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Substance use and sociodemographic background as risk factors for lifetime psychotic experiences in a non-clinical sample

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ABSTRACT

Introduction: Psychotic experiences (PE) are relatively common in the general population. PE is associated with mental health impairment and may be predictive of clinical psychosis. Substance use predicts PE, but the association is insufficiently understood, particularly the role of illicit substances. The purpose of this study was to describe PE (visual and auditory hallucinations and delusions of reference and persecution) in a population characterized by high levels of substance use and to investigate substance use and sociodemographic background characteristics as risk factors for PE.

Methods: We used data from the Norwegian Offender Mental Health and Addiction Study (NorMA), a cross-sectional survey of 1499 individuals from Norwegian prisons. The outcome was one, two, three or four types of PE during the lifetime. The association between different variables and PE was investigated using multinomial logistic regression with three outcome categories: 0 PE, 1–2 PE and 3–4 PE.

Results: The prevalence of lifetime PE was 53.7%. Several substances were strongly associated with PE: For cannabis, the adjusted relative risk ratio (RRR) of 1–2 PE was 2.78 (95% CI 1.89–4.10) and of 3–4 PE it was 4.36 (2.58–7.36). For amphetamine, the RRR of 1–2 PE was 3.26 (2.11–5.05) and of 3–4 PE it was 5.93 (3.72–9.46). For all variables, the association to PE was stronger with more types of PE.

Conclusions: High levels of alcohol use, and lifetime use of cannabis, amphetamine and heroin were associated with PE. These effects were robust even when the substance use variables were adjusted against each other.

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1. Introduction

Substance use can cause psychotic symptoms both during and after exposure. Psychotic symptoms have been elicited experimentally by exposing healthy volunteers to substances such as amphetamine (Angrist & Gershon, 1970; Bell, 1973; Griffiths, Oates, & Cavanaugh, 1968) and cannabis (D'Souza et al., 2004; Freeman et al., 2014; Morrison et al., 2009), and a dose-response relationship has been demonstrated between drug exposure and psychotic symptoms in both recreational and heavy users (McKetin, Hickey, Devlin, & Lawrence, 2010; McKetin, Lubman, Baker, Dawe, & Ali, 2013; Di Forti et al., 2014). Psychotic symptoms acutely elicited by substance use can remain for months and even years (Akiyama, 2006; Akiyama, Saito, & Shimoda, 2011; Fasihpour, Molavi, & Shariat, 2013; Lecomte et al., 2013), and over time, sensitization to drugs appears to play a major role in the susceptibility of psychotic symptoms (Sato, Chen, Akiyama, & Otsuki, 1983; Sato, 1992; Ujike & Sato, 2004). Also, when followed over time, between 22% and 33% of those with amphetamine-induced psychosis (Kittirattanapaiboon et al., 2010; Niemi-Pynttäri et al., 2013; Medhus et al., 2015) and 44.5% and 46% of those with cannabis-induced psychosis (Arendt, Rosenberg, Foldager, Perto, & Munk-Jørgensen, 2005; Niemi-Pynttäri et al., 2013) end up fulfilling the diagnostic criteria for primary psychosis. Psychotic symptoms elicited by substance use could thus be an indication of proneness to psychosis (Bramness et al., 2012).

During the past 15 years it has been documented that psychotic symptoms are relatively common in non-clinical populations, and a continuous rather than categorical understanding of psychosis has been proposed (Johns & Van Os, 2001; Verdoux & Van Os, 2002; van Os, 2014). The term psychotic experiences (PE) refers to hallucinations and delusions that may or may not be bizarre, draw attention or cause distress and help seeking behavior (Linscott & Van Os, 2013), and is reported by 8% of the general population (Van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). Most of those who

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experience PE do not have a psychotic disorder. These individuals are thus below the diagnostic cut-off, but still on the psychosis continuum. Irrelevant of diagnosis, an increase in number of PE is associated with more mental health impairment (Nuevo et al., 2012). In addition to the individual suffering associated with PE, knowledge about the pathogenesis and etiology of clinical cases will be gained by focusing not only on the extreme end of the continuum, but on the entire distribution of PE in the population.

PE is predicted by factors similar to those associated with schizophrenia, such as age, minority positions, urbanity, low education, income and employment status and exposure to stress and trauma (Linscott & Van Os, 2013; Van Os et al., 2009). Also genetic risk factors affect both mild and severe PE (Zavos et al., 2014), with greater exposure being associated with increased psychosis severity also below the diagnostic threshold (Binbay et al., 2012).

Cannabis is the illegal substance most studied in relation to PE, and change in cannabis use in the normal population is associated with changes in the frequency of PE (Van Gastel et al., 2014). Use of illicit substances apart from cannabis is more uncommon, but is even stronger associated to PE (Van Os et al., 2009; Linscott & Van Os, 2013). In previous studies however, illegal substances apart from cannabis have been of low frequency and often grouped together as one variable. In samples of offenders, both the prevalence of substance use disorders and psychosis is higher than in the general population (Fazel, Bains, & Doll, 2006; Fazel & Danesh, 2002; Fazel, Doll, & Långström, 2008). Thus, investigating PE in a sample where use of different illicit substances is more prevalent could increase our understanding of the relative importance of the different substances and their relation to other risk factors.

The aim of this study was to investigate the prevalence of lifetime PE in a non-clinical population characterized by considerable substance use. We wanted to investigate how sociodemographic background characteristics, lifetime substance-use and current mental distress were related to lifetime PE.

2. Material and methods

2.1. Setting and procedure

The Norwegian criminal justice system is characterized by low imprisonment rates and comparably high levels of care and services (Johnsen, Granheim, & Helgesen, 2011; Pratt, 2008). The prison population rate was 75 per 100,000 in 2014, (Kristoffersen, 2014), which is low compared to other countries (World Prison Brief, 2015). According to Norwegian penal code, individuals who committed the criminal act under the influence of a severe mental disorder are to be sentenced to psychiatric care instead of imprisonment (Straffeloven, 2005).

This study was based on cross-sectional data from the Norwegian offender Mental Health and Addiction (NorMA) study (Bukten et al., 2015). Data were collected in 57 of the 63 prison units in Norway in 2013 and 2014, including high and low security units and transitional houses. The average number of registered inmates in Norway at any given time in 2013 was $N = 3787$. Inmates were recruited for participation based on availability and willingness to participate, and there were no exclusion criteria. A total of 1499 individuals (of which 98 were women) responded to the questionnaire. The major reasons for not participating were unwillingness, language barriers and the inmate being out on rehabilitation or judicial activities. A full description on the study setting and participants can be found elsewhere (Bukten et al., 2015).

2.2. Questionnaire and measures

We used a modified and extended version of a questionnaire from a previous Norwegian prison study (Ødegård, 2008). The main topics covered were socio-demographic background, crime, substance use and health. The questionnaire contained 116 questions and took approximately 30 to 60 min to complete. In addition to Norwegian, the questionnaire was available in English, Russian, French and German.

The questionnaire contained four questions about different types of psychotic experiences, presented as "unusual experiences you may have had", and they were all introduced by "Have you ever…". The four questions measured visual hallucinations, auditory hallucinations, delusions of reference and persecutory delusions. The wording in the questions were from the psychosis section of the Psychiatric Research Interview for Substance and Mental disorders (PRISM-IV) (Hasin et al., 1996), either directly cited or several questions tapping the same symptom were used to construct one question. For each question, the respondent was asked to indicate whether this had been experienced only under the influence of substances, while substance free, or both. The outcome variable was divided into five categories according to how many types of PE (regardless of which) the respondent confirmed: no psychotic experiences; one type of PE; two types of PE; three types of PE and all four types of PE. In the regression analysis we kept the 0 PE category, but merged the two highest and the two lowest of the four categories of confirmed PE: 1–2 PE and 3–4 PE.

Measures on sociodemographic background included age, gender, education, place of birth and rearing conditions. The variable "no education" was a dichotomization of a six-category response to a question of highest level of education, where individuals with some schooling but no completed education (practical or theoretical) were characterized as having "no education". Having grown up without biological parents included those who had grown up with relatives, adoption parents, foster parents or others. We included substance use variables with yes/no response to lifetime use of cannabis, amphetamine and heroin, as these are frequently used among the prison population. Alcohol use was measured with the Alcohol Use Disorder Identification Test (AUDIT), a validated measure of hazardous and harmful patterns of alcohol consumption (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The AUDIT score range from 0 to 40, and is the sum of responses to ten questions with possible responses ranging from 0 to 4. We categorized this variable into low (0–7 points), moderate (8–19 points) and high (20–40 points) AUDIT-score, corresponding to the AUDIT levels of probable unproblematic drinking, hazardous drinking in need of monitoring and possible dependence (Babor et al., 2001). The SCL-10 is a validated measure of mental distress, and the score is the calculated mean of responses to ten questions about being bothered or distressed during the past two weeks, with possible responses ranging from "not at all" (1) to "extremely" (4) (Strand, Dalgard, Tambs, & Rognerud, 2003).

2.3. Ethics

The project was been recommended by the Norwegian Committee of Research Ethics (REK), by the Ministry of Justice and Public Security and the Directorate of Norwegian Correctional Service. Participation in the study was voluntary and based on written informed consent.

2.4. Missing data and statistical analyses

The number of missing values on the outcome measure was 179 (11.9%). The SCL-10 mean score and the AUDIT-score were regarded as missing if not all 10 items were answered, but in most cases only one or two items were missing. Table 1 account for the number of missing values for all the variables.

Before conducting the analyses we checked for multi-collinearity, and found that the substance use variables were correlated, the strongest correlation being between lifetime use of amphetamine and cannabis (Pearson's $r = 0.661$). Being born outside a Nordic country was negatively correlated with all the substance use variables, the strongest to amphetamine (Pearson's $r = -0.338$). Within the sociodemographic variables the strongest correlation was between age and no education (Pearson's $r = -0.311$).