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# Comparisons of schizotypal traits across 12 countries: Results from the International Consortium for Schizotypy Research

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#### ABSTRACT

*Background:* Schizotypal traits are expressions of underlying vulnerability to psychotic disorders which have a potential impact on mental health status, neurocognition, quality of life, and daily functioning. To date, little research has examined epidemiologic landscape of schizotypal traits at the cross-national level. Our aim was to study the expression of schizotypal traits by sex, age, and country in a combined sample gathered from 12 countries. *Methods:* A total of 27,001 participants completed the Schizotypal Personality Questionnaire (SPQ). The mean age of participants was 22.12 (SD = 6.28); 37.5% (n = 10,126) were males.

Results: Schizotypal traits varied according to sex, age, and country. Females scored higher than males in the positive dimension, whereas males scored higher in the disorganization dimension. By age, a significant decrease in the positive schizotypal traits was observed. Epidemiological expression of schizotypal traits varied by country. Moreover, several interactions by sex, age, and country were found.

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SPQ Age

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Conclusions: This pattern is similar to those found in patients with psychosis and psychotic-like experiences. These findings provide new insights and the opportunity to explore the phenotypic expression of schizotypal traits at cross-national level.

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#### 1. Introduction

Schizotypal traits are often viewed as phenotypic indicators of liability for schizophrenia-spectrum disorders (Barrantes-Vidal et al., 2015; Fonseca Pedrero and Debbané, 2017; Lenzenweger, 2010; Meehl, 1962). They are seen as anomalies or deficits of cognitive (e.g., paranoid ideation, ideas of reference), social/emotional (e.g., anhedonia, lack of close friends), and behavioural systems (e.g., odd behaviour and language) (Cohen et al., 2015). In many respects, schizotypal traits resemble the clinical symptoms of schizophrenia, albeit without exceeding the clinical thresholds required for diagnosis with a mental disorder (Kwapil et al., 2017; Linscott and van Os, 2013). These set of traits cluster in a manner that is similar to the positive, negative, and disorganization symptom clusters observed in patients with schizophrenia (Liddle, 1987). Likewise, they are associated with the demographic, environmental, and genetic risk factors that predict psychotic disorder (Linscott and van Os, 2013; Morton et al., 2017). Schizotypal traits predict the onset of psychotic disorders (Debbané et al., 2015; Flückiger et al., 2016; Salokangas et al., 2013; Shah et al., 2012) as well as increased risk for non-psychotic psychopathology (e.g., depression, suicide) (Fisher et al., 2013; Kelleher et al., 2014; Schimanski et al., 2017) and impaired neurocognition, mental health status, quality of life, and daily functioning (e.g., Cohen et al., 2015; Ettinger et al., 2014; Siddi et al., 2017). These findings converge to suggest that schizotypy may be a useful phenotype for understanding the pathogenesis of psychosis.

Sex, age, country of origin, and ethnic or migrant status correlate with the expression of psychosis phenotypes at clinical and subclinical levels (i.e., psychosis symptoms, schizotypal traits) (Jongsma et al., 2018; Kelleher et al., 2012; Linscott and van Os, 2013; McGrath et al., 2008; McGrath et al., 2015; Nuevo et al., 2012; Spauwen et al., 2003; van Os et al., 2000). In general, females tend to have higher scores than males on the attributes comprising the positive dimension (e.g., ideas of reference, unusual perceptual experiences) whereas males have higher scores on those components comprising the negative (e.g., anhedonia) dimension (Bora and Arabaci, 2009; Fonseca-Pedrero et al., 2012; Kwapil et al., 2008; Mason and Claridge, 2006; Miettunen and Jääskeläinen, 2010; Raine, 1992). Some have observed minor departures from this general pattern, such as higher levels of social anxiety, which some view as a component of the negative dimension, among females (Bora and Arabaci, 2009).

Psychotic symptoms usually emerge during late adolescence or early adulthood, many years before clinical diagnosis (Fusar-Poli et al., 2014). Schizotypal traits are also more prevalent during childhood and adolescence than in adulthood (e.g., Fonseca-Pedrero et al., 2012). In non-clinical adult populations, age correlates positively with negative schizotypy and negatively with positive schizotypy (Mason and Claridge, 2006). On subscales of the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991), Bora and Arabaci (2009) found that younger participants reported more self-reference ideas, odd beliefs, unusual perceptual experiences, odd behavior, and odd speech.

Rates of subclinical psychosis vary across cultures, countries, and ethnic groups (Larøi et al., 2014; McGrath et al., 2008, 2015; Myers, 2011; Nuevo et al., 2012). For example, the prevalence of experiencing at least one psychotic symptom varies from 0.8% to 31.4% across world regions (Nuevo et al., 2012). Among residents of defined geographic regions, country of origin can predict variation in rates of hallucination experiences (Johns et al., 2002). Similar differences across countries and ethnic groups are evident for schizotypal traits. Scores on measures of

schizotypal dimensions vary among European countries (Fonseca-Pedrero et al., 2015; Ortuño-Sierra et al., 2013), between American and Spanish samples (Fonseca-Pedrero et al., 2017a; Kwapil et al., 2012), and within multiethnic populations (Cicero, 2016; Chmielewski et al., 1995; Kwapil et al., 2008). These differences have been obtained using diverse measures of schizotypal traits including the SPQ, the Chapman scales (Chmielewski et al., 1995), and the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE) short-form (Fonseca-Pedrero et al., 2015). Significant cross-national variation is also evident in the incidence of psychotic disorder (Jongsma et al., 2018).

To date, little research has examined epidemiologic landscape of schizotypal traits at the cross-national level. There have been many investigations of the associations of sex, age, nationality, and ethnicity with schizotypal traits, in most studies comparisons have been restricted to Western countries or small numbers of countries. Given these limitations, our aim was to compare a broad array of schizotypal traits assessed with the SPQ from participants recruited in 12 Western and non-Western countries. We sought to better understand international variation in the self-report of schizotypal traits. We hypothesized that: (a) males would report more interpersonal (negative) and disorganized traits than females and that females would report more positive schizotypal traits than males; (b) younger participants would have higher scores than older participants in positive schizotypal traits; and (c) expression of schizotypal traits would vary across countries.

#### 2. Method

This is one of a series of studies by members of the International Consortium for Schizotypy Research (ICSR) (https://srconsortium.org/). Other findings from the sample described here are reported by Fonseca-Pedrero et al. (2017b, 2018).

#### 2.1. Participants

Participants were recruited at 21 sites across 12 countries (United States of America, United Kingdom, China, Belgium, Spain, Italy, Tunisia, Australia, New Zealand, Canada, Mauritius, and Greece). The overall sample consisted of 27,001 participants. The mean age was 22.12 years (SD=6.28; range 16–55 years). Participants were divided among three age groups: 17–19 year-olds (n=9333; 34.6%), 20–25 year-olds (n=10,395; 38.5%), and 26–55 year-olds (n=3160; 11.7%); 15.2% (n=4113) of participants did not provide their ages. Participants included 10,126 males (38.2%) and 16,368 females (61.8%); sex was not reported by 507 participants (n=26,494). In this study we examined data at the country level, aggregating across research sites within each country. Table 1 shows socio-demographic characteristics of the whole sample by country. Information about the age, sex, and other characteristics of the samples from each site can be found in the supplementary material.

#### 2.2. Instrument

The Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) was used across all sites as a common index of schizotypal traits. The SPQ is 74-item self-report measure of positive, negative, and disorganized schizotypal traits. The SPQ yields nine subscale scores: Magical Thinking (Odd Beliefs), Unusual Perceptual Experiences, Ideas of Reference, Paranoid Ideation (Suspiciousness), Excessive Social Anxiety, No Close

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