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Dimensional psychotic experiences in adolescence: Evidence from a taxometric study of a community-based sample

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ABSTRACT

Psychotic experiences of varying severity levels are common in adolescence. It is not known whether beyond a certain severity in the general population, psychotic experiences represent a categorically distinct phenomena to milder psychotic experiences. We employed taxometric analytic procedures to determine whether psychotic experiences in adolescence are taxonic (i.e. categorical) or dimensional. Six different psychotic experiences were assessed in a community sample of approximately 5000 adolescents. Three taxometric procedures were conducted. Across all procedures, there was no evidence of a taxon (i.e. a separate latent population) underlying psychotic experiences in adolescence. Rather, a dimensional structure was supported. The results support the notion that psychotic experiences are continuously distributed throughout the general population, and there is no clear discontinuity between milder and more severe psychotic experiences. Thus, these findings support the use of dimensional approaches to understanding psychotic experiences in etiological studies. In clinical practice, categorical cut-offs are needed: the present findings show that a 'natural' break point is not present for identifying severe psychotic experiences, and it is likely therefore that other criteria (such as general functioning) might better aid decision-making with regards to identifying individuals with severe psychotic experiences in need of care during adolescence.

1. Introduction

Psychotic experiences of varying severity levels, such as paranoia, hallucinations, and anhedonia, frequently occur in the general population (Laursen et al., 2007; Dominguez et al., 2011). They are common during adolescence, prior to the typical age of onset for a psychotic disorder (Poulton et al., 2000; Laursen et al., 2007; Ronald et al., 2014; Wong et al., 2014). Psychotic experiences confer increased risk of developing psychotic disorders (e.g. Kelleher and Cannon, 2011); they are also associated with elevated degrees of distress and risk of suicide (Brett et al., 2014; Kelleher et al., 2014), emphasizing the need to characterize and understand psychotic experiences in their own right.

An important question regards the structure of psychotic experiences in the general population; are they dimensional or categorical? If psychotic experiences are dimensional, then one would expect to see them quite commonly throughout the general population to varying degrees of severity. No clear cut between more severely affected and mildly affected individuals would be clear. To give an example, Binbay et al. (2012) investigated psychotic symptoms in a sample of Turkish adults. The association between these behaviors and proxies of genetic risk for psychosis (in this case, family history) was investigated. A greater family history of psychosis was associated with a linear increase in continuous psychotic symptoms, suggesting that milder and more severe forms of these symptoms present throughout the general population.

Conversely, it may be that psychotic experiences are categorical, with individuals with severe degrees of psychotic experiences presenting as qualitatively distinct from the remainder of the population. van Os et al. (2009) reported that psychotic experiences were indeed quite common throughout the general population. For the majority of individuals, however, these milder behaviors tended to disappear with development, while a minority of cases (approximately 7%) developed difficulties requiring clinical intervention, and were thus distinct from individuals showing milder degrees of psychotic experiences.

Evidence to date indicates that psychotic experiences are indeed present to varying degrees throughout the general population (Ronald et al., 2014). Further, a recent twin study reported that the heritability of psychotic experiences in adolescence was

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consistent across differing severity levels, suggesting that the genetic factors that influence severe degrees of psychotic experiences are also associated with milder degrees of psychotic experiences (Zavos et al., 2014), thus indicating that, on an etiological level, psychotic experiences are dimensional. A more recent development has been the recognition that individual psychotic experiences, such as paranoia (Freeman et al., 2005; Bebbington et al., 2013; Ronald et al., 2014) and lack of ability to experiences pleasure (Ronald et al., 2014), are also common in the general population, and present with varying degrees of severity.

Further direct evidence of continuous psychotic experiences in the general population could be gleaned from *taxometric procedures*. These methods were first proposed by Meehl (1962), and are designed to test for the existence of a *taxon* underlying a certain disorder. A taxon can be considered a latent population, who represent cases. The remainder of the population are considered to be controls (the *complement*). The taxon is qualitatively distinct from the complement. This is contrasted with the scenario whereby the disorder in question is dimensional; varying degrees of behaviors characteristic of a given disorder, which are qualitatively similar to those seen in individuals with the disorder, would be expected to present throughout the general population (Pickles and Angold, 2003). Meehl (1962) originally applied taxometric procedures to test for the existence of a schizotypy taxon. If such taxa exist, then the procedures enable one to estimate the base rate of the taxon (i.e. the prevalence rate).

Few studies have investigated whether psychotic experiences in the general population are continuously distributed. Psychotic experiences capture the symptoms characteristic of psychosis, such as paranoia, assessed as traits in the general population. In contrast, schizotypal traits comprise more personality-based scales such as magical ideation, that are less closely tied to the diagnostic criteria of psychotic disorders and conflate individual psychotic experiences. Two studies exist, and both lent support for the notion that psychotic experiences are dimensional. The first of these studies administered the Community Assessment of Psychic Experiences (CAPE) to a sample of college students; the evidence suggested that there was no taxon underlying psychotic experiences (Daneluzzo et al., 2009). Subsequently, a study of the Collaborative Psychiatric Epidemiological Survey and the National Comorbidity Survey, which focused solely on positive psychotic experiences in adults, also lent support for a dimensional, rather than taxonic, structure for psychotic experiences (Ahmed et al., 2012).

Notably, neither of these existing studies focused on psychotic experiences in adolescence. As mentioned above, adolescence is a time at which psychotic experiences are common, prior to the typical adult onset of psychotic disorders, and are risk factors for later psychotic disorders (Poulton et al., 2000; Laursen et al., 2007; Ronald et al., 2014), and hence there is a need to understand the structure of psychotic experiences in adolescence. For example, are psychotic experiences in adolescence continuously distributed, with no clear cut between more severely affected individuals and those showing milder manifestations? Or are psychotic experiences in adolescence taxonic, with adolescents showing more severe degrees of psychotic experiences presenting with qualitative differences to their peers? Such a question is of clinical and practical importance. For instance, if one is assessing psychotic experiences with a view to predict who will go on to develop a psychotic disorder, then it may help to understand whether established cut-offs are required, or whether one can rely on quantitative assessments of psychotic experiences. On a practical level, establishing whether psychotic experiences are taxonic may assist with etiological studies; should such studies rely on case-control approaches, which divide individuals into groups, or employ continuous trait scores?

To our knowledge, there are no studies employing taxometric procedures to characterize psychotic experiences in adolescence. We thus aimed to test whether adolescent psychotic experiences in a large, population-representative sample would represent a dimensional construct, or whether they would be underscored by a latent taxon. We focused on a community-based sample, as opposed to a clinically ascertained sample, to ensure that psychotic experiences would be present to differing degrees of severity, rather than biasing the sample towards more severe cases. Given existing evidence from alternative epidemiological methods (e.g. Binbay et al., 2012; Zavos et al., 2014), we expected psychotic experiences to be dimensional. We did not expect to find evidence of a latent taxon underlying psychotic experiences.

2. Method

2.1. Participants

Families taking part in the Twins Early Development Study (TEDS), a longitudinal sample of twins born in England and Wales between 1994 and 1996 (Haworth et al., 2013), were invited to take part in the Longitudinal Experiences And Perceptions (LEAP) project when the twins were aged 16-years. In total, 10,874

Table 1
Descriptive statistics.

Demographic characteristics		
	Participating in LEAP	Non-Participating in LEAP
% Male	45%	53%
% Monozygotic	35%	32%
% White	94%	91%
% Mothers with one or more A-levels	16%	12%

Descriptive statistics						
Measure	Possible range of scores	Interquartile range	$\bar{x}$ (SD)	Median	Skew	Cronbach's α
Paranoia	0–72	13	12.17 (10.62)	10	1.56 (−0.62)	.93
Hallucinations	0–45	7	4.66 (6.02)	2	2.09 (0.22)	.88
Cognitive Disorganisation	0–11	4	3.96 (2.85)	4	0.44 (−0.64)	.77
Grandiosity	0–24	6	5.32 (4.42)	4	1.18 (−0.41)	.86
Anhedonia	0–50	10	17.33 (7.93)	17	0.48 (−0.99)	.78
Negative Symptoms	0–30	4	2.81 (3.88)	1	2.42 (−0.85)	.86

A-levels: *qualifications taken at the age of 17/18 in England and Wales; LEAP*: *Longitudinal Experiences And Perceptions study.*
Skew statistics in parentheses are for log transformed scores used in analyses.