Nonclinical Participants' Reports of Hallucinatory Experiences

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Abstract

Hallucinatory experiences in nonclinical subjects were examined using a French adaptation of a self-report questionnaire (Launay-Slade Hallucinations Scale; LSHS). The factor structure of this questionnaire was examined. In addition to prevalence, we explored various characteristics of the reported hallucinatory experiences, including frequency, degree of control, emotional reaction, relationship to stressful events, and personal saliency. We also examined the relationship between the presence of hallucinatory experiences and other factors, such as substance use and social desirability. Two hundred and thirty-six nonclinical participants completed a modified version of the LSHS, a social desirability scale, and answered follow-up questions. Factor analysis of the present version of the LSHS revealed a five-factor structure. Results regarding participants' hallucination frequency, perceived levels of control, and affective responses are reported. Additional results and implications are discussed.

Résumé

Nous avons étudié les hallucinations chez des sujets non cliniques au moyen d'une adaptation française d'un questionnaire d'autodéclaration (échelle d'hallucinations de Launay-Slade, ou LSHS). Nous nous sommes penchés sur la structure des facteurs du questionnaire. Nous avons exploré, outre leur prévalence, diverses caractéristiques des hallucinations déclarées, notamment fréquence, degré de contrôle, réaction affective, relation avec des événements anxiogènes, pertinence personnelle. Nous nous sommes intéressés également à la présence de facteurs qui s'ajoutaient aux hallucinations, par exemple consommation de substances et opportunité sociale. Aux fins de l'étude, 236 participants non cliniques ont rempli une version modifiée du questionnaire LSHS et une échelle d'opportunité sociale, et ils ont répondu à des questions de suivi. L'analyse factorielle de la version adaptée du questionnaire LSHS a mis au jour une structure à cinq facteurs. Nous faisons état des résultats obtenus en ce qui concerne la fréquence des hallucinations des participants, leur degré de contrôle perçu et leurs réactions affectives. Nous traitons également de résultats et de conséquences autres.

Recent years has seen an increasing interest in hallucinations, including investigations of its prevalence in nonclinical populations. Studies reveal that a substantial number of participants without a psychiatric history report having typical hallucinatory experiences (for a review see Johns & van Os, 2001). Furthermore, studies have documented the multidimensionality of hallucinatory experiences in both clinical (Levitan, Ward, Catts, & Hemsley, 1996) and nonclinical samples (Aleman, Nieuwenstein, Böcker, & de Haan, 2001; Larøi, Marczewski, & Van der Linden, 2004). For example, Larøi et al. (2004) investigated the multidimensionality of hallucinations in nonclinical participants with principal component analysis based on an adaptation of the LSHS. This yielded four factors, characterized as representing: 1) sleep-related hallucinatory experiences, 2) vivid daydreams, 3) intrusive thoughts or realness of thought, and, 4) auditory hallucinations. As the authors mentioned, however, hallucinations in the visual modality were not adequately assessed and more research was warranted in order to better assess the presence of visual hallucinations.

Although there is much research concerning the prevalence of hallucinations in the general population, few studies have looked directly at characteristics beyond prevalence. Honig et al. (1998) compared nonclinical participants without a psychiatric history with schizophrenic patients and patients diagnosed with dissociative disorders, all of whom were hearing voices. Results revealed a number of similarities between groups in terms of the characteristics of their hallucinations. In particular, all three groups were similar in terms of the different forms the voices took (i.e., whether the voices spoke in the second- or third-person), experienced their voices as both negative and positive, and expressed a certain lack of control. These preliminary results suggest the existence of common ground in terms of characteristics of hallucinations between patient and nonpatient voice-hearers. However, only auditory hallucinations were explored in this study, and certain important aspects of hallucinations (e.g., frequency, personal salience,

context-specificity) were not examined or taken into account.

Another issue that has not been adequately treated in the literature is the degree to which hallucinations reported in nonclinical subjects are related to the intake of various alcoholic and/or narcotic substances. Leudar, Thomas, McNally, and Glinski (1997) explored the pragmatic properties of verbal hallucinations in a group of schizophrenic patients with hallucinations and in a group of nonclinical participants (students) who heard voices. The nonclinical group in this study did not indicate having taken hallucinogenic drugs (even though most were occasional cannabis users) and that their alcohol consumption was reported as being within "recommended safety limits," thus ruling out illicit drug or alcohol use as possible explanations for the presence of hallucinations in these subjects. However, the examination of a possible association between the presence of hallucinations in nonclinical participants and the intake of various alcoholic and/or narcotic substances could not be carried out in this study, since substance intake in subjects was minimal. It is particularly important to clarify this issue as most studies looking at hallucination-proneness include university students as their participants – a population in which substance-use is relatively abundant (Gledhill-Hoyt, Lee, Strote, & Wechsler, 2000; Webb, Ashton, Kelly, & Kamali, 1997).

This study had several aims. The first aim was to explore the factor structure of the present version of the LSHS. The second aim was to explore nonclinical participants' reports of hallucinatory experiences concerning various characteristics of hallucinations such as prevalence, frequency, degree of control, emotional reactions, relationship with particularly difficult or stressful events, and personal saliency. Furthermore, we wished to examine various (inadequately unexplored) notions described in the literature, especially concerning associations between negative affect and various factors related to hallucinations (e.g., degree of control, frequency of the experiences). For instance, it has been suggested that a lower degree of control of hallucinations is related to negative affect (Johns, Hemsley, & Kuipers, 2002; Nayani & David, 1996). Also, Nayani and David have suggested that a process of "accretion" occurs in schizophrenic patients with auditory hallucinations. They suggest that, over time, an individual suffering from hallucinations is apt to become more involved with the voices (e.g., have dialogues with them, describe them in more detail), which results in a reduction of associated negative affect. Finally, another aim of the study was to examine the issue of substance-use and hallucinatory experiences and the issue of the extent to which participants' answers on the scale are related to what they believe are socially appropriate responses. The present study is the first of its kind to look directly and simultaneously at these different characteristics of hallucinatory experiences.

Method

Participants

Participants consisted of 236 nonclinical subjects (university students) who were approached for their cooperation, which was voluntary. Mean age was 22.6 years (*SD* = 3.6; range 18-34). Fifty-nine percent of participants were female and 41% were male. No incentive was offered for participating.

Materials

All participants completed a recently modified version of the Launay-Slade Hallucinations Scale (LSHS; Launay & Slade, 1981) as was used in Larøi et al. (2004). This version consists of the inclusion of items tapping into hallucinatory experiences not included in previous versions of the scale, and the removal of items that have posed problems in previous research (see Larøi et al. for more detailed information). Validity of this version has been previously documented (Larøi et al.) where a four-factor structure was extracted (sleep-related hallucinatory experiences; vivid daydreams; intrusive thoughts or realness of thought; auditory hallucinations) that was highly similar to those found in previous studies of clinical and nonclinical participants utilizing the same scale. In addition to this, a new factor (sleep-related hallucinations) was extracted. A sleep-related hallucinations factor had never been identified in the literature before.

Moreover, two modifications on the version utilized in Larøi et al. (2004) were made. First, one item was removed from the scale ("In the past I have heard the voice of God or one of his messengers speaking to me"). This was due to the item's extremely low response rate. Second, a visual hallucination-item included in Larøi et al. ("Sometimes, when I look at things such as chairs and tables, they are unreal or strange") was replaced with another one ("Sometimes I have seen things or animals when nothing was in fact there"). The addition of a more appropriate visual hallucination item was in response to the general lack of these types of items in the LSHS (Morrison, Wells, & Nothard, 2000). This resulted in a total of 16 items, which are scored on a 5-point scale as follows: 0 = "certainly does not apply to me," 1 = "possibly does not apply to me," 2 = "unsure," 3 = "possibly applies to me," and 4 = "certainly applies to me."

TABLE 1
LSHS Items and Factor Loadings[a]

Item	1	2	3	4	5
I have had the feeling of touching something or being touched and then found that nothing or no one was there (TH)	**.73**				
Sometimes, immediately prior to falling asleep or upon awakening, I have had a sensation of floating or falling or that I left my body temporarily (HHE1)	**.72**				
Sometimes, immediately prior to falling asleep or upon awakening, I have had the experience of having seen or felt or heard something or someone that wasn't there or the feeling of being touched even though no one was there (HHE2)	**.71**				
On certain occasions I have had the feeling of the presence of someone close who has deceased (VH1)[b]	**.58**				
In my daydreams, I can hear the sound of a tune almost as clearly as if I were actually listening to it (DD1)		**.79**			
The sounds that I hear in my daydreams are usually clear and distinct (DD2)		**.73**			
The people in my daydreams seem so true to life that sometimes I think that they are (DD3)		**.69**			
Sometimes my thoughts seem as real as actual events in my life (VT1)		.53	**.70**		
No matter how hard I try to concentrate, unrelated thoughts always creep into my mind (VT2)			**.65**		
Sometimes a passing thought will seem so real that it frightens me (VT3)			**.64**		
I have been troubled by hearing voices in my head (AH1)				**.73**	
In the past, I have had the experience of hearing a person's voice and then found that no one was there (AH2)				**.68**	
I often hear a voice speaking my thoughts aloud (AH3)				**.63**	
On certain occasions, I have seen the face of a person in front of me, but that there was no one (VH2)					**.71**
Sometimes I have seen things or animals when nothing was in fact there (VH3)	.51				**.65**

[a] Primary loadings (> .5) are written in bold and important secondary loadings are underlined. The olfactory hallucinations-item did not load higher than .5 on any of the factors.
[b] The abbreviation VH (visual hallucination) for this item is admittedly not entirely accurate. However, for simplicity's sake and due to lack of a more appropriate term, the abbreviation VH will be used throughout for this item.

Follow-up questions were also included in the LSHS for each affirmative response to an item. When an item was endorsed (i.e., the subject answers "3" or "4"), participants were asked three 5-point scales exploring frequency ("It occurs to me very rarely – It occurs to me very often"), emotional reaction ("For me, the experience is: Negative – Positive"), and the degree of control (both in terms of making them cease and appear; "They do not cease – They cease;" "They do not appear – They appear"). When all the items were finished, only participants who answered affirmatively to at least one of the items (i.e., responding at least "3" on an item) were also asked whether the experiences concerned them personally or not, if close people (family members, friends, etc.) were implicated, if they involved events already personally experienced,[1] if they occurred in the context of particularly difficult or stressful events, and if they were experienced under the influence of one or several narcotic and/or alcoholic substances (i.e., medication, alcohol, tobacco, cannabis/hashish/marijuana, other substances). In addition, all participants completed the Marlow-Crowne social desirability scale (Crowne & Marlow, 1960). This was included in order to examine whether participants answered according to what they believe are socially appropriate responses.

1 If participants answered "yes" to this question, they were required to answer if the event was experienced "recently," "a while ago" (1-5 years ago), or "quite a long time ago" (more than 5 years).

TABLE 2
Overall Number of Participants (and Rates) for Each Subscale According to Prevalence, Frequency, and Degree of Control

Factor	Prevalence[a]	Frequency[b] (rare-often)	Control[c] (low-high)	Affect (negative-positive)
1. Sleep-related hallucinations	94 (40%)	64-40 (27%-17%)	57-50 (24%-21%)	83-59 (35%-25%)
2. Daydreaming	137 (58%)	9-76 (4%-32%)	19-78 (8%-33%)	17-125 (7%-53%)
3. Intrusive or vivid thoughts	149 (63%)	12-54 (5%-23%)	57-24 (24%-10%)	99-59 (42%-25%)
4. Auditory hallucinations	59 (25%)	52-57 (22%-24%)	71-33 (30%-14%)	78-54 (33%-23%)
5. Visual hallucinations	68 (29%)	80-40 (34%-17%)	45-78 (19%-33%)	113-24 (48%-10%)

[a] Percentage of participants who answered "possibly applies to me" or "most certainly applies to me."
[b] For "rare," figures represent the percentage of participants who responded "1" (very rare) on the frequency scale and for "often," figures represent the percentage of participants who responded "5" (very often) on the frequency scale.
[c] Low control is represented by the percentage of participants responding "they do not cease" and "they reappear." High control is represented by the percentage of participants responding "they cease" and "they do not reappear."

Finally, the psychometric properties of the present version of the LSHS were examined, including its internal validity (principle components analysis) and internal consistency and reliability.

Results

Factor Structure

Principal components analysis on LSHS-items (prevalence scores) revealed five factors that accounted for 59% of the variance. The criterion chosen for the number of factors to be extracted was Catell's scree test, which plots the eigenvalues in component order, draws a straight line through the components with the lowest eigenvalues, and retains those whose eigenvalues fall above this line. Criteria for defining the factors were as follows: Items were required to load above 0.5 on a factor to contribute to it and furthermore, if an item loaded over 0.5 on multiple factors, it only contributed to the factor it loaded highest on. Eigenvalues for the five factors were: Factor 1 (5.03); Factor 2 (1.96); Factor 3 (1.83); Factor 4 (1.61); and Factor 5 (1.46).

Table 1 shows loadings on the five factors that we characterized as representing items related to: 1) sleep-related hallucinatory items, 2) vivid daydreams, 3) intrusive or vivid thoughts, 4) auditory hallucinations, and, 5) visual hallucinations. The results of the principal factor analysis with Varimax rotation revealed the same factors as the principal components analysis, with similar loadings of items on factors.

We interpreted the first factor (which explained 29% of the variance) as representing sleep-related hallucinations, the second factor (10%) as vividness of daydreams, the third factor (9%) as representing intrusive or vivid thoughts, the fourth factor (7%) may be characterized as representing auditory hallucinations, and finally, the fifth factor (4%) may be described as visual hallucinations.

Internal Reliability

Internal consistency and reliability were determined by looking at item-total score correlations and Cronbach's alpha coefficient (Cronbach, 1951). Results revealed a high reliability (Cronbach $\alpha = .87$) for all items. Cronbach's alpha coefficients for each factor were also calculated (Factor 1 = .74; Factor 2 = .72; Factor 3 = .68; Factor 4 = .76). It was not possible to determine a Cronbach's alpha coefficient for Factor 5 as this factor contained only two items. Also, corrected item-to-total score correlations (i.e., the correlation of each item with the total score corrected by excluding the given item from calculation of the total) were highly significant ($p < .001$), with Pearson r values ranging from .32 to .70. Such a clear positive correlation between all 16 items and total score also indicated good internal consistency and reliability.

TABLE 3
Overall Number of Participants (and Rates) for all LSHS Items According to Prevalence, Frequency, and Degree of Control

Item	Prevalence	Frequency (rare-often)	Control (low-high)
1. Sometimes a passing thought will seem so real that it frightens me (VT3)	139 (59%)	21-21 (9%-9%)	66-17 (28%-7%)
2. Sometimes my thoughts seem as real as actual events in my life (VT1)	125 (53%)	12-47 (5%-20%)	43-19 (18%-8%)
3. No matter how hard I try to concentrate on my work unrelated thoughts always creep into my mind (VT2)	182 (77%)	2-99 (1%-42%)	64-38 (27%-16%)
4. In the past, I have had the experience of hearing a person's voice and then found that no one was there (AH2)	80 (34%)	38-85 (16%-36%)	35-47 (15%-20%)
5. The sounds I hear in my daydreams are generally clear and distinct (DD2)	120 (51%)	5-59 (2%-25%)	17-66 (7%-28%)
6. The people in my daydreams seem so true to life that I sometimes think that they are (DD3)	146 (62%)	12-97 (5%-41%)	17-16 (7%-38%)
7. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it (DD1)	142 (60%)	12-73 (5%-31%)	24-80 (10%-34%)
8. I often hear a voice speaking my thoughts aloud (AH3)	45 (19%)	19-66 (8%-28%)	109-21 (46%-9%)
9. I have been troubled by hearing voices in my head (AH1)	54 (23%)	97-21 (41%-9%)	68-33 (29%-14%)
10. On certain occasions, I have seen the face of a person in front of me, but there was no one (VH2)	76 (32%)	90-31 (38%-13%)	38-85 (16%-36%)
11. Sometimes, immediately prior to falling asleep or upon awakening, I have had the experience of having seen or felt or heard something or someone that wasn't there or the feeling of being touched even though no one was there (HHE2)	125 (53%)	71-12 (30%-5%)	40-66 (17%-28%)
12. Sometimes, immediately prior to falling asleep or upon awakening, I have had a sensation of floating or falling or that I left my body temporarily (HHE1)	153 (65%)	28-54 (12%-23%)	68-40 (29%-17%)
13. On certain occasions I have had the feeling of the presence of someone close who has deceased (VH1)	50 (21%)	68-68 (29%-29%)	73-33 (31%-14%)
14. In the past, I have smelt a particular odour when there was nothing there (OH)	57 (24%)	19-35 (8%-15%)	57-35 (24%-15%)
15. I have had the feeling of touching something or being touched and then found that nothing or no one was there (TH)	45 (19%)	90-26 (38%-11%)	40-57 (17%-24%)
16. Sometimes I have seen things or animals when nothing was in fact there (VH3)	59 (25%)	68-50 (29%-21%)	52-68 (22%-29%)

Prevalence, Frequency, Control, and Affect Rates for Each of the Five Factors

Table 2 presents overall rates of prevalence, frequency, degree of control, and affect rates reported in participants for each of the five factors identified in the factor analysis. Based on this, the highest rates of prevalence concerned the intrusive or vivid thought factor (63%), followed by the daydreaming factor (58%). The least prevalent were the auditory hallucination (25%) and visual hallucination (29%) factors. In general, participants indicated high frequency rates for the daydreaming (32%) and intrusive or vivid thought (23%) factors, with few participants reporting low frequency rates for these factors (4%

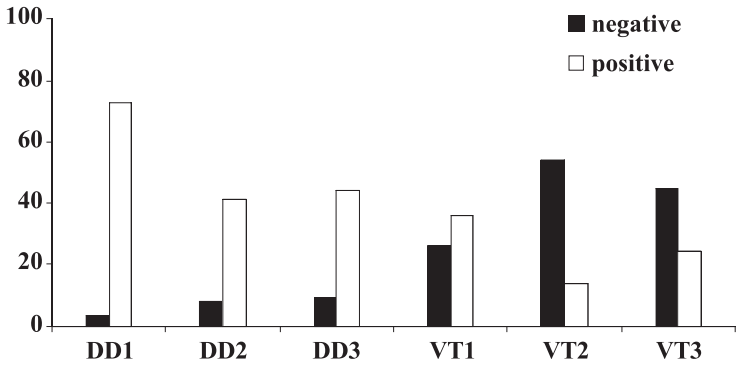

Figure 1. Percentages of negative and positive affective charge for daydream (DD) and vivid thought (VT) items.

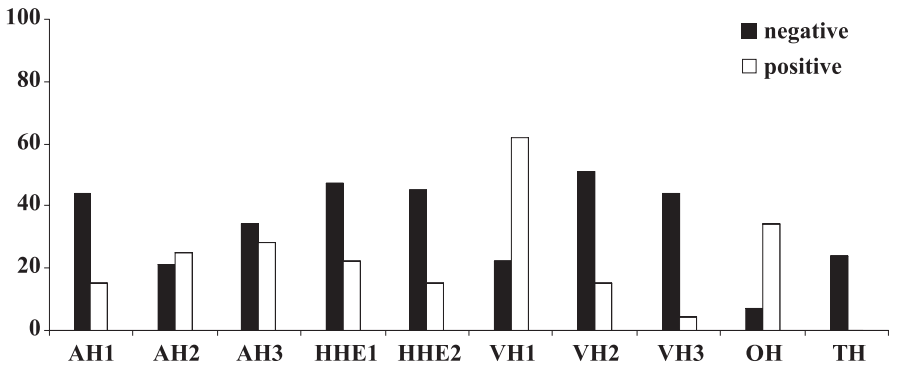

Figure 2. Percentages of negative and positive affective charge for hallucination-items.

and 5%, respectively). In contrast, a greater percentage of participants considered visual hallucinations to be rare (34%), and fewer described these experiences as being frequent (17%). In terms of control rates, items in the daydreaming factor were perceived as being highly controllable, with 33% of participants reporting a high degree of control, and only 8% indicating a low degree of control. The opposite trend was observed with items in the auditory hallucinations factor, where almost a third (30%) of participants reported a low degree of control, and only 14% indicated having a high degree of control for these experiences. Finally, negative (compared to positive) affect rates were greater for the visual hallucination, intrusive or vivid thought, sleep-related and auditory hallucination factors, whereas the opposite was the case for the daydreaming factor, with over half (53%) of participants considering these experiences as positive emotional experiences, compared to only 7% of participants who perceived these experiences as being negative.

Prevalence, Frequency, and Control Rates for Individual Items

Table 3 presents rates of prevalence, frequency, and the degree of control indicated by participants for each LSHS item. Although prevalence rates vary considerably, even the lowest rates represent a substantial number of participants. Clear differences between items can also be observed. For example, almost one-third of participants characterized hallucinatory experiences represented by item numbers 3, 4, 6, 7, 8, and 13 as occurring very often. In contrast, about one-third of participants described items 9, 10, 11, 13, 15, and 16 as occurring very rarely. Similar variations can be observed in terms of degree of control. About one-third of participants reported a very low degree of control for items 1, 8, 9, 12, and 13, whereas almost one-third of participants associated a high degree of control to items 5, 6, 7, 10, 11, and 16.

Affective Charge Rates for Individual Items

Participants were also asked to rate the affective charge of experiences. For the majority of the items,

between one-third and half of participants considered them as neutral (i.e., answered "3" on the scale). Thus, a substantial number of participants indicated some sort of affective reaction.

Figure 1 presents results concerning the affective charge of items concerning daydream and vivid thought. Daydream items were rated as generally more positive compared to the vivid or intrusive thought items, which were viewed as more negative.

Figure 2 presents results concerning the affective charge of items related to hallucinatory experiences. In general, most items were perceived as more negative than positive. The only exceptions were items VH1 ("On certain occasions I have had the feeling of the presence of someone close who has deceased"), which was seen as more positive, and OH ("In the past, I have smelt a particular odour when there was nothing there"), which was considered neutral by subjects.

Possible relations between emotional reactions and various factors (degree of control, frequency) were then explored. In order to examine relations between affective reactions and the degree of control, we correlated mean responses for emotion and control (for all items), with mean responses for both making the experiences cease (i.e., representing the degree to which participants found it easy/difficult to cease ongoing hallucinatory experiences) and for preventing them from reappearing (i.e., representing the degree to which participants found it easy/difficult to avoid having hallucinatory experiences). As a reminder, the response scale for the degree of negative-positive emotion varied from "1" (a primarily negative experience) to "5" (a primarily positive experience). For the question concerning *ceasing* the experiences, low scores signified a low degree of control. In contrast, a high score was related to a low degree of control for the question concerning making them *reappear*. Correlations between mean responses for emotion and mean responses for ceasing the experiences were significant ($r = .65$; $p < .001$). Similarly, correlations between mean responses for emotion and mean responses for making the experiences reappear were also significant ($r = -.73$; $p < .001$). In other words, the more the participants perceived the experiences as negative, the lower the degree of control (in terms of both making them cease and preventing them from reappearing) they felt they had of these experiences. Finally, mean responses for emotion and mean responses for frequency were correlated. This revealed a significant correlation ($r = .64$; $p < .001$), suggesting that the more frequent the experiences are, the more positive they are perceived.

Complementary Questions and Social Desirability

Participants were also asked complementary questions regarding their hallucinations. A significant majority of participants considered the experiences as concerning them personally (90%), implicating close people (65%), and involving personally experienced events (81%). In terms of this latter aspect, the events varied from being recent (in 26% of participants), taking place 1 to 5 years ago (44%), and more than 5 years old (31%). Only 8% of participants indicated an association between hallucinatory experiences and the intake of alcohol and/or drugs. Twenty-four percent of participants reported that their hallucinations were experienced in the context of one or several particularly difficult or stressful periods. Finally, no significant correlations between LSHS-scores and scores on the Marlow-Crowne social desirability scale were found.

Discussion

The present study had several goals. First, we wished to explore the factor structure of the present version of the LSHS. Second, we wished to explore aspects of hallucinations such as prevalence, frequency, emotional reactions, relationship with stressful events, and personal saliency in nonclinical participants. Finally, the issue of substance-use and hallucinatory experiences was explored, in addition to the relationship between social desirability and reports of hallucinations.

Principal components analysis of LSHS-items revealed five factors, which were characterized as representing: 1) sleep-related hallucinatory experiences, 2) vivid daydreams, 3) intrusive or vivid thoughts, 4) auditory hallucinations, and 5) visual hallucinations. This is in accordance with previous studies utilizing the LSHS. For example, three previous studies have found evidence for a vivid daydream factor and for a factor related to vivid thoughts (Aleman et al., 2001; Larøi et al., 2004; Levitan et al., 1996). Evidence for an auditory hallucinations factor is in line with three studies (Larøi et al.; Levitan et al.; Morrison et al., 2000). Finally, evidence of a specific visual hallucinations factor has been shown in one study (Morrison et al.) that utilized a modified version of the LSHS, which included four additional visual hallucination-items. The presence of a visual hallucinations factor in the present study, compared to its absence in other studies utilizing the LSHS (Aleman et al.; Larøi et al.; Levitan et al.), is because a more adequate visual hallucinations-item was added in the present version of the scale. In terms of the sleep-related hallucinations factor, the items that loaded on this factor are the same ones that loaded on the sleep-related factor in Larøi et al.

Among these items was the one assessing the presence of tactile hallucinations, which is in line with studies reporting an association between tactile sensations and hypnagogic and hypnopompic experiences (Cheyne, 2001; Ohayon, 2000). Writers have also pointed out that a "sensed presence" ("the feeling of raw otherness present-at-hand"; Cheyne) often accompanies hypnagogic and hypnopompic hallucinations (Cheyne; Cheyne, Rueffer, & Newby-Clark, 1999a). This experience of a sensed presence is phenomenologically similar to the item "On certain occasions I have had the feeling of the presence of someone close who has deceased," which also loaded on the sleep-related hallucinations factor.

A substantial percentage of participants responded affirmatively (i.e., "possibly applies" or "certainly applies") to items related to hallucinatory experiences (34% for Item 4; 19% for Item 8). These results are globally comparable to previous studies such as Larøi et al. (2004; 28% and 13%, respectively) and Aleman et al. (2001; 31% and 11%, respectively).

A substantial number of participants reported high frequencies of hallucinations. More specifically, 24% of participants had auditory hallucinatory experiences very frequently (19% for all the hallucination-items).[2] These findings are difficult to compare with studies with clinical participants as assessment in these studies often includes specific frequencies (e.g., several times a day, once a week, once a month), whereas in the present study a more general response scale was used ("It occurs to me very rarely" – "It occurs to me very often"). Nonetheless, one study comparing a group of psychiatric patients (schizophrenic patients with a history of auditory hallucinations) with a nonpsychiatric group (tinnitus patients suffering from musical hallucinations) found evidence for similar frequency rates in both groups (Johns et al., 2002).

Few participants indicated high levels of control of their hallucinations. The average percentage of participants reporting a very high degree of control (hallucination onset and offset) of the three auditory hallucination-items was only 14%. This figure was somewhat higher (21%) for all hallucination-items, which is due to elevated ratings of high control for three items (VH2: 36%; VH3: 29%; HHE2: 28%). Nevertheless, the fact that few participants reported a high degree of control for the auditory hallucinations is in line with studies assessing degree of control of auditory hallucinatory experiences in psychotic patients (Chadwick & Birchwood, 1994; Chadwick, Sambrooke, Rasch, & Davies, 2000; Close & Garety, 1998).

In general, most participants indicated having emotional reactions to hallucinations, with the majority of them being perceived as more negative than positive. In the present study, an average of 33% of participants reported negative responses for the auditory hallucination-items (34% for all hallucination-items). This finding is in line with studies that include schizophrenic patients with hallucinations, which show that patients view their hallucinations as primarily negative (Boschi et al., 2000; Chadwick & Birchwood, 1994; Close & Garety, 1998; Johns et al., 2002). In addition, participants perceived the hypnagogic and hypnopompic experience-items as predominantly negative experiences, which is in agreement with previous studies (Cheyne, Newby-Clark, & Rueffer, 1999b; Ohayon, 2000).

Furthermore, mean responses for emotion and mean responses for degree of control were found to be significantly associated. In particular, negative affective responses were related to a lower degree of control. This is in line with studies suggesting a negative relationship between the degree of negative emotion (e.g., distress, anxiety) and the degree of control of hallucinations (i.e., a lower degree of control being related to greater levels of distress; Johns et al., 2002; Nayani & David, 1996). Also, mean responses for emotion and mean responses for frequency were significantly correlated. This association may be due to a process of "accretion" described by Nayani and David, whereby subjects who are more "familiar" with their hallucinatory experiences (i.e., those who have had them for a longer period of time or who have them more frequently) are likely to be more involved with the voices, which may result in a reduction of associated negative affect (or indeed in an increase in the positive affect as suggested by findings from the present study). This latter finding is, however, not in line with Johns et al. who reported that "participants in both groups described feelings of anger, irritation and agitation, especially if their hallucinations occurred frequently" (p. 83). This may be related to the fact that the participants included in the Johns' et al. study experienced hallucinations much more frequently (as they consisted of patients) than in the present study. That is, when the frequency of hallucinations exceeds a certain "threshold," hallucinations may be perceived as generally negative (i.e., irritating, annoying, bothersome). However, if this threshold has not been exceeded, the more frequent

2 As a reminder, hallucination items include (number of items in parentheses): auditory hallucination-items (3), visual hallucination-items (3), hypnopompic and hypnagogic hallucinatory-experiences (2), one tactile hallucination-item, and one olfactory hallucination-item.

the experiences occur (and therefore the less odd or eccentric they may seem to the subjects), the less frightening or distressing they may seem to the hallucinator. These data suggest that relations between the familiarity of hallucinations and affective reactions should be examined in more detail.

Participants in the present study also reported positive reactions to their hallucinatory experiences. For example, 23% considered the auditory hallucination-items as positive (22% for all hallucination-items), which corresponds with studies including psychotic patients with auditory hallucinations (Birchwood & Chadwick, 1997; Chadwick & Birchwood, 1994; Chadwick et al., 2000; Close & Garety, 1998; Davies, Griffin, & Vice, 2001; Johns et al., 2002; Romme & Escher, 1989). In particular, one hallucination-item ("On certain occasions I have had the feeling of the presence of someone close who has deceased") was characterized as a positive experience by 60% of participants. This finding can be related to the literature on hallucinations in older adults. Grimby (1993, 1998) examined bereavement reactions amongst older adults and observed that the vast majority of those who had experienced hallucinations declared them to be pleasant in character. Furthermore, the reported pleasure of the experiences was related to matrimonial happiness. In the present study, it may be hypothesized that the positive experience associated with this item is related to a positive or intimate relation with the deceased person (based on the age of the participants included in the present study, this may concern their grandparents). This finding also suggests that not only do both older and young adults experience this type of hallucination, but also that they share common ground in terms of (positive) emotional reactions to them.

A substantial number of participants (almost one-fourth) indicated that their hallucinatory experiences occurred in the context of a particularly difficult or stressful life-event. This corresponds with the hypothesis that the onset of hallucinations coincides with periods of stress-induced emotional arousal or traumatic life-events (Johns et al., 2002; Romme & Escher, 1989).

Very few participants indicated having had hallucinatory experiences when under the influence of alcohol and/or narcotics, thus providing evidence of the validity of the study's results. Furthermore, these findings are important as they legitimate the use of young adults (in particular students) as study participants in cognitive explorations of hallucinations. Finally, correlations between LSHS-scores and scores on the Marlow-Crowne social desirability scale were not significant, which is in agreement with previous studies (Barrett & Etheridge, 1992; Young, Bentall, Slade, & Dewey, 1987).

In sum, the present study confirmed the multidimensionality of hallucinatory experiences in the normal population, which corresponds to both clinical and nonclinical studies. In addition, findings from the present study suggest that not only is there a continuum between nonclinical participants and psychotic patients experiencing hallucinations in terms of prevalence, other aspects related to the hallucinatory experience also coincide. As with psychotic patients, the majority of normal participants also expressed high rates of frequency, low levels of control, and (negative) affective responses to hallucinatory experiences. Furthermore, hallucinations were considered personally salient (since they involved personally experienced events or people close to the participants) and occurred in the context of particularly difficult or stressful life-events. Finally, these experiences were unrelated to alcohol and/or drug use, and were not associated with the propensity towards social desirability.

Findings from the present study can be related to recent theoretical work suggesting the role of negative emotion in the formation and maintenance of hallucinations in both nonclinical subjects (Morrison, Wells, & Nothard, 2002) and patients (Freeman & Garety, 2003). For example, Morrison et al. (2002) posit that the negative emotion (e.g., distress) associated with hallucinations may be modulated by the presence of negative metacognitive beliefs about voices or intrusive thoughts (e.g., "Not being able to control my thought is a sign of weakness"). Furthermore, according to these authors, while positive metacognitive beliefs about voices or intrusive thoughts are associated with the development of hallucination-proneness, the presence of negative beliefs may lead to the genesis of troublesome, (negative) emotionally charged types of hallucinations. Thus, the presence of specific metacognitive beliefs may explain, in part, the negative affect associated with hallucinations in the present study.

It should be noted that the present study contains a number of limitations. For example, only nonclinical participants (and in particular university students) were included in the study, so that one should be cautious in generalizing these findings to clinical populations. Also, we did not examine the test-retest reliability and predictive validity of the questionnaire. Finally, since we did not assess specific frequencies (e.g., once a day, once a week, once a month), it is difficult to compare our results with studies involving clinical participants where such frequencies are often utilized. It should be noted, how-

ever, that there was a highly significant correlation ($r = .84$; $p < .001$) between endorsing an item and rating its frequency.

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