European Psychiatry xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

European Psychiatry

journal homepage: http://www.europsy-journal.com

Original article

Cannabis use in early adolescence is associated with higher negative schizotypy in females

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ARTICLE INFO

Article history:
Received 16 May 2017
Received in revised form 17 July 2017
Accepted 18 July 2017
Available online xxx

Keywords:
Marijuana
Introvertive anhedonia
Gender
Sex
Psychosis

ABSTRACT

The current study examined the relationship between early onset cannabis use (before age 16) and different schizotypy dimensions, and whether gender moderates these associations. Participants were 162 cannabis users, aged 15–24 years, who completed an online assessment examining alcohol and other drug use, psychological distress, and schizotypy. Participants were divided according to whether or not they had started using cannabis before the age of 16 (early onset = 47; later onset = 115) and gender (males = 66; females = 96). The interaction between gender and onset group was significantly associated with the dimension of introvertive anhedonia. Follow-up analyses showed that early onset cannabis use was associated with higher levels of introvertive anhedonia in females only. The current findings suggest that gender is an important moderator in the association between early onset cannabis use, schizotypy, and possibly, psychosis risk.

1. Introduction

A considerable proportion of adolescents have used cannabis recently. For instance, in Australia, up to 15% of adolescents (aged 14–19) have used cannabis in the past year, of which 30% are using it at least weekly [1]. These data are of concern in the context of animal and human research suggesting that adolescent exposure to cannabis is associated with risk of poorer psychosocial consequences, psychosis-related outcomes, and cognitive impairment [2–7]. Research showing that adolescent cannabis use is associated with a range of negative consequences, coupled with research implicating the endocannabinoid system in the regulation of neurodevelopmental processes [8,9], suggests that cannabis use in adolescence may disrupt neurodevelopmental processes and result in brain changes resembling those associated with psychosis risk [10], or even psychosis itself [11].

The growing recognition of psychosis symptoms and disorders as dimensional in nature (as opposed to categorical, for diagnostic purposes) has seen a growing interest in the examination of schizotypy to inform psychosis research [12]. Schizotypy refers to a collection of personality traits, including those relating to the positive symptoms of psychosis (known as positive schizotypy, and including unusual perceptions and magical thinking), those relating to disorganised thought symptoms (disorganised schizotypy), and those relating to negative symptoms (negative schizotypy, e.g., anhedonia and avolition) [13], which are considered related to psychosis risk [14]. Indeed, a large number of studies have now linked cannabis use to schizotypy, with the strongest association being with positive schizotypy [15].

Unfortunately, despite research indicating that age of first cannabis use is an important factor in determining the extent to which exposure to cannabis increases psychosis risk (e.g., [2,3]), very few studies have examined age of cannabis use onset in relation to schizotypy. One study [16] that has examined age of use onset in relation to schizotypy dimensions found that frequent use of cannabis was associated with both higher positive and negative schizotypy, and that this effect was much larger among users who had started using cannabis in early adolescence.

A further limitation of current studies examining the relationship between cannabis use and different schizotypy dimensions is the failure to include a number of important moderating and/or confounding variables that may impact the relationships. For instance, research suggests that sex may be an important

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http://dx.doi.org/10.1016/j.eurpsy.2017.07.009
0924-9338/

moderator of the effects of cannabinoid exposure on psychosis-related behaviour, cognitive impairments, and brain changes [17–20]. Sex, however, has largely been ignored in research examining the relationship between cannabis use and schizotypy. Another example is the lack of consideration of various cannabis use parameters. Most studies simply compare current use with never use, without regard to other important variables such as quantity of cannabis use. Research shows that quantity is an important predictor of cannabis use problems, i.e., independently of frequency [21], and further, has been associated with a number of psychosis-related symptoms in cannabis-using adolescents attending treatment [22].

The current study aims to address these gaps in the literature, by investigating: (1) whether early onset cannabis use is associated with different schizotypy dimensions; (2) whether sex moderates the association between early onset cannabis use and schizotypy; and (3) various cannabis use parameters in relation to different schizotypy dimensions.

2. Materials and methods

2.1. Participants

Participants were 162 young people who reported having ever used cannabis and had complete study data. These participants were part of a longitudinal study, in which the overall sample at baseline was 324 (or 327, if including 3 participants with missing data, none of which were cannabis users). Participants were recruited Australia-wide, via advertisements placed on websites, local newspapers, community notice boards, and update lists. Inclusion criteria included being aged between 14 and 24 years and fluent in English. Exclusion criteria included having a past head injury, history of neurological disorders, and having ever received a diagnosis of schizophrenia or schizoaffective disorder.

2.2. Procedure

The study was conducted via the Internet with all measures implemented using Inquisit Millisecond Software Web version 4.0.2. Eligible participants who consented to take part were emailed a link to the study assessment. Within two weeks of having completed the assessment, participants were emailed a $20 electronics store voucher. Parental consent was not obtained for participants under 16, since this requirement may have rendered the study less accessible to drug-using adolescents, thus reducing the generalisability and/or validity of the data. This and all other aspects of the study were approved by the UNSW Sydney Human Research Ethics Committee.

2.3. Measures

2.3.1. Demographic & substance use information.

The baseline assessment covered demographic information including sex, age, education, and family history of psychosis-related disorders. The questionnaire also asked about lifetime and current tobacco, alcohol, and illicit drug use. Participants who reported having ever used any drug were asked what age they first used it, followed by whether they had used it in the past six months. If they had used it in the past six months, they were asked about the extent to which they had used it; i.e. less than once a month, about once a month, once a week or more, or daily. This information was used to categorize participants who had ever used cannabis into two groups. One group included participants who had used cannabis but had used it less than weekly (including not at all) in the past six months (occasional users), while the second group included participants who used cannabis once a week or more often in the past six months (frequent users). Such a grouping for frequent cannabis use has been used in previous studies, across the same timeframe (6 months), and found to be associated with a number of negative outcomes (e.g., [23]). Further questions included items from the Brief Treatment Outcome Measure (BTOM; [24]). For cannabis use, age of first use was also obtained. This information was used to split participants into two groups, those who used cannabis before the age of 16, and those who used it for the first time after 16. This split is commonly used and associated with psychosis risk and a range of other negative outcomes (e.g., [2]).

2.3.2. Schizotypy

To measure schizotypy, we used the short form of the Oxford-Liverpool Inventory of Feeling and Experiences (OLIFE; [25]), which comprises four subscales: unusual experiences, introvertive anhedonia, cognitive disorganisation, and impulsive non-conformity. The unusual experiences scale measures odd perceptual and cognitive experiences related to the positive symptoms of schizophrenia (e.g., "Have you ever thought that you had special, almost magical powers?"). This scale is often referred to as positive schizotypy. The introvertive anhedonia scale assesses the inability to experience pleasure and other experiences related to the negative symptoms of schizophrenia (e.g., "Do you like mixing with people?"), and this scale is often referred to as negative schizotypy. Cognitive disorganisation items relate to disorganised thought/speech and distractibility (e.g., "Are you easily distracted when you read or talk to someone?"). Finally, impulsive nonconformity items relate to impulsivity and emotional instability (e.g., "Do you often feel the impulse to spend too much money which you know you can't afford?").

2.3.3. Psychological distress

Participants completed the brief Depression Anxiety Stress Scales (DASS-21; [26]). The DASS-21 contains 21 items assessing depression, anxiety, and stress/tension symptoms. Total score was used to control for psychological distress, as opposed to the three subscales separately, due to high correlations among the latter.

2.4. Analyses

Independent samples t-tests examined differences between early onset users (those who reported first use before the age of 16) and later onset users (those who reported first use at age 16 years or over), as well as gender, on normally distributed variables. Mann-Whitney U tests were used to examine differences on non-normally distributed variables, which included tobacco, alcohol, and other drug use. Chi^2 tests examined differences between groups on gender, and family history of schizophrenia.

Four multiple regressions were run, one for each schizotypy dimension (Unusual experiences, introvertive anhedonia, cognitive disorganization, and impulsive nonconformity). Within each model, the following variables were entered as predictors/covariates: age, gender, family history of schizophrenia, alcohol, tobacco, illicit drug use, psychological distress, various cannabis use parameters (frequent use in the past 6 months, quantity of use, and onset before 16 years), as well as non-dependent schizotypy dimensions. These variables were selected due to study aims and/or research showing their influence on schizotypy or related variables [22,27–31]. The interaction between gender and early use onset was examined using mean-centered values to avoid multicollinearity.

A significant interaction was followed up by conducting linear regressions split by gender, with early onset use in the model along with any other variable that was $P < .1$ in the overall regression.

Please cite this article in press as: Albertella L, et al. Cannabis use in early adolescence is associated with higher negative schizotypy in females. European Psychiatry (2017), http://dx.doi.org/10.1016/j.eurpsy.2017.07.009