranquila y relajadamente:**
	0	Siempre
	1	A menudo
	2	Raras veces
	3	Nunca

D		**Me siento lento/a y torpe:**
3		Gran parte del día
2		A menudo
1		A veces
0		Nunca
	A	**Experimento una desagradable sensación de "nervios y hormigueos" en el estómago o en el abdomen:**
	0	Nunca
	1	Sólo en algunas ocasiones
	2	A menudo
	3	Muy a menudo
D		**He perdido el interés por mi aspecto personal:**
3		Completamente
2		No me cuido como debería hacerlo
1		Es posible que no me cuide como debiera
0		Me cuido como siempre lo he hecho
	A	**Me siento inquieto/a como si no pudiera parar de moverme:**
	3	Realmente mucho
	2	Bastante
	1	No mucho
	0	En absoluto
D		**Espero las cosas con ilusión**
0		Como siempre
1		Algo menos que antes
2		Mucho menos que antes
3		En absoluto
	A	**Experimento de repente sensaciones de gran angustia o temor**
	3	Muy a menudo
	2	Con cierta frecuencia
	1	Raramente
	0	Nunca
D		**Soy capaz de disfrutar con un buen libro o con un buen programa de radio o televisión:**
0		A menudo
1		Algunas veces
2		Pocas veces
3		Casi nunca

Revise el cuestionario por si ha olvidado responder alguna pregunta

Espacio a rellenar por el investigador
D (8-10)_____
A (8-10)_____

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STAI

AUTOEVALUACION A (E/R)

A / E	PD =	30	+	—	=
A / R	PD =	21	+	—	=

Apellidos y nombre ..... *Edad* ..... *Sexo* ..... V ó M

Centro ..... *Curso/Puesto* ..... *Estado civil* .....

Otros datos ..... *Fecha* .....

A-E

INSTRUCCIONES

A continuación encontrará unas frases que se utilizan corrientemente para describirse uno a sí mismo. Lea cada frase y señale la puntuación 0 a 3 que indique mejor cómo se *SIENTE* Vd. *AHORA MISMO*, en este momento. No hay respuestas buenas ni malas. No emplee demasiado tiempo en cada frase y conteste señalando la respuesta que mejor describa su situación presente.

		Nada	Algo	Bastante	Mucho
1.	Me siento calmado	0	1	2	3
2.	Me siento seguro	0	1	2	3
3.	Estoy tenso	0	1	2	3
4.	Estoy contrariado	0	1	2	3
5.	Me siento cómodo (estoy a gusto)	0	1	2	3
6.	Me siento alterado	0	1	2	3
7.	Estoy preocupado ahora por posibles desgracias futuras	0	1	2	3
8.	Me siento descansado	0	1	2	3
9.	Me siento angustiado	0	1	2	3
10.	Me siento confortable	0	1	2	3
11.	Tengo confianza en mí mismo	0	1	2	3
12.	Me siento nervioso	0	1	2	3
13.	Estoy desasosegado	0	1	2	3
14.	Me siento muy «atado» (como oprimido)	0	1	2	3
15.	Estoy relajado	0	1	2	3
16.	Me siento satisfecho	0	1	2	3
17.	Estoy preocupado	0	1	2	3
18.	Me siento aturdido y sobreexcitado	0	1	2	3
19.	Me siento alegre	0	1	2	3
20.	En este momento me siento bien	0	1	2	3

COMPRUEBE SI HA CONTESTADO A TODAS LAS FRASES CON UNA SOLA RESPUESTA

Ahora, vuelva la hoja y lea las Instrucciones antes de comenzar a contestar a las frases.

Autor: C.D. Spielberger.
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A-R

INSTRUCCIONES

A continuación encontrará unas frases que se utilizan corrientemente para describirse uno a sí mismo.

Lea cada frase y señale la puntuación 0 a 3 que indique mejor cómo se *SIENTE* Vd. *EN GENERAL* en la mayoría de las ocasiones. No hay respuestas buenas ni malas. No emplee demasiado tiempo en cada frase y conteste señalando lo que mejor describa cómo se siente Vd. generalmente.

		Casi nunca	A veces	A menudo	Casi siempre
21.	Me siento bien	0	1	2	3
22.	Me canso rápidamente	0	1	2	3
23.	Siento ganas de llorar	0	1	2	3
24.	Me gustaría ser tan feliz como otros	0	1	2	3
25.	Pierdo oportunidades por no decidirme pronto	0	1	2	3
26.	Me siento descansado	0	1	2	3
27.	Soy una persona tranquila, serena y sosegada	0	1	2	3
28.	Veo que las dificultades se amontonan y no puedo con ellas	0	1	2	3
29.	Me preocupo demasiado por cosas sin importancia	0	1	2	3
30.	Soy feliz	0	1	2	3
31.	Suelo tomar las cosas demasiado seriamente	0	1	2	3
32.	Me falta confianza en mí mismo	0	1	2	3
33.	Me siento seguro	0	1	2	3
34.	Evito enfrentarme a las crisis o dificultades	0	1	2	3
35.	Me siento triste (melancólico)	0	1	2	3
36.	Estoy satisfecho	0	1	2	3
37.	Me rondan y molestan pensamientos sin importancia	0	1	2	3
38.	Me afectan tanto los desengaños, que no puedo olvidarlos	0	1	2	3
39.	Soy una persona estable	0	1	2	3
40.	Cuando pienso sobre asuntos y preocupaciones actuales, me pongo tenso y agitado.	0	1	2	3

COMPRUEBE SI HA CONTESTADO A TODAS LAS FRASES CON UNA SOLA RESPUESTA

7.8. Escala de Pánico y Agorafobia de Bandelow (Panic and Agoraphobia Scale, PAS)

1

Este cuestionario está diseñado para personas que sufren ataques de pánico y agorafobia. Puntúe la severidad de sus síntomas en la *semana pasada.*
Los ataques de pánico se definen como descargas súbitas de ansiedad, acompañadas de algunos de los siguientes síntomas:

- Palpitaciones o taquicardia
- Sudoración
- Temblor o sacudidas
- Boca seca
- Dificultad para respirar
- Sensación de shock
- Dolor torácico o molestias
- Náuseas o malestar abdominal
- Sensación de vértigo, inestabilidad
- Sensación de que los objetos son irreales (como en un sueño), o que uno mismo está distanciado o «no realmente aquí»
- Miedo a perder el control, volverse loco
- Miedo a morir
- Sofocos o escalofríos
- Sensación de hormigueo

A.1. *¿Con qué frecuencia tuvo ataques de pánico?*
0. Sin ataques de pánico la semana pasada
1. 1 ataque de pánico la semana pasada
2. 2 o 3 ataques de pánico la semana pasada
3. 4-6 ataques de pánico la semana pasada
4. Más de 6 ataques de pánico

A.2. *¿Cómo de severos fueron los ataques de pánico en la semana pasada?*
0. Sin ataques de pánico la semana pasada
1. Los ataques fueron generalmente leves
2. Los ataques fueron generalmente moderados
3. Los ataques fueron generalmente graves
4. Los ataques fueron generalmente muy graves

A.3. *Normalmente, ¿cuánto duraron los ataques de pánico?*
0. Sin ataques de pánico la semana pasada
1. De 1 a 10 minutos
2. Entre 10 y 60 minutos
3. Entre 1 y 2 horas
4. Más de 2 horas

U. *La mayor parte de los ataques, ¿fueron esperados (sucedieron en situaciones temidas) o inesperados (espontáneos)?*
9. Sin ataques de pánico
0. Principalmente inesperados
1. Más inesperados que esperados
2. Algunos inesperados y algunos esperados
3. Más esperados que inesperados
4. Más de 2 horas

B.1. *Durante la última semana, ¿evitó determinadas situaciones por miedo a tener un ataque de pánico o una sensación de incomodidad?*
0. No evitación (o mis ataques no suceden en situaciones determinadas)
1. Evitación infrecuente de situaciones temidas
2. Evitación ocasional de situaciones temidas
3. Evitación frecuente de situaciones temidas
4. Evitación muy frecuente de situaciones temidas

B.2. *Por favor, marque las situaciones que evita o en las cuales se producen ataques de pánico o una sensación de incomodidad:*

Aviones	Sitios altos
Autobuses, trenes	Cruzando puentes
Teatros, cines	Viajando lejos de casa
Haciendo cola	Quedarse en casa solo
Fiestas o reuniones sociales	Metro
Restaurantes	Barcos
Sitios cerrados (p. ej., túneles)	Supermercados
Aulas, salones de conferencias	Auditorios, estadios
Conduciendo o yendo en coche (p. ej., en un atasco)	Multitudes
Grandes habitaciones (vestíbulos)	Museos
Caminando por la calle	Ascensores
Campos, grandes avenidas	

Otras situaciones: _____
0. Ninguna (o sin agorafobia)
1. 1 situación
2. 2-3 situaciones
3. 4-8 situaciones
4. Ocurre en muchas situaciones distintas

B.3. *¿Qué grado de importancia tenían las situaciones evitadas?*
0. No eran importantes (o sin agorafobia)
1. No muy importantes
2. Moderadamente importantes
3. Muy importantes
4. Extremadamente importantes

C.1. *En la semana pasada, ¿tuvo temor a tener un ataque de pánico (ansiedad anticipatoria)?*
0. Sin ansiedad anticipatoria
1. Temor infrecuente a tener un ataque de pánico
2. A veces temor a tener un ataque de pánico
3. Temor frecuente a tener un ataque de pánico
4. Temor constante a tener un ataque de pánico

C.2. *¿Qué intensidad tenía ese «temor de temor»?*
0. Nula
1. Leve
2. Moderada
3. Marcada
4. Extrema

D.1. *En la semana pasada, ¿sus ataques de pánico o agorafobia le causaron restricciones (deterioro) en sus relaciones familiares (con su pareja, los niños)?*
0. Sin deterioro
1. Deterioro leve
2. Deterioro moderado
3. Deterioro marcado
4. Deterioro extremo

D.2. *En la semana pasada, ¿sus ataques de pánico o agorafobia le causaron restricciones (deterioro) en su vida social y actividades de ocio (p. ej., no ha sido capaz de ir al cine o a una fiesta)?*
0. Sin deterioro
1. Deterioro leve
2. Deterioro moderado
3. Deterioro marcado
4. Deterioro extremo

D.3. *En la semana pasada, ¿sus ataques de pánico o agorafobia le causaron restricciones (deterioro) en sus responsabilidades en el trabajo (o en las tareas del hogar)?*
0. Sin deterioro
1. Deterioro leve
2. Deterioro moderado
3. Deterioro marcado
4. Deterioro extremo

E.1. *En la última semana, ¿se preocupó por sufrir algún daño por sus síntomas de ansiedad (p. ej., tener un ataque de corazón, o desmayarse y herirse)?*
0. No es cierto
1. Escasamente cierto
2. Parcialmente cierto
3. Principalmente cierto
4. Totalmente cierto

E.2. *¿Algunas veces pensó que su médico estaba equivocado cuando le decía que sus síntomas del tipo golpes de corazón, respiración entrecortada, vértigo, etc., tenían una causa psicológica? ¿Creía que, en realidad, detrás de esos síntomas existía una causa somática (física, corporal) que todavía no había sido descubierta?*
0. No es cierto (más bien enfermedad psíquica)
1. Escasamente cierto
2. Parcialmente cierto
3. Principalmente cierto
4. Totalmente cierto (más bien enfermedad orgánica)

Puntuaciones

A. Ataques de pánico: _____
B. Agorafobia, conductas de evitación: _____
C. Ansiedad en los períodos interataques: _____
D. Discapacidad: _____
E. Preocupaciones por la salud: _____
T. Puntuación total (suma de todos los ítems excepto el «U»): _____

ESCALA DE LIEBOWITZ DE ANSIEDAD SOCIAL (LSAS)

Lea atentamente cada frase y decida hasta que punto esa situación afecta a su ansiedad y a su comportamiento. Para responder, utilice las siguientes escalas:

Miedo o ansiedad (A)	Evitación (B)
0 = ninguno	0 = nunca
1 = ligero	1 = ocasionalmente
2 = moderado	2 = a menudo
3 = severo	3 = usualmente

		A	B
1.	Telefonear en público.	…..	…..
2.	Participar en pequeños grupos.	…..	…..
3.	Comer en lugares públicos.	…..	…..
4.	Beber con otras personas en lugares públicos.	…..	…..
5.	Hablar con personas de autoridad.	…..	…..
6.	Actuar o dar una charla frente a una audiencia.	…..	…..
7.	Ir a una fiesta.	…..	…..
8.	Trabajar mientras le observan.	…..	…..
9.	Escribir mientras le observan.	…..	…..
10.	Telefonear a alguien que no conoce muy bien.	…..	…..
11.	Hablar con gente que no conoce muy bien	…..	…..
12.	Reunirse con desconocidos.	…..	…..
13.	Orinar en lavabos públicos.	…..	…..
14.	Entrar a una sala cuando otros ya están sentados.	…..	…..
15.	Ser el centro de atención.	…..	…..
16.	Tomar la palabra en una reunión.	…..	…..
17.	Realizar un test.	…..	…..
18.	Expresar desacuerdo o desaprobación a gente que no conoce muy bien.	…..	…..
19.	Mirar a los ojos a gente que no conoce muy bien.	…..	…..

20. Informar a un grupo. ….. …..
21. Intentar ligar con alguien. ….. …..
22. Devolver algo comprado en una tienda. ….. …..
23. Dar una fiesta. ….. …..
24. Resistir la presión de un vendedor muy insistente. ….. …..
25. Situaciones más importantes para usted:

    a) ……

    b) ……

    c) ……

PD - A:
PD - B:
PUNTUACIÓN TOTAL:

Annex IV: Escales olfactòries: Test d'Sniffin' Sticks, OAS, AIO i EROL.

Sniffin' Sticks

Date, time _____ , _____

Name _____ Age _____ Sex m f

Smell test - Thresholds

left-sided testing

Dil.							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

right-sided testing

Dil.							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

Results

☐ left ☐ right

bilateral testing

Dil.							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

Results

☐ bilateral

ESCALA DE CONCIENCIA SOBRE LOS OLORES (OAS)

Este cuestionario recoge información sobre los olores y el olfato en diferentes situaciones. Por favor, marca con un círculo la opción que mejor refleje tu opinión o sensación en cada situación.

1.- Cuando caminas por el bosque, ¿prestas atención a los olores que te llegan de tu alrededor?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

2.- Cuando alguien está guisando en la cocina, ¿percibes el olor de la comida que está preparando?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

3.- ¿Notas el olor de la comida que proviene de las casas cuando tú estás en la calle?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

4.- Cuando estás estudiando, o en general concentrado/a, ¿te pueden distraer los olores de tu entorno?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

5.- Cuando visitas a alguien en su casa, ¿te fijas en cómo huele su casa?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

6.- ¿Hueles un libro nuevo?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

7.- Cuando un conocido huele de una forma diferente a la habitual, por ejemplo, porque lleva un nuevo perfume, ¿te das cuenta inmediatamente?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

8.- ¿Notas el aliento o la sudoración de los demás?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

9.- ¿Prestas atención al perfume, loción para después del afeitado o al desodorante que los demás utilizan?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

10.- ¿Eres el/la primero/a en oler el gas?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

11.- ¿Eres el/la primero/a en oler que la leche está agria?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

12.- ¿Eres el/la primero/a en oler el fuego, incluso cuando el olor proviene de una barbacoa o de una chimenea?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

13.- ¿Eres el/la primero/a en identificar comida “pasada” en la nevera?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

14.- ¿Te sientes alegre o feliz cuando percibes en el aire un olor agradable?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

15.- ¿Te sientes molesto/a por la presencia de un olor extraño o desconocido?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

16.- Cuando en tu entorno hay un olor desagradable que no desaparece, ¿te sientes nervioso/a o con ansiedad?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

17.- ¿Los olores logran que revivas recuerdos intensos y fuertes?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

18.- ¿Hueles la ropa antes de ponértela?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

19.- Si tu ropa huele a humo o a comida de la noche anterior, ¿te pones otra ropa debido al olor?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

20.- ¿A veces, rechazas la comida por su olor?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

21.- Cuando una habitación huele de manera desagradable, ¿ésto puede repercutir en tu estado de ánimo?

Apenas influencia	Poca influencia	Alguna influencia	Bastante influencia	Mucha influencia

22.- Cuando alguien tiene un olor corporal desagradable, ¿ésto hace que lo encuentres poco atractivo? Sí □ No □

En consecuencia, EL OLOR CORPORAL tiene …

Apenas influencia	Poca influencia	Alguna influencia	Bastante influencia	Mucha influencia

23.- Cuando alguien tiene un olor corporal agradable, ¿ésto hace que lo encuentres atractivo? Sí □ No □

En consecuencia, OLOR CORPORAL tiene .....

Apenas influencia	Poca influencia	Alguna influencia	Bastante influencia	Mucha influencia

24.- Las personas difieren en su sensibilidad a los olores. Un olor desagradable puede ser insoportable para unas personas mientras que a otras no les afecta. ¿Cuán sensible a los olores piensas que eres?

(1) Mucho menos sensible que los demás
(2) Menos sensible que los demás
(3) Igual de sensible que los demás
(4) Más sensible que los demás
(5) Mucho más sensible que los demás

25.- ¿Cuán molesto te sientes cuando no puedes oler debido a un resfriado o a la gripe?

Nada molesto	Muy poco molesto	Poco molesto	Bastante molesto	Muy molesto

26.- ¿Cuán importante es para ti que tus sábanas huelan a limpio?

Nada importante	Muy poco importante	Poco importante	Bastante importante	Muy importante

27.- ¿Cuando buscas pareja, cuán importante es para ti que tu posible pareja tenga un olor agradable?

Nada importante	Muy poco importante	Poco importante	Bastante importante	Muy importante

28.- Hoy en día, muchas flores de cultivo ya no tienen apenas fragancia. ¿Consideras que es importante que las flores tengan fragancia?

Nada importante	Muy poco importante	Poco importante	Bastante importante	Muy importante

29.- ¿Cuán importantes son los olores para ti en tu vida cotidiana?

Nada importantes	Muy poco importantes	Poco importantes	Bastante importantes	Muy importantes

30.- ¿Qué echarías más de menos? Marca la respuesta con una cruz.

- □ Perder la audición de un oído.
- □ Perder el olfato.
- □ Perder tu dedo pequeño del pie.

31.- Si estás en un espacio público, sentado cerca de alguien que huele mal, ¿buscarás otro asiento si es posible?

No	Probablemente no	Quizás	Probablemente sí	Sí

32.- Supongamos que estás en un supermercado que huele mal. ¿Ésta sería una razón para que no volvieras a ir?

(4) Nunca volvería allí.
(3) Sólo volvería si no hubiera otra posibilidad.
(2) Iré con menos frecuencia de la que iría a un supermercado que huela mejor.
(1) No dejaré que mis compras se vean influenciadas por la forma en la que huele el supermercado.

33.- Cuando compramos un producto, diferentes propiedades son importantes. La fragancia es una de ellas. A continuación, encontrarás una serie de características que pueden jugar un papel durante la compra de un producto. Por favor, ordena según el grado de importancia que tienen para ti cada una de estas características. (1) sería la más importante, (2) la siguiente más importante, etc.

a) Gel de ducha:

….. Envase
….. Precio
….. Olor
….. Resultado que te da el producto

b) Productos de limpieza:

….. Envase
….. Precio
….. Olor
….. Resultado que te da el producto

c) Desodorante:

….. Envase
….. Precio
….. Olor
….. Resultado que te da el producto

ESCALA SOBRE EL IMPACTO AFECTIVO DE LOS OLORES (AIO)

En este cuestionario aparecen una serie de preguntas relacionadas con la influencia del olfato en algunas decisiones. Para cada pregunta, elige la opción con la que más te identifiques y márcala con un círculo.

Impacto de los olores

1.- Cuando te gusta una nueva comida, ¿en parte es porque te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

2.- Cuando NO te gusta una nueva comida, ¿en parte es porque no te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

3.- Cuando te gusta un nuevo lugar, ¿en parte es porque te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

4.- Cuando NO te gusta un nuevo lugar, ¿en parte es porque no te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

5.- Cuando te gusta un nuevo cosmético o producto de salud, ¿en parte es porque te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

6.- Cuando NO te gusta un nuevo cosmético o producto de salud, ¿en parte es porque no te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

7.- Cuando te gusta una persona que has conocido, ¿en parte es porque te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

8.- Cuando NO te gusta una persona que has conocido, ¿en parte es porque no te gusta como huele?

Nunca	Raramente	A veces	Con frecuencia

ESCALA RELACIONAL SOBRE EL OLFATO (EROL)

1.- ¿Oler bien o llevar colonia te ayuda a afrontar situaciones de cierta tensión?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

2.- ¿Reconocerías a tu novio/a con los ojos cerrados por su olor?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

3.- ¿Notas que el olor puede activar tu conducta sexual?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

4.- ¿Notas que el olor puede frenar tu conducta sexual?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

5.- ¿Has observado si en algunas situaciones tienes el OLFATO MÁS FINO (por ejemplo, cuando tienes hambre, cuando te angustias, durante el período menstrual, …)?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

En caso afirmativo, ¿cuáles son? ……
……..
……

6.- ¿Si no llevas colonia/perfume, te sientes menos seguro/a?

Mucho menos seguro/a	Un poco menos seguro/a	Igual de seguro/a

7.- ¿Si llevas colonia/perfume, te sientes más atractivo/a?

Mucho más atractivo/a	Un poco más atractivo/a	Igual de atractivo/a

8.- ¿Si no llevas desodorante, te sientes menos seguro/a?

Mucho menos seguro/a	Un poco menos seguro/a	Igual de seguro/a

9.- ¿Si llevas desodorante, te sientes más atractivo/a?

Mucho más atractivo/a	Un poco más atractivo/a	Igual de atractivo/a

10.- ¿Hay olores que hacen que tengas la sensación que el lugar donde estás es MÁS PEQUEÑO de lo que es en realidad?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

11.- ¿Hay olores que hacen que tengas la sensación que el lugar donde estás es MÁS AMPLIO de lo que es en realidad?

Nunca	Pocas veces	Algunas veces	Con bastante frecuencia	Siempre

Annex V. Informació i consentiment informat.

FULL D'INFORMACIÓ I CONSENTIMENT INFORMAT PER A L'ESTUDI SOBRE LA FUNCIÓ OLFACTÒRIA EN EL TRASTORN D'ANGOIXA.

DESCRIPCIÓ DE L'ESTUDI: OBJECTIU I PROCEDIMENT

L'olfacte i la seva relació amb la salut mental és una àrea de creixent interès dins la recerca científica. L'estudi d'aquest sentit ens permet obtenir informació sobre com l'olfacte influeix en les nostres emocions, conducta i cognició. Així mateix, l'estudi de la funció olfactòria mitjançant tècniques de neuroimatge i psicofisiologia ens ofereix un mètode complementari i no invasiu per a investigar sobre els mecanismes cerebrals subjacents a les malalties mentals.

Aquest estudi s'ha dissenyat amb l'objectiu d'investigar el sentit de l'olfacte en les persones que pateixen el trastorn d'angoixa.

El procediment consta dels següents passos:

1.- L'investigador us farà una entrevista per a valorar si compliu els requisits per a poder formar part de l'estudi. La durada d'aquesta entrevista oscil.larà entre 30 i 45 minuts.

2.- En cas que sigueu admesos, haureu de respondre uns qüestionaris que recullen informació sobre el vostre estat d'ànim, angoixa i també sobre el sentit de l'olfacte. Així mateix, es farà una valoració sobre el vostre llindar olfactori mitjançant un test breu i senzill que permet avaluar la capacitat que teniu per a detectar una olor. També explorarem la flexibilitat de les vostres articulacions. El temps aproximat requerit per a fer aquestes tasques serà d'una hora i mitja.

BENEFICIS

Al tractar-se d'un estudi amb finalitat estrictament científica, no està prevista la remuneració econòmica dels participants, tal com és habitual en aquest tipus d'estudis.

CONFIDENCIALITAT

Es garanteix la confidencialitat i això vol dir que sempre es preservarà l'anonimat de les dades. Els resultats de l'estudi s'emmagatzemaran en arxius específics creats especialment per a aquesta fi i estaran protegits amb les mesures de seguretat exigides en la legislació vigent (llei orgànica 15/1999 de protecció de dades de caràcter personal). Aquests resultats podran ser consultats pels investigadors/es de l'estudi i ser publicats en revistes científiques i exposades en trobades de l'àmbit científic sense que constin les vostres dades personals. En qualsevol moment, podeu sol.licitar les vostres dades de l'estudi.

CONSENTIMENT INFORMAT

Títol del protocol: Estudi sobre la funció olfactòria en el trastorn d'angoixa.

Jo (nom i cognoms) .....….

- He llegit el full d'informació que se m'ha entregat.
- He pogut fer preguntes sobre l'estudi.
- He rebut suficient informació sobre l'estudi.
- He entès el contingut d'aquest full informatiu i de l'estudi, en general.

He parlat amb (nom de l'investigador): .....

Entenc que:

- La meva participació és voluntària.
- Puc retirar-me de l'estudi quan vulgui i sense haver de donar explicacions. Això no afectarà la meva atenció mèdica.

Dono lliurement la meva conformitat per a participar en l'estudi tal i com s'ha descrit en aquest document.

Lloc i data, ..., ..., d ..... de 20 .....

Signatura,

Participant Investigador

....

MOLTES GRÀCIES PER LA TEVA PARTICIPACIÓ.