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Prevalence and correlates of auditory vocal hallucinations in middle childhood

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Background
Hearing voices occurs in middle childhood, but little is known about prevalence, aetiology and immediate consequences.

Aims
To investigate prevalence, developmental risk factors and behavioural correlates of auditory vocal hallucinations in 7- and 8-year-olds.

Method
Auditory vocal hallucinations were assessed with the Auditory Vocal Hallucination Rating Scale in 3870 children. Prospectively recorded data on pre- and perinatal complications, early development and current problem behaviour were analysed in children with auditory vocal hallucinations and matched controls.

Results
The 1-year prevalence of auditory vocal hallucinations was 9%, with substantial suffering and problem behaviour reported in 15% of those affected. Prevalence was higher in rural areas but auditory vocal hallucinations were more severe and had greater functional impact in the urban environment. There was little evidence for associations with developmental variables.

Conclusions
Auditory vocal hallucinations in 7- and 8-year-olds are prevalent but mostly of limited functional impact. Nevertheless, there may be continuity with more severe psychotic outcomes given the serious suffering in a subgroup of children and there is evidence for a poorer prognosis in an urban environment.

Declaration of interest
None.

Auditory vocal hallucinations among adults are often associated with psychiatric disorders, but reviews of general population incidence and prevalence studies show that the rate of psychotic experiences, including auditory vocal hallucinations, is far greater than traditional estimates of the incidence and prevalence of psychotic disorders (systematic review van Os *et al*, 2009).[1] Nevertheless, auditory vocal hallucinations may be usefully conceptualised as a risk factor for psychotic disorder, particularly if they are associated with psychological or behavioural complications.[2–6] In children and adolescents, auditory vocal hallucinations occur in both clinical and non-clinical populations.[7,8] Although the phenomenon of hearing voices in childhood may predict adult schizophrenia, the great majority of children with hallucinatory experiences never make the transition to clinical disorder.[9] Population surveys generally involve children in late childhood or adolescence, reporting prevalence rates of auditory hallucinations between 5 and 16%.[1]

Not only auditory vocal hallucinations, but also pre- and perinatal risk factors[8,10] and delayed developmental milestones[6,11] may be associated with later psychotic disorder. Therefore, examination of the developmental correlates of auditory vocal hallucinations may throw some light on the possible pathway to psychosis.

The current paper describes the first part of a longitudinal population-based case–control survey among children 7 and 8 years old at the time of the first interview. In part as a function of data available, the study focuses on the exploration of: the prevalence and characteristics of auditory vocal hallucinations; associations of auditory vocal hallucinations with demographic data (age, gender, degree of urbanisation and parental socio-economic status (SES)); associations with pre- and perinatal factors and early development; and associations with behavioural problems.

Method

Procedure

A cross-sectional, two-staged population-based survey of children aged 7 and 8 years attending primary school in the province of Groningen (about 550 000 inhabitants), The Netherlands, was carried out during the school year 2002/2003. Children with an intellectual disability, including learning problems and/or an IQ < 70, were excluded according to the Dutch school selection system. The study was incorporated in a routine paediatric community health service screening at schools, during which vision and hearing acuity tests were conducted.

The auditory vocal hallucinations interviews were administered by 12 professional female interviewers working at the paediatric community health service, all highly experienced in working with young children. They were trained (by J.A.J. and G.v.d.W.) in conducting the interviews and scoring the answers. In addition, 2-monthly booster sessions were held by the child psychiatrist (J.A.J.) to ensure reliability and prevent interviewer 'drift'.

A two-stage procedure was applied. First, children were asked the screening question: 'In the past year, have you heard one or more voices that only you and no one else could hear?' In case of an affirmative answer, a structured interview to assess auditory vocal hallucinations was conducted with the Auditory Vocal Hallucination Rating Scale (AVHRS).[12]

Parents of children positive for auditory vocal hallucinations on the AVHRS (AVH-positive children) and an equal number of parents of children negative on the AVHRS (control children) were asked to complete the Child Behaviour Checklist for children between 4 and 18 years of age (CBCL).[13] Using a matching algorithm, the control children were frequency-matched on gender, age and degree of urbanisation of the school by the

paediatric community health service. Data on pre- and perinatal influences and early development of the case–control sample were routinely gathered by the Infant Health Service. Informed consent was obtained from the boards of schools and the parents of the children involved because of the sensitivity of the subject and the extra time involved (about 30 min for administering the AVHRS and about 20 min for completing the CBCL questionnaire by parents).

Participants

A total of 5409 children were eligible for testing during the school year 2002/2003. However, 1539 children were excluded for logistical ($n = 245$) or for other reasons ($n = 1294$, including: lacking informed consent, $n = 351$; absent owing to illness, $n = 28$; lacking school's consent, $n = 902$; dubious test result, $n = 13$). Thus, a sample of 3870 children (72%) remained; 347 of these screened AVH-positive. Participation was somewhat higher among 8-year-olds compared with 7-year-olds (77% *v.* 68%). Boys and girls were equally represented. The participation rate for children attending rural schools was higher than for children attending urban schools (80 *v.* 51%). Degree of urbanisation was defined by density of letter boxes per square kilometre, which conformed with the recommendation of Statistics Netherlands (www.cbs.nl/en-GB/menu/home/default.htm).

From the selected AVH-positive and control children ($n = 694$), 61% ($n = 423$) of the parents returned the CBCL questionnaire without differences in their children's auditory vocal hallucinations status ($n = 207$ for AVH-positive children and $n = 216$ for controls), gender, age or degree of urbanisation.

The Infant Health Service records of 476 children (69% of the group of 694) could be traced ($n = 240$ AVH-positive children and $n = 236$ controls). The children whose records were not available did not differ in age (i.e. being 7 or 8 years old), gender or (severity of) auditory hallucinations from those whose records were available.

Instruments

The AVHRS is a revised and extended version of the 11-item auditory hallucinations subscale of the Psychotic Symptom Rating Scales (PSYRATS).[14] Based on continuing development of the scale, fed by daily practice at the voices out-patient department of the University Medical Center Groningen, five items were added. These measure: number of voices, and if more than one voice whether these talked separately or simultaneously; anxiety because of voices; interference with thinking; form of address of voices; and hypnagogic and hypnopompic voices.

The 16-item AVHRS is a structured interview, rating on a 5-point scale characteristics such as frequency and duration of voice-hearing, origin of voices according to respondents (internal attribution, e.g. 'they could be my own thoughts and feelings', or 'could be caused by stress', or external attribution, e.g. 'the voices are caused by deceased persons or extraterrestrials'), amount and threat of negative content, degree and seriousness of suffering, interference with daily functioning and control over voices (i.e. person can dampen voices or has at least some influence on their occurrence). The complete list of items is presented in online Table DS1.

Psychometric properties of the AVHRS are good,[15] showing interrater agreement (weighted Kappa) of 0.84 and internal consistency (Cronbach's alpha) of 0.84 for past month assessment in a sample of adult voice hearers. Cronbach's alpha in our sample of AVH-positive children ($n = 347$) was 0.77 for past year assessment.

For the current study, the child psychiatrist (J.A.J.) adjusted the language to the age group. In a pilot study among 25 children with auditory hallucinations, of approximately the same age, understanding of the wording of the items was tested extensively in relation to developmental age. This exercise showed that the children understood both the screening question and the AVHRS items, and were also able to differentiate between hallucinations on the one hand and fantasy, illusions, real voices and noises on the other. The first three items (number of voices, frequency and duration; online Table DS1) appeared to be particularly informative in identifying individuals mistakenly reporting illusions or real noises as auditory vocal hallucinations. Because the answers on the item pertaining to hypnagogic and hypnopompic voices were sometimes inconclusive, it was decided to drop this item for use in this age group.

The Infant Health Service records provided data on pregnancy (duration, infections, vaginal bleeding, hypertension/pre-eclampsia), delivery (duration, meconium in amniotic fluid, acute Caesarean section, rotation disturbances, umbilical cord complications, instrumental delivery) and the child's condition immediately after birth (placental/umbilical cord aberrations, the 5-min Apgar score – a global clinical measure to assess the health of neonates at 1, 5 and 10 min after birth, the one at 5 min being the strongest predictor for later psychopathology[16] – dysmaturity, birth weight, reanimation/resuscitation). Data on early development were gathered from the Van Wiechen Developmental Test (VWDT).[17] This test provides developmental neuromotor, social and communicative milestones reached by 90% of the children with a normal development at a specific age.

The CBCL[13] is a self-report questionnaire for parents about their child. It consists of 113 items, grouped into 9 syndrome scales of behavioural, social and physical functioning: social withdrawal, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, rule-breaking behaviour, aggressive behaviour and sexuality. Items are rated on a three-point scale with zero for 'not true', one for 'somewhat or sometimes true', and two for 'very true or often true'. In addition to the syndrome scales, three global indices were used: internalising (based on the scales of anxious/depressed, social withdrawal and somatic complaints) and externalising (based on the scales of rule-breaking behaviour and aggressive behaviour) and total score. Age- and gender-adjusted norm scores are available to determine the clinical range of psychopathology.

Analysis

Analyses were performed using SPSS for Windows, version 16.0. Frequency tables were used to describe prevalence rates and characteristics of auditory vocal hallucinations. Categories of these characteristics were grouped together in order to create simpler higher-order groupings for analysis. Categorical demographic data (gender, age (7 or 8 years old), degree of urbanisation and SES) were analysed using chi-squared tests. The variable SES (low, middle and high) was derived from parental education and occupation, as reported in the CBCL. One-way ANOVA was used to analyse continuous CBCL syndrome scores.

For the analysis of pre- and perinatal factors and early development, some items were dichotomised. For example, duration of delivery was categorised as either $\leqslant 12$ or > 12 hours[18] and the 5-min Apgar score was dichotomised around the conventional cut-off value of 7. In line with the research by Brouwers-De Jong *et al* (1996),[17] the VWDT items were combined into three domains: fine motor activity, adaptive and personal/social behaviour; gross motor activity; and communication.

Although the Infant Health Service should collect data on all newborns up to the age of 54 months, in practice most of the items of the Van Wiechen schedule were not completed after the

age of 12 months. Therefore, data pertaining to the first 12 months of development were analysed.

Given evidence that mild psychotic experiences in young children show less continuity over time with psychotic disorder than severe psychotic experiences,[5,6,9,19] severity of voice-hearing should be taken into account. In order to select the children experiencing the most negative consequences of hearing voices, a severity index was composed from all AVHRS items. To this end, items were recoded to zero, 'none or mild consequences', *v.* one, 'considerable to severe consequences'. From this severity index (ranging from 0–12) two groups were inferred: 'severe AVH-positive' children, i.e. children scoring in the highest quartile of the severity index (score $\geqslant 5$); and 'mild AVH-positive' children (scores 0–4). These two groups were compared with the control group with one-way ANOVA. *Post hoc* analyses were used to test differences between subgroups.

Standard binary and multinomial logistic regression analyses were used to estimate the relative contribution of factors and covariates to the dependent variables. Logistic regression analyses assessing associations with prenatal and developmental risk factors were performed using four separate groups of independent variables: pregnancy, delivery, child's condition immediately after birth and early development. Significance tests were two-tailed with alpha set at 0.05. Given the fact that many statistical tests were conducted, Simes' modification of the Bonferroni procedure for multiple testing[20] was applied to the results of the analyses.

Missing data

Data in the prevalence and CBCL sample were almost complete, but the paediatric community health service data-set showed a number of missing values. These cases can be assumed to be missing at random, which allows a multiple imputation procedure to predict missingness by other observed variables.[21]

Thus, 20 data-sets were imputed in STATA 10.1 for Windows with the ICE routine,[22] yielding 20 alternative versions of complete data-sets. These were analysed separately and effect sizes and standard errors (which may vary) were then combined to obtain overall estimates, followed by regression analyses on the combined data-sets using the MICOMBINE routine.

Results

Prevalence rates

In the total sample of children assessed for auditory vocal hallucinations ($n = 3870$), the 1-year prevalence rate of such hallucinations was 9.0% (95% CI 8.1–9.9). No differences in gender were observed, but rates were significantly higher at 8 years of age than at 7 years. Rates were nearly four times higher for children living in rural areas compared with children living in urban areas.

Logistic regression modelling revealed that only rural *v.* urban area remained significantly associated with auditory vocal hallucinations (odds ratio (OR) rural area: 3.74, 95% CI 2.39–5.87) when entering age and rural *v.* urban area jointly in the model. No differences between AVH-positive children and controls were found on SES in the CBCL sample.

Characteristics and impact of auditory vocal hallucinations

Results are summarised in online Table DS1. Girls scored higher on intensity of suffering ($\chi^2 = 5.21$, $P = 0.03$) and particularly on anxiety ($\chi^2 = 18.28$, $P < 0.001$). Of the children who heard voices the 7-year-olds heard them with greater frequency than the 8-year-olds ($\chi^2 = 8.52$, $P = 0.01$).

Children attending urban schools reported hearing two or more voices more frequently than those attending rural schools ($\chi^2 = 8.77$, $P = 0.005$). In addition, they more often reported hearing voices speaking simultaneously ($\chi^2 = 12.21$, $P = 0.002$), voices that continued for a longer period ($\chi^2 = 9.61$, $P = 0.008$) and voices associated with greater interference in thinking ($\chi^2 = 13.01$, $P = 0.001$). They also more often attributed their voices to an external source ($\chi^2 = 12.14$, $P = 0.002$).

Pre- and perinatal and early development variables in relation to auditory vocal hallucinations

In the sample of children with Infant Health Service records ($n = 476$, $n = 240$ AVH-positive children and $n = 236$ controls) logistic regression showed one significant association with the pregnancy variables: infection during pregnancy occurred more often among mothers of AVH-positive children (OR = 2.01, 95% CI 1.01–4.03). No associations between auditory vocal hallucinations and the variables of 'delivery' and 'child's condition right after birth' were found. On the (early development) variable 'fine motor activity, adaptive, personal/social behaviour in the first 12 months', AVH-positive children appeared to be delayed compared with controls (OR = 1.23, 95% CI 1.02–1.49). Multinomial regression with the severity tripartition ('severe AVH-positive' children, the highest quartile, $n = 58$; 'mild AVH-positive' children; and controls) as the dependent variable did not reveal any associations with pre- and perinatal and early development variables for severity of hearing voices.

Table 1 Prevalence rates of 7- and 8-year-old children with auditory vocal hallucinations by gender, age, and degree of urbanisation ($n = 3870$)

	% (95% CI)	*n*	χ^2	*P*
Auditory vocal hallucinations	9.0 (8.1–9.9)	347		
Age			5.06	0.01
7 years ($n = 1907$)	7.9 (6.8–9.2)	151		
8 years ($n = 1963$)	10.0 (8.7–11.4)	196		
Gender			0.32	NS
Boys ($n = 1895$)	9.2 (8.0–10.6)	175		
Girls ($n = 1975$)	8.7 (7.5–10.0)	172		
Schools			39.54	<0.0001
Urban schools ($n = 719$)	2.9 (1.9–4.4)	21		
Rural schools ($n = 3151$)	10.3 (9.3–11.5)	326		

NS, not significant.

Associations between auditory vocal hallucinations and current behaviour problems

Mean CBCL total score in the AVH-positive group ($n = 207$) was 24.6 (range 0–93, s.d. = 19.4), in the control group ($n = 216$) this was 21.9 (range 0–85, s.d. = 17.2). This score was in the clinical range of psychopathology, for 27% of the AVH-positive children and for 22% of the control children. In the AVH-positive children with the most severe consequences of voice-hearing (the severe AVH-positive group) the mean total score was 29.3 (s.d. = 20.7) and for 38% this score was in the clinical range ($\chi^2 = 6.24$, $P = 0.04$). The severe AVH-positive children appeared to differ from both the mild AVH-positive children and controls on CBCL total score ($F = 3.78$, $P = 0.024$), on the index 'internalizing' ($F = 3.54$, $P = 0.03$) and on the syndrome scales 'somatic complaints' ($F = 5.90$, $P = 0.003$), 'anxious/depressed' ($F = 3.23$, $P = 0.041$), 'social problems' ($F = 5.16$, $P = 0.006$) and 'thought problems' ($F = 3.99$, $P = 0.019$). Multinomial logistic regression analyses with the auditory vocal hallucinations severity tripartition as the dependent variable and the nine CBCL syndrome scales as predictors showed that 'somatic complaints' appeared to be the only factor contributing significantly to the model of auditory vocal hallucinations (OR = 1.25, 95% CI 1.03–1.53).

Multiple testing

After applying Simes' modification of the Bonferroni procedure for multiple testing,[20] the following results survived: girls were more anxious because of auditory vocal hallucinations than boys; urban children reported more interference with thinking because of auditory vocal hallucinations, reported more often an external attribution for their voices, more often heard more voices and/or simultaneous voices than rural children; and severe AVH-positive children differed from mild AVH-positive children and controls on the CBCL syndrome scale 'somatic complaints'.

Discussion

The 1-year prevalence of auditory vocal hallucinations in primary school children aged 7 and 8 years (9.0%) comes close to prevalence rates in older (>11) children.[1,23,24] In our study, auditory vocal hallucinations were equally distributed between the genders and were possibly related to age and degree of urbanisation. Most children experienced no or mild subjective burden, but 15% reported serious suffering and 19% experienced substantial interference with thinking. Of note, 9% heard third-person voices talking or arguing about them or commenting on them, which according to Schneider (1957)[25] may be considered 'first rank' in relation to the diagnosis of schizophrenia.

The substantially lower prevalence rate among urban school children is unexpected, certainly in the perspective of the higher risk for schizophrenia in urban areas.[26–28] However, negative consequences of auditory vocal hallucinations appeared to be more severe in the urban areas, which corresponds with an earlier report of poorer prognosis of subclinical psychotic experiences in urban populations.[29] The fact that urban children more often attribute their voices to an external source suggests that they may be more at risk of developing secondary psychotic ideation and full-blown psychotic disorder.[19]

The AVH-positive children did not differ from controls in SES, contrary to studies reporting that indices of lower SES are associated with psychotic symptoms.[1,30,31] A possible explanation for this discrepancy may be that in young children, psychotic experiences may be 'salient' but not inevitably associated with future psychotic disorder. Auditory vocal hallucinations may represent the earliest expression of dysregulated salience[32] which, if no secondary delusional complications develop, may be reversible in the great majority of cases.[33,34]

The question arises whether there may have been a selection bias based on lower participation of low-SES children. Therefore, parents' education and occupation levels were compared with general population statistics in the area under study.[35] These showed no large or systematic differences, except for the mothers' occupation levels, with over-representation of both lower-level and higher-level occupations. Therefore, lower participation rate of low-SES children is unlikely.

Besides SES, we also intended to analyse data on immigration. However, according to the Infant Health Service records ($n = 476$) only 39 children were in some way involved in immigration. Most of them had parents who immigrated from (neighbouring) West European countries. Only nine children came from regions indicating possible refugee status, thus numbers were too few to draw reliable conclusions.

We found no strong evidence for an association between auditory vocal hallucinations and pre- and perinatal risk factors. Apart from the fact that infection during pregnancy had occurred more frequently among mothers of AVH-positive children, the development of the fine motor activity in AVH-positive children was somewhat delayed compared with control children. However, as both groups appeared to have developed normally in fine motor activity (even quicker than the norm) the relevance of this finding is unclear. Moreover, the difference was small.

The fact that a score <7 on the Apgar scale only occurred in five voice-hearing children and not in control children might be noteworthy given findings of a Danish study[16] that a low Apgar score is a strong predictor for mental disorders (including psychosis). Because of zero variance in the latter group, this variable had to be omitted from the regression model with multiple imputation. A chi-squared test, however, revealed a significant difference between AVH-positive children and controls ($\chi^2 = 5.54$, $P = 0.024$).

The majority of the children, both AVH-positive and controls, had CBCL scores within the normal range, meaning that there were no signs of psychopathology. Both McGee and colleagues (2002)[36] and Escher and co-workers (2002)[33] observed that most AVH-positive children did not display sufficient other symptoms for a diagnosable psychiatric disorder. Although voice-hearing was associated with slightly more parent-reported problematic behaviour, the children who experienced the most negative consequences of voice-hearing appeared to have more problems on the CBCL syndrome scales 'somatic complaints', 'anxious/depressed', 'social problems', 'thought problems', the index 'internalizing' and the total CBCL score. For the highest quartile of voice-hearing severity these scores often were in the clinical range of psychopathology. This is in line with the observation of Scott and colleagues (2009),[24] who noticed that adolescents scoring in the highest decile on the CBCL (or having elevated depressive symptoms) were more likely to report hallucinations. Regression analyses revealed that in the current study, somatic complaints appeared to be the most important predictor of serious consequences of hearing voices. This is consistent with the notion that in children, emotional problems and distress in general are often expressed at the level of physical complaints, in particular abdominal pain.

Post hoc analyses showed that third-person voices were highly associated with the AVHRS severity score: almost two-thirds of the children (63%) were included in the severe burden group with scores ⩾5. They also had higher CBCL scores on somatic complaints.

To our knowledge, to date no prevalence studies have been conducted on auditory vocal hallucinations among children younger than 9 years of age. The appropriate age for testing auditory vocal hallucinations in children is still a matter of debate. The question of whether young children may differentiate fantasy from reality has been examined in detail by Woolley (1997),[37] who argued that children indeed are often engaged in 'fantastical' and 'magical' thinking, but that they are not fundamentally different from adults in that respect. Furthermore, Taylor and colleagues (1993)[38] found that children (mean age of 4 years) with and without imaginary companions do not differ in their ability to distinguish fantasy from reality.

Limitations

A number of limitations are apparent. First, there was a 28% non-participation rate that resulted in under-representation of children attending schools in urban areas. This may have had two consequences. First, the reported absolute rate of auditory vocal hallucinations may be too high or too low if urban schools differed systematically from rural schools. For example, reported absolute rates of auditory vocal hallucinations may slightly over-estimate the true rate, given that urban schools may have lower rates of auditory vocal hallucinations yet were under-represented. Second, reported associations between auditory vocal hallucinations and urbanicity may be biased if urban schools that refused differed systematically from urban schools that participated, for example if refusing urban schools differentially contained individuals with auditory vocal hallucinations of very low severity. Although we cannot exclude this, we assume this is unlikely. Unfortunately, no demographic data were available from schools that refused to test for systematic differences.

Second, there was a non-response of 39% in the parents who were requested to complete the CBCL questionnaire, which, however, was not contingent on hearing voices. This also applies to the fact that only 69% of the Infant Health Service records could be traced. However, the missing children in both the CBCL sample and in the Infant Health Service sample did not differ in gender, age and urbanisation. After the age of 12 months, many items of the Van Wiechen schedule had not been completed, which is mainly as a result of the recording policy of the Infant Health Service to register only in case of anomalies. This limited our analyses to the first 12 months.

Third, the children were only interviewed about auditory vocal hallucinations, and additional questions could not be addressed because of limitations in time. Thus, although it could be that brief experiences of hearing voices were a result of illness or high fever, this was not examined.

Fourth, formal interrater agreement sessions in this sample of young children were (under the conditions of a population-based survey) not allowed by the Central Committee on Research involving Human Subjects in the Netherlands, in order to avoid stigmatisation. Agreement in the booster sessions, based on the interviewers' descriptions of actual cases, appeared to be very good; however, this was not systematically recorded. Interrater agreement sessions, performed in two other studies on adult samples of individuals hearing voices, showed very good kappa's: 0.84 in a study of the psychometric properties of the AVHRS[15] and 0.88 in the 5-year follow-up of the current study. Because the paediatric community health service interviewers were trained in the same way as the interviewers in the two studies quoted, we assume that their interrater agreement would have shown a comparable agreement rate.

Finally, given rising interest in gene–environment interactions in psychotic disorders,[39] family history of mental illness could have thrown more light on the moderating influence of familial liability for psychiatric disorders on associations with other risk factors. However, family history was not recorded by the paediatric community health service and it was not feasible, for both logistic and financial reasons, to question parents about it afterwards.

The focus of the study was on auditory vocal hallucinations, not on psychiatric disorders because hallucinatory experiences are not necessarily pathognomonic. It may be argued that lack of child psychiatric expertise has reduced the proper recognition of auditory vocal hallucinations in this sample of children. However, this is rather unlikely, as recognition of auditory vocal hallucinations seems to be more dependent on auditory vocal hallucinations-focused questioning than on child psychiatric expertise *per se*. Although the AVHRS is not a comprehensive diagnostic psychiatric interview to be conducted by well-trained child psychiatrists, it taps clinically relevant topics of the phenomenon.

Multiple testing

Considering the exploratory character of the study with the aim of identifying possible differences, and not the acceptance or rejection of null hypotheses *per se*, the interpretation of the results was somewhat broader than strictly allowed according to the Bonferroni correction with Simes' modification. This is in line with the opinion of Perneger (1998),[40] that the study of a single topic or hypothesis should, in the case of using predefined statements and existing theory, not be affected by the number of comparisons, and that each small comparison made in the context of a larger study should be considered on its own merit.

Future research

Auditory vocal hallucinations in young children are prevalent but most children experience no or only mild subjective burden. Nevertheless, there may be a degree of continuity with more severe psychotic outcomes in children who suffer severely, in children hearing third-person voices and in children scoring in the clinical range of the CBCL. Therefore, this cohort will be followed into adulthood, to study the course of hallucinatory experiences, the possible relationship with behavioural problems and to determine the predictive value of auditory vocal hallucinations for later psychiatric disorder.

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