Schizophrenia Research xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Schizophrenia Research

journal homepage: www.elsevier.com/locate/schres

Hallucinations in adolescents and risk for mental disorders and suicidal behaviour in adulthood: Prospective evidence from the MUSP birth cohort study

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ARTICLE INFO

Article history:
Received 16 February 2016
Received in revised form 7 May 2016
Accepted 9 June 2016
Available online xxxx

Keywords:
Hallucinations
Birth cohort
Mental disorders
Psychotic disorders
Suicide

ABSTRACT

Background: Hallucinations, once equated with serious mental disorders, are common in adolescents. Given the high prevalence of hallucinations, it is important to determine if they are associated with adverse mental health outcomes in adulthood. This study compared the mental health outcomes of participants (aged 30–33 years) in the Mater-University of Queensland Study of Pregnancy (MUSP) who reported hallucinations at (a) 14 years only and (b) 14 and 21 years versus cohort members without hallucinations.
Method: Participants ($n = 333$) were aged between 30 and 33 years and (a) reported hallucinations on the Youth Self-Report Questionnaire at 14 and/or the Young Adult Self-Report Questionnaire at 21 years and (b) controls ($n = 321$) who did not report hallucinations. Lifetime diagnoses of mental disorders were ascertained by the Structured Clinical Interview for DSM Disorders (DSM IV-TR) administered by clinical psychologists. Suicidal behaviour was measured by self report.
Results: Hallucinations at 14 years only were not associated with an increased risk of mental disorders in adulthood. Hallucinations reported at both 14 and 21 years were associated with lifetime diagnoses of psychotic disorders (OR, 8.84; 95% CI: 1.61–48.43 and substance use disorders (OR, 2.34; 95% CI: 1.36–4.07) and also strongly associated with lifetime suicide attempts (OR, 7.11; 95% CI: 2.68–18.83).
Conclusions: Most adolescents who experience hallucinations do not have an increased rate of mental disorder in adulthood; however, those with hallucinations that are experienced at more than one point in time are at increased risk of suicidal behaviour and both psychotic and non-psychotic psychopathology.

1. Introduction

Hallucinations, cardinal symptoms of psychotic disorders, also occur in other mental disorders and in otherwise well individuals. For example, a large community-based study reported the lifetime prevalence of hallucinations as 5.2% (McGrath et al., 2015) whilst studies of adolescents have found a higher prevalence of almost 15% (Kelleher et al., 2012a). Studies exploring the outcomes of hallucinations in adolescents have found an increased risk of subsequent psychotic disorder (Poulton et al., 2000; Welham et al., 2009) and other psychopathology (Dhossche et al., 2002; Fisher et al., 2013; Kelleher et al., 2012b). However, these studies have their limitations and the utility of hallucinations as a predictor of future mental health disorders is in debate.

Five population studies have examined adult mental health outcomes of children and adolescents who hallucinate. Two studies based on the Dunedin birth cohort assessed diagnostic outcomes of participants who experienced psychotic symptoms measured at 11 years (based on the Diagnostic Interview Schedule for Children) (Fisher et

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http://dx.doi.org/10.1016/j.schres.2016.06.009
0920-9964/

al., 2013; Poulton et al., 2000). Participants who were interviewed by child psychiatrists and identified as having psychotic symptoms had a 16-fold greater risk of adult schizophreniform disorder (odds ratio [OR], 16.4; 95% confidence interval [CI], 3.9–67.8) at 26 years (Poulton et al., 2000). In a subsequent study of the same cohort, outcomes were extended to 38 years, where it was found that hallucinations were associated with an increased likelihood of schizophrenia (relative risk [RR], 7.24; 95% CI, 2.17–24.13) and posttraumatic stress disorder (RR, 3.03; 95% CI, 1.33–6.89) (Fisher et al., 2013), suggesting childhood psychotic symptoms may be a useful predictor of future mental health problems. In a longitudinal study of youth aged 14–17 years, Dominguez and colleagues measured psychotic experiences at three time points over an 8-year period. They found that those who reported hallucinations and other psychotic experiences at only one time did not have an increased risk of subsequent psychosis (compared with those who never hallucinated). However, adolescents with hallucinations at all three time points had 10 times the odds of future psychosis (OR, 9.9; 95% CI, 2.5–39.8) (Dominguez et al., 2011).

Two studies have reported the diagnostic outcomes of adolescents who experienced auditory or visual hallucinations measured by the Youth Self-Report (Dhossche et al., 2002; Welham et al., 2009). Welham and colleagues reported that participants of the Mater Hospital University of Queensland Study of Pregnancy (MUSP) who experienced hallucinations at 14 years were at increased risk of non-affective psychosis at age 21 (OR, 5.09; 95% CI, 2.18–11.8 [males]; 2.27; 1.01–5.12 [females]) (Welham et al., 2009). However, this study did not examine non-psychotic disorders as an outcome. By contrast, Dhossche and colleagues assessed both psychotic and non-psychotic outcomes in adulthood of hallucinations in a community sample of adolescents (Dhossche et al., 2002). Those reporting hallucinations were at increased risk of a depressive disorder (OR, 3.0; 95% CI, 1.1–8.8) or substance use disorder (OR, 7.8; 95% CI, 2.5–24.6) at 8-year follow-up but none had transitioned to psychotic disorder.

Collectively, these studies suggest children and adolescents who hallucinate are at increased risk of psychotic and non-psychotic disorders in adulthood. However, all studies assessed diagnostic outcomes using lay interviewers rather than clinicians, few examined a range of both psychotic and non-psychotic outcomes, and only one (Dominguez et al., 2011) examined hallucinations in adolescents at more than one time point showing that persistence of hallucinations was important in predicting future psychosis. There is a need for studies that examine a range of outcomes associated with hallucinations, which are measured at more than one time point, and that follow participants into adulthood after they have transitioned through the period of highest risk for psychosis (Dhossche et al., 2002; Welham et al., 2009).

Another outcome associated with hallucinations in adolescents and adults is suicidality. A cross-sectional study of a large representative sample of adults showed those respondents with psychotic experiences (PE) were more likely to report current suicidal ideation (OR, 5.24; 95% CI, 2.85–9.62) and suicide attempts (OR, 9.48; 95% CI, 3.98–22.62) (DeVylder et al., 2015a). Prospective studies have also reported that PE in adolescents elevate the risk for suicidal behaviours at follow-up. A prospective cohort study of school-based adolescents with baseline psychopathology and psychotic symptoms found 14% had reported a suicide attempt by 3 months (OR, 17.91; 95% CI, 3.61–88.82) and 34% reported a suicide attempt by 12 months (OR, 32.67; 95% CI, 10.42–102.41) (Kelleher et al., 2013). Another longitudinal cohort study of adolescents found that PE at one time point only without psychological distress was not associated with an increased risk of suicidality at 12 months (Martin et al., 2015). However, persistent psychotic experiences (i.e. those present at both baseline and one year follow-up) and those PE accompanied by psychological distress were associated with increased odds of suicide attempts (OR, 4.63: 95% CI, 1.21–17.72 and 12.81; 4.02–40.88, respectively). Both studies have follow-up times limited to 12 months and did not report associations with adult suicidal behaviour.

The current study examined a broad range of mental health outcomes in adulthood for those who reported experiencing hallucinations at (i) 14 years and (ii) both 14 and 21 years. Based on previous findings (van Os et al., 2009), it was hypothesised that those experiencing hallucinations at 14 years would be at increased risk of adult psychotic and non-psychotic disorders as well as suicidality. Additionally, those adolescents who experienced hallucinations at both 14 and 21 years would have the highest risk of psychotic and non-psychotic disorder and suicidality at 30–33 years.

2. Method

2.1. Participants

Participants were from the Mater-University of Queensland Study of Pregnancy (MUSP), a prospective birth cohort study of mothers and their offspring who received antenatal care at the Mater Misericordiae Mothers' Hospital, a major public hospital in Brisbane, Australia, between 1981 and 1984. Baseline data were collected on 7223 mothers and their singleton live-birth offspring who have since been prospectively followed-up over thirty years. Further information describing the MUSP cohort study can be found elsewhere (Najman et al., 2005). At the 14- and 21-year data collections, the Youth Self-Report (Achenbach, 1991) and the Young Adult Self-Report (Achenbach, 1997) were used to identify those offspring experiencing auditory and visual hallucinations (Fig. 1). Only participants who provided data at both 14- and 21-year follow-ups were eligible for recruitment. In total, 3535 participants completed the hallucination questions at both time points, of which 822 (23.3%) endorsed experiencing auditory or visual hallucinations at 14 and/or 21 years. This group consisted of 455 participants (12.9%) with hallucinations only at 14 years old, 227 (6.4%) with hallucinations only at 21 years old and 140 (4%) with hallucinations at both 14 and 21 years old.

2.2. Sampling protocol

The target sample included all 822 MUSP participants who endorsed experiencing hallucinations at ages 14 and/or 21 and 490 randomly selected MUSP participants who did not report hallucinations at either time point. The intended ratio of participants endorsing hallucinations to those not endorsing hallucinations (roughly 2:1), was chosen to oversample individuals who were at a potentially greater risk of having a psychotic disorder by age 30. Four hundred and forty-five (54%) of those who had experienced hallucinations (56.7% male, M age = 31.6, SD = 0.88) and 321 (65%) of those who had not experienced hallucinations were interviewed (42.2% male, M age = 31.1, SD = 0.95). This resulted in a total sample of 766 participants. The current study restricted cases to (a) 250 (54.9%) participants who reported hallucinations at age 14 alone and (b) 83 (59.2%) participants who reported hallucinations at age 14 and age 21. One hundred and twelve cohort members reported hallucinations at 21 years only but were not included in the present study as it could not be determined if they had already developed a psychotic disorder prior to this age (we intend to follow these individuals in future studies). Methods to assess potential bias resulting from the response rates are outlined below.

2.3. Interview procedure

Interviews were conducted face to face when possible, and phone interviews were used when participants were unable to attend the study location. Interviews involved completion of self-report questionnaires and participation in a semi-structured interview. Interviewers were 'blind' to age 14 and age 21 hallucination group status.

Please cite this article as: Connell, M., et al., Hallucinations in adolescents and risk for mental disorders and suicidal behaviour in adulthood: Prospective evidence from the MUS..., Schizophr. Res. (2016), http://dx.doi.org/10.1016/j.schres.2016.06.009