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## The role of meta-cognitions and thought control techniques in predisposition to auditory and visual hallucinations

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**Objectives.** This study examines the relationship between a predisposition to hallucinations and meta-cognitive variables and thought-control techniques, controlling for the possible effect of anxiety. In order to do so, we start out with the hypothesis that anxiety does not, in itself, explain the association between meta-cognitions and a predisposition to auditory and visual hallucinations.

**Design.** A within-participants correlational design was employed.

**Methods.** Four psychometric tests relating to predisposition to hallucinations, anxiety, meta-cognitions and thought-control techniques were administered to 150 participants.

**Results.** It was found that, after controlling for participants' anxiety levels, the 'loss of cognitive confidence' factor predicted the score on the scale of predisposition to both auditory and visual hallucinations. Thought-control strategies based on worry were also found to be predictive of a greater predisposition to hallucinations, regardless of whether or not participants' anxiety level was controlled.

**Conclusions.** Meta-cognitive variables of cognitive confidence and thought control through worry are positively associated with a predisposition to hallucinations.

**Limitations.** The correlational nature of the design does not allow inferences about causal relationships.

It is estimated that 4.6% of the general population report hallucinatory experiences in some perceptual modality (Tien, 1991), whilst various studies with university students report rates of over 30% (see Barrett & Etheridge, 1992; Bentall & Slade, 1985; Posey & Losch, 1983).

It is meaningful to study the psychological variables related to a predisposition to hallucinations in this type of population.

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### **Meta-cognitions**

The study of meta-cognitions in relation to auditory hallucinations is in large part justified by the fact that the distinction between appearance and reality is itself a meta-cognitive ability (Bentall, 1990; Flavell, 1986). Recently, the self-referent executive function (S-REF) model (Wells, 2000; Wells & Matthews, 1994) has been proposed as a framework for understanding auditory hallucinations (Lobban, Haddock, Kinderman, & Wells 2002; Morrison, Wells, & Nothard, 2000). This model is based on the notion that vulnerability to psychological disorders is characterized by an excess of self-focused attention and reflective processes, and the activation of certain dysfunctional beliefs. Some of these dysfunctional beliefs are of a meta-cognitive nature. Following this model, intrusive mental experiences are subject to interpretation that relies on meta-cognitive knowledge and may be influenced by coping strategies. Hence, meta-cognitions are relevant to the study of hallucinations.

A wide variety of research aimed at defining the role of meta-cognitions in hallucinations has been carried out in recent years, with almost all of this research employing the Meta-cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997). Using this instrument, Baker and Morrison (1998) compared the meta-cognitions of a group of schizophrenic patients with hallucinations, a group of schizophrenic patients without hallucinations and a group from a non-psychiatric population. The patients that reported some kind of hallucinatory experience scored higher than the other two groups in their *beliefs about the uncontrollability and danger of their cognitions*, as well as in their *beliefs about the positive effects of worry*. A logistical regression analysis revealed that *beliefs about the uncontrollability and danger of their thoughts* predicted hallucinations. In a later study, Morrison *et al.* (2000) adapted the Launay-Slade hallucination scale (LSHS, Launay & Slade, 1981), with the aim of measuring predisposition to hallucinations in a non-clinical sample and examining the variables related to this predisposition. These authors found that MCQ factors 'cognitive self-consciousness' and 'uncontrollability and danger' of thoughts, and beliefs about 'responsibility and superstition' in relation to thoughts, significantly discriminated the high- and low-predisposition groups. Subsequently, Lobban *et al.* (2002) developed a version of the MCQ specifically adapted for schizophrenic patients. This instrument was administered to a group of patients currently reporting hallucinatory symptoms and another schizophrenic group that had never reported such symptoms. These authors used two control groups: a group of patients with anxiety disorders and a group of non-patients. The results indicated that, after controlling statistically for the level of depression and anxiety, both the patients with auditory hallucinations and the non-hallucinating schizophrenics maintained the idea that *their thoughts should be consistent* with one another more firmly than the two control groups. These authors also found that patients with hallucinations and those with anxiety showed significantly lower levels of *confidence in their cognitive processes* than the non-hallucinating schizophrenics and the normal controls. A further result emerging from this study is that patients with anxiety problems scored significantly higher than those with auditory hallucinations in the factor referring to *uncontrollability of thoughts*.

### **Thought-control techniques**

Other variables that seem relevant to the study of auditory hallucinations are related to the techniques people use for controlling their thoughts. Morrison *et al.* (2000) used the

Thought Control Questionnaire (TCQ; Wells & Davies, 1994) and found that people with a high predisposition used significantly more strategies based on punishment and reappraisal. Later, García-Montes, Pérez-Álvarez, and Fidalgo (2003) found that repeated suppression of self-discrepant thoughts led to an increase in the quality with which a non-clinical group perceived auditory illusions. Morrison and Wells (2000) showed that patients with a 'schizophrenia' diagnosis used a significantly higher proportion (compared with non-patients) of punishment- and worry-based control strategies. All of this ties in with the literature on auditory hallucinations and coping mechanisms (Farhall & Gehrke, 1997; Morrison, 1998; Romme & Escher, 1989; Yusupoff & Tarrier, 1996), which has stressed the advantages of accepting the voices, rather than actively avoiding them.

The aim of the present study is to explore the relationship between a predisposition to hallucinations and meta-cognitive variables and thought-control techniques, controlling for the possible effect of anxiety, in a sample of university students. We start from the working hypothesis that there is a specific relationship between these variables that is independent of anxiety. Thus, having controlled this trait, those individuals with a strong predisposition to hallucinations have greater levels of meta-cognitive beliefs and more frequently use thought-control techniques than those with a weak predisposition.

## **Method**

### ***Participants***

One hundred and fifty subjects volunteered to participate in the study (108 women and 42 men). All of them were university students taking different courses (psychology, education, humanities and speech therapy) at the University of Almería ( $N = 95$ ) and the University of Oviedo ( $N = 55$ ). Course credits were offered to those who agreed to participate in the study. The mean age of the participants was 23.4 years ( $SD = 4.41$ ).

### ***Materials***

*Revised predisposition to hallucinations scale (RHS; Morrison et al., 2000)*

This scale was used by Morrison *et al.* (2000) to measure the predisposition of a non-clinical population to hallucination-like experiences. It has 13 items with four response options (1 = never, 2 = sometimes, 3 = often and 4 = almost always). In the original version, items are grouped into two factors, one that measures predisposition to auditory hallucinations and one that measures predisposition to visual hallucinations. This questionnaire was translated into Spanish according to the recommendations of Muñiz and Hambleton (1996) and the psychometric properties of the adapted version have been published by Fidalgo, Gutiérrez, García, and Cangas (2003). The factorial analysis carried out on the Spanish version revealed a structure similar to that found previously by Morrison *et al.*, only differing in relation to the category of the second item ('no matter how much I try to concentrate on my work, unrelated thoughts always creep into my mind'; Fidalgo *et al.*, 2003). In the Spanish version, this item loaded on the factor referring to visual hallucinations and not, as in the English version, the factor corresponding to auditory hallucinations. The two factors explained 37.4% of the variance with a total-scale alpha of 0.74 (Fidalgo *et al.*, 2003).

*State-trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)*

Anxiety, as a personality trait, was measured using the subscale 'trait anxiety' of this inventory. The Spanish version (translated, adapted and published by the Spanish publishers TEA) was employed.

*Thought control questionnaire (TCQ; Wells & Davies, 1994)*

This is an instrument designed for measuring the types of strategies people use to try to control thoughts they would like to not have or that are uncomfortable. It has 30 items grouped in five subscales: distraction, social control, punishment, worry and reappraisal. Each item is answered on a 4-point scale (1 = never, 2 = sometimes, 3 = often and 4 = almost always). The translation of this scale was made in accordance with the recommendations of Muñiz and Hambleton (1996). For the sample that participated in our study, the alpha coefficients of the subscales were, in the order in which the factors have been described, as follows: .85, .74, .50, .66 and .71.

*Meta-cognitions questionnaire (MCQ; Cartwright-Hatton & Wells, 1997)*

The MCQ is a questionnaire with 65 items answered using a scale of 1 ('I do not agree') to 4 ('I totally agree'). Factorial analysis carried out by the authors showed the presence of five empirically differentiated and relatively stable factors (Cartwright-Hatton & Wells, 1997). Four of them represent meta-cognitive content: positive beliefs about worry, negative beliefs about the uncontrollability of thoughts and their danger, loss of cognitive confidence, and superstitious and responsibility beliefs in relation to one's own thoughts. The fifth factor represents a meta-cognitive process: 'cognitive self-consciousness' - that is, the tendency to be aware of one's thoughts. The concurrent validity of the test is also supported by empirical studies (Cartwright-Hatton & Wells, 1997). In the present study we used a Spanish version of the MCQ that, once again, was translated according to the recommendations of Muñiz and Hambleton (1996). The internal consistency (alpha) coefficients for the five subscales of the questionnaire in our study sample were, in the order in which the factors have been described, as follows: .92, .88, .86, .81 and .73

**Procedure**

Participants completed the scales in the order they appear in the above descriptions. For this purpose they were allocated to groups that included no more than 40 people. Given the nature of some items, it was ensured that the distance between subjects was sufficient to prevent them observing the responses of their companions. Completion of the scales took about 45 to 55 minutes.

**Results**

Table 1 shows the partial correlations between predisposition to auditory hallucinations, predisposition to visual hallucinations, the factors of the MCQ and the factors of the TCQ, after controlling for trait anxiety.

With the aim of identifying the factors of the MCQ and the TCQ that might predict scores on the scale of predisposition to hallucinations, we carried out two multiple linear regression analyses, one for auditory hallucinations and another for visual hallucinations. In each case we entered, as independent variables, the factors of the MCQ and the TCQ, after controlling for trait anxiety on step 1. A 'stepwise' method of entry was specified in constructing the final regression model.

**Table 1.** Partial correlations controlling for trait anxiety

	Mcq2	Mcq3	Mcq4	Mcq5	TcqD	TcqP	TcqR	TcqW	TcqS	Aud.	Vis.
Mcq1	.03	.11	.30**	.22**	.07	.08	.16*	.21**	-.03	.08	.16*
Mcq2	-	.12	.43**	.22**	-.03	.29**	.17*	-.04	.03	.15	.14
Mcq3	-	-	-.04	-.04	-.06	.02	.07	-.08	-.12	.21**	.26**
Mcq4	-	-	-	.25**	.11	.34**	.25**	.16*	.05	.14	.09
Mcq5	-	-	-	-	-.01	.16*	.34**	.09	-.06	.07	.12
TcqD	-	-	-	-	-	.31**	.13	.21**	.04	.06	.00
TcqP	-	-	-	-	-	-	.16*	.23**	-.15	.12	.17*
TcqR	-	-	-	-	-	-	-	.29**	.12	.15	.11
TcqW	-	-	-	-	-	-	-	-	.00	.33**	.21**
TcqS	-	-	-	-	-	-	-	-	-	.00	.01
Aud	-	-	-	-	-	-	-	-	-	-	.28**

\* $p < 0.05$ ; \*\*  $p < 0.01$ .

Note. Mcq1 = positive beliefs about worry; Mcq2 = negative beliefs about uncontrollability of thoughts and their danger; Mcq3 = loss of cognitive confidence; Mcq4 = superstitious and responsibility beliefs in relation to one's own thoughts; Mcq5 = cognitive self-consciousness; TcqD = distraction techniques for thought control; TcqP = punishment techniques for thought control; TcqR = reappraisal techniques for thought control; TcqW = worry techniques for thought control; TcqS = social techniques for thought control; Aud. = predisposition to auditory hallucinations; Vis. = predisposition to visual hallucinations.

With this statistical procedure measuring predisposition to auditory hallucinations, the final equation was significant ( $F(3, 145) = 18.89, p = .000000002$ ) and predicted more than 26% of the total variance ( $R^2$  corrected = .26). For predisposition to visual hallucinations, the proportion of explained variance is somewhat lower ( $R^2$  corrected = .22). Even so, the equation was also significant ( $F(3, 145) = 14.90, p = .00000001$ ). Table 2 shows a summary of the results of these analyses.

**Table 2.** Multiple regression analysis controlling for trait anxiety

Dependent variable	Step	Variables in the equation	Increment in $R^2$	$\beta^*$	$t^*$	$p^*$
Predisposition to auditory hallucinations	Step 1	STAI-Trait	.12	0.17	2.27	.02
	Step 2	Worry techniques for thought control	.10	0.35	4.76	.000004
	Step 3	Loss of cognitive confidence	.05	0.24	3.52	.001
Predisposition to visual hallucinations	Step 1	STAI-Trait	.12	0.19	2.45	.01
	Step 2	Loss of cognitive confidence	.06	0.27	3.60	.004
	Step 3	Worry techniques of thought control	.05	0.23	3.04	.003

\* Values in the final equation.

Once the effect of trait anxiety was controlled, similar results were obtained for predisposition to auditory and visual hallucinations. "In both cases, the MCQ subscale 'loss of cognitive confidence' and the TCQ subscale 'worry' made individual contributions".

With the aim of determining whether the exclusion of trait anxiety may substantially alter the results, we repeated the same regression analyses without controlling for the effect of trait anxiety.

The final equation for auditory hallucinations, without controlling for the effect of anxiety, was significant ( $F(3, 145) = 20.53, p = .0000000003$ ), explaining 28% of the variance ( $R^2$  corrected = .28). In turn, in relation to visual hallucinations, the final equation explained 23% of the total variance ( $R^2$  corrected = .23) and was significant ( $F(3, 145) = 15.71, p = .000000006$ ). The results found on this second occasion are shown in Table 3.

**Table 3.** Multiple regression analysis not controlling for trait anxiety

Dependent variable	Variables in the equation	Increment			
		in $R^2$	$\beta^*$	$t^*$	$p^*$
Predisposition to auditory hallucinations	Worry techniques for thought control	.16	0.36	5.12	.0000009
	Loss of cognitive confidence	.09	0.23	3.17	.002
	Negative beliefs about uncontrollability of thoughts and their danger	.04	0.22	2.97	.003
Predisposition to visual hallucinations	Loss of cognitive confidence	.12	0.27	3.61	.004
	Worry techniques of thought control	.08	0.24	3.39	.001
	Negative beliefs about uncontrollability of thoughts and their danger	.04	0.21	2.82	.005

Note. Method: Stepwise.

In this case, the MCQ subscale related to 'negative beliefs about the uncontrollability of thoughts and their danger' made an additional contribution to each equation.

## Discussion

Meta-cognitive beliefs about cognitive confidence and thought-control strategies of worry made independent significant contributions to predispositions to auditory and visual hallucinations. These relationships held when trait anxiety was controlled. Without controlling for trait anxiety, the meta-cognitive belief dimension of uncontrollability and danger made an additional contribution to the equation.

With regard to meta-cognitive variables, it might be thought that participants scoring a high predisposition to auditory or visual hallucinations simply show greater insecurity with respect to their perceptual processes and, therefore, would not be comparable with patients who actually experience hallucinations. In view of this, we may call into question the true utility of studies with non-clinical populations, since what may actually be being measured is not the predisposition to hallucinations but, rather, people's insecurity about their perceptual-attentional capacities. Even so, in our view, the importance of the factor related to lack of confidence in one's own cognitive processes must be specifically understood as lending further support to the model of continuity. In favour of this line of argument, it should be recalled that cognitive difficulties have long been recognized as an important component of schizophrenia (Bleuler, 1972; Kraepelin, 1971). Likewise, it should be pointed out that the results

obtained here with a non-clinical sample are similar, once patients' anxiety level has been controlled, to those found with a clinical population by Lobban *et al.* (2002).

Furthermore, and in relation to thought-control techniques, the results of the present work appear to indicate that the use of thought-control strategies, such as trying to worry about other matters of less importance (the 'worry' factor of the TCQ), is in some way related to a greater disposition to both auditory and visual hallucinations. It would appear, then, that the data from our study are similar to those of Morrison and Wells (2000), who compared a sample of patients diagnosed with schizophrenia with a sample of non-patients.

Thus, according to the findings of the present study, it would appear that strategies typified by perseveration (such as worry) appear to be associated with vulnerability. This is consistent with the S-REF model, which states that meta-cognitions constitute a vulnerability factor and that unhelpful coping strategies, such as thought control by perseveration, are particularly important.

In this regard, we feel it appropriate to stress that, on attempting to control statistically for the effect of anxiety, we are in no way suggesting that anxiety has no clinical relevance for the proper understanding of auditory hallucinations. Anxiety is closely related to the appearance of hallucinations (Bentall, 1990) and, in fact, neuroticism has been considered as a risk factor for the development of a schizophrenic disorder (Van Os & Jones, 2001).

In any case, it should be borne in mind that the design of the study was correlational, so no causal relationships of any kind can be established. Thus, although we have reported certain meta-cognitive variables and certain thought-control techniques as contributing to auditory and visual hallucinations, it is possible that they are the result of hallucinations.

The implications of the findings presented and discussed here for the development of psychological intervention should be treated with extreme caution because, among other reasons, they derive from a sample of the non-clinical population. From the assumption of continuity, it could be expected that patients with auditory hallucinations would benefit from a change in their meta-cognitive beliefs (Morrison, 2001). Likewise, it would seem appropriate to promote different mechanisms of thought control. In this regard, some research lines that we believe may be useful are represented by the new cognitive-behavioural treatments that attempt to promote the acceptance of private events (Bach & Hayes, 2002; García-Montes, Luciano, Hernández, & Zaldivar, 2004; García-Montes *et al.*, 2003). In any case, meta-cognitive interventions aimed at modifying perseveration and meta-cognitive beliefs as specified in meta-cognitive theories of anxiety (Wells, 1999, 2000; Wells & Carter, 1999; Wells & Matthews, 1994) may be applicable to psychotic symptoms.

Finally, we should not neglect to mention the fact that the present study has a series of methodological limitations. Apart from that already referred to in relation to the type of sample and the correlational nature of the work, it should be pointed out that there was no type of control for the possible use of drugs by the participants, which could be a 'confounding factor.' Further possible confounding variables may be subjects' levels of depression or other aspects related to their personality. A possible line of future research would focus on the differences between normal and clinical populations in interpreting and reacting to their cognitive intrusions. Likewise, it would be interesting to study the possible relationships between anxiety, meta-cognitive beliefs, thought-control mechanisms and positive psychotic symptoms in more detail.

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