Psychiatry Research 225 (2015) 50–57

Contents lists available at ScienceDirect

Psychiatry Research

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

# Cognitive biases mediate the relationship between temperament and character and psychotic-like experiences in healthy adults

Łukasz Gawęda [a,*], Katarzyna Prochwicz [b], Matteo Cella [c]

[a] II Department of Psychiatry, Medical University of Warsaw, ul. Kondratowicza 8, 03-242 Warsaw, Poland
[b] Institute of Psychology, Jagiellonian University, Krakow, Poland
[c] Department of Psychology, Institute of Psychiatry, King's College London, United Kingdom

ARTICLE INFO

*Article history:*
Received 11 June 2014
Received in revised form
22 September 2014
Accepted 3 October 2014
Available online 14 October 2014

*Keywords:*
Psychosis proneness
Psychosis
Personality
Cognition
Cognitive biases
Mediation

ABSTRACT

Psychotic-like experiences (PLEs) are frequently reported in the general population. Healthy individuals reporting PLEs have a similar personality profile to people with psychosis; however, the mechanisms by which personality influences PLEs are unclear. This study tests the hypothesis that cognitive biases mediate the relationship between two dimensions of personality (i.e. temperament and character) and positive and negative PLEs. Two hundred and ninety-six healthy participants were assessed using the Community Assessment of Psychic Experiences scale, the Temperament and Character Inventory and the Davos Scale for Cognitive Biases. We performed multiple stepwise regression analysis and mediation analysis according to Baron and Kenny's method. Harm-avoidance and self-directedness personality dimensions significantly predicted PLEs frequency. High self-transcendence and lower cooperativeness predicted positive PLEs. Cognitive biases were significant mediators in relationships between temperament, character and both positive and negative PLEs. In particular, attention to threat and external attribution biases fully mediate the relationship between cooperativeness and positive PLEs. Other cognitive biases partially mediate the relationships between self-transcendence and positive PLEs and self-directedness, harm-avoidance and negative PLEs. Our study tentatively suggests that personality may influence PLEs *via* the cognitive bias pathway.



## 1. Introduction

An increasing number of epidemiological studies (Bradbury et al., 2009; Gale et al., 2011; Johns and van Os, 2001; Kelleher and Cannon, 2011; Linscott and van Os, 2013; Stefanis et al., 2002; van Os et al., 2000, 2001, 2009) show that psychotic-like experiences (PLEs) do not only occur in people with psychosis but are also prevalent in the general population. Consistent findings have revealed that healthy individuals experience psychotic-like experiences (PLEs), such as delusional ideations (e.g. self-reference ideations), hallucinatory-like experiences (e.g. hearing thoughts being spoken out loud), or negative-like symptoms (e.g. disturbances in the experience of pleasure) (for recent reviews see Linscott and van Os (2013); van Os et al. (2009)). According to a recent meta-analysis, approximately 8% of the adult general population reports PLEs (Linscott and van Os, 2013), and these experiences were found to increase the risk of developing psychosis (Bak et al., 2003).

These studies have strived to clarify the risk factors associated with PLE occurrence in healthy individuals. Personality and cognitive functioning have been increasingly linked with reports of PLEs (Bora and Veznedaroglu, 2007; Nitzburg et al., 2014; for review see Ohi et al. (2012); Reichenberg (2005) and Smith et al. (2008)). However, most studies consider these two factors independently and their possible interaction is unclear.

Recently, some authors have advanced a dynamic model of the relationship between personality, cognitive functioning and psychopathology (Dragan and Dragan, 2014; Gaweda and Kokoszka, 2014) with particular reference to PLEs (Gaweda and Kokoszka, 2013). These authors hypothesized the central role of cognitive biases in mediating the relationship between personality and PLEs. In this framework, cognitive biases are considered as dysfunctional patterns of thinking that can lead to inaccurate judgment and perceptual distortions (Haselton et al., 2005). Cognitive biases are highly prevalent among healthy people, however, if exaggerated they may lead to perceptual distortions and inflexible beliefs often found in various psychiatric disorders (e.g. Cella et al., 2013). Recent studies support the role of cognitive biases in the relationship between personality and anxiety and depression (Dragan and Dragan, 2014; Gaweda and Kokoszka, 2014), and hallucinatory-like experiences (Gaweda and Kokoszka, 2013). In this study we extend

* Corresponding author. Tel./fax. +48 22 326 58 92.
*E-mail address:* lgaweda@wum.edu.pl (Ł. Gawęda).

http://dx.doi.org/10.1016/j.psychres.2014.10.006
0165-1781/

the work conducted on PLEs and explore the mediating role of cognitive biases between personality and positive and negative PLEs in healthy adults.

Cloninger et al. (1993) developed an influential biopsychosocial model of personality. According to this model, personality consists of two main elements: temperament and character. Temperament represents inherited traits, such as automatic emotional reactions, whereas character is developed as a consequence of a dynamic interaction between heritable traits and environment. Cloninger et al. also developed and validated a scale to measure personality dimensions (see Section 2.2.3 for a description of the Temperament and Character Inventory, TCI, (Cloninger et al., 1994). This model has stimulated numerous studies in the area of psychopathology, including psychosis (for a review, see Ohi et al. (2012))

Studies using the TCI have consistently shown that people with psychosis have higher scores on harm avoidance (HA) and lower scores on self-directedness (SD) when compared to healthy controls (Gonzalez-Torres et al., 2009; Guillem et al., 2002; Hori et al., 2008; for review see Ohi et al. (2012) and Smith et al. (2008)). Furthermore, people with psychosis have higher self-transcendence (ST) and lower cooperativeness (CO), reward dependence (RD), and persistence (P) when compared to healthy individuals (for a review, see Ohi et al. (2012) and Song et al. (2013)).

Research conducted using a schizotypal inventory, the Schizotypal Personality Questionnaire (SPQ; (Raine, 1991)), showed that higher schizotypy values are positively correlated with HA and ST and negatively with SD and CO (Bora and Veznedaroglu, 2007; Daneluzzo et al., 2005). More recent studies have shown that individuals who experience PLEs have similar temperament and character profiles to people with psychosis (Bora and Veznedaroglu, 2007; Gaweda and Kokoszka, 2013; Nitzburg et al., 2014; Smith et al., 2008). Recently, Gaweda and Kokoszka (2013) found that hallucinatory-like experiences are related to two character dimensions: ST and SD. Nitzburg et al. (2014) explored the relationships between temperament and character using the Community Assessment of Psychic Experiences (CAPE; (Stefanis et al., 2002), which assesses two dimensions of psychosis (positive and negative) in addition to depressive symptoms. Consistent with previous findings, the CAPE total score correlated positively with ST and HA and negatively with SD and RD.

The mechanisms linking temperament and character and PLEs are still unknown. One possible mechanism linking personality to PLEs may be cognitive bias, since it may act as the implementation aspect of a personality feature by constructing and maintaining beliefs. For example, people with higher HA may hold beliefs such as “I should avoid trouble”. This belief may result in a tendency towards behavioral avoidance. Indeed, recent studies (Dragan et al., 2012; Gaweda and Kokoszka, 2014) have shown that metacognitive biases (i.e. thinking about thinking) mediate the relationship between personality, anxiety, and depressive symptoms in healthy individuals. This model was also supported in the context of hallucinatory-like experiences (Gaweda and Kokoszka, 2013). These findings, however, cannot be generalized to other cognitive biases, such as jumping to conclusions, which has been more robustly associated with psychosis.

According to the cognitive model of psychosis, cognitive biases play a key role in the development of psychotic symptoms (e.g. Garety et al., 2001). Research showed that patients with psychosis tend to make judgments without a sufficient amount of information (e.g. Bristow et al., 2014; Garety et al., 1991; Moritz and Woodward, 2005). This cognitive bias is referred to as the jumping to conclusions (JTC) bias. Moreover, psychosis is consistently found to be related to external attribution bias (the tendency to attribute events to external sources) (e.g. Gaweda et al., 2013; for review see Waters et al. (2012)). Furthermore, it was shown that patients with schizophrenia have the tendency to process interpersonal threat (excessive perception of others' behavior as threatening) (e.g. van der Gaag et al., 2013). Belief inflexibility is another cognitive bias that is often observed among patients diagnosed with schizophrenia (Moritz and Woodward, 2006; Woodward et al., 2006). Similar cognitive biases are associated with PLEs among healthy individuals (e.g. Allen et al., 2006; Buchy et al., 2007; Juarez-Ramos et al., 2014; Woodward et al., 2007). Recently, a new self-report measure has been developed for cognitive biases that are prevalent in psychosis (van der Gaag et al., 2013).

### 1.1. Current study

In this study we intended to replicate the association between temperament and character and PLEs. According to previous research (Gaweda and Kokoszka, 2013; Nitzburg et al., 2014), we hypothesized that positive PLEs would be associated with ST and SD. We also predicted that negative PLEs would correlate with HA and SD.

We also intended to test how cognitive biases mediate the relationship between personality dimensions and negative and positive PLEs. According to previous studies, we expected stronger mediation of cognitive biases for positive as compared to negative PLEs. On the basis of previous research (e.g. Bristow et al., 2014; Woodward et al., 2006), we expected external attribution bias, attention to threat, and jumping to conclusions to be significant mediators in our model. More precisely, we hypothesized that the cognitive biases would mediate the relationships between SD, ST, and positive PLEs.

## 2. Method

### 2.1. Participants

Two hundred and ninety-six healthy participants (30 males) aged between 19 and 35 years of age ($M$=22.40 years, S.D.=2.81) took part in the study after written informed consent had been obtained. Most participants were university students. The exclusion criteria of the study were: current or past psychiatric and neurological diagnosis, a current substance abuse problem and relatives diagnosed with psychiatric disorders. We assessed the psychiatric family history and psychiatric and neurological diagnosis of the participants using a self-report questionnaire. A local biomedical committee approved the study.

### 2.2. Assessment

#### 2.2.1. Community Assessment of Psychic Experiences (CAPE; (Stefanis et al., 2002)

The CAPE is a measure of psychotic-like experiences in the general population which was developed from the Peters Delusion Inventory (Peters et al., 1999). In comparison to a previous, similar measure, the CAPE comprises more items targeting different psychic experiences that lie on the psychosis continuum. A factor analysis of the CAPE shows that this measure assesses three distinct dimensions: positive (18 items) and negative psychotic symptoms (14 items), and depressive symptoms (8 items). In this study we used a Polish version of the scale that was translated in a back-translation procedure, with inconsistencies resolved during a discussion. In this study we only focused on the positive and negative factors, as these are more specific to psychosis. For the analysis we used the CAPE's measure of frequency of PLEs. Cronbach's alpha was 0.81 for positive dimensions; $\alpha$=0.70 for the negative dimension. Cronbach's alpha for the total frequency scores was $\alpha$=0.90.