

Personality traits are associated with the valence of future imagined events in individuals with schizophrenia

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Abstract

The relationships between the valence (positive or negative) of future imagined events and personality dimensions were examined in patients with schizophrenia. Correlational analyses showed that Extraversion was positively associated with the simulation of more positive future events whereas a statistical trend between Neuroticism and negative emotional valence was found. As in nonclinical individuals, personality is related to characteristics of mental time travel in schizophrenia patients.

Introduction

Mental time travel (MTT) involves both the capacity to reflect on past experiences and to simulate our personal futures. Similarly to memories for the past, several lines of evidence suggest that the emotional valence of future imagined experiences constitutes a key element to guide future behaviors such as emotion regulation and decision-making (D'Argembeau and Van der Linden, 2007).

Concerning schizophrenia and episodic foresight, it has been shown that individuals with schizophrenia are impaired in imagining specific and pre-experiencing future events (Chen et al., 2016; D'Argembeau et al., 2008; de Oliveira et al., 2009), which can be characterized by a "loss of future" (Ingvar, 1985). They experience less vivid representations of personally significant future imagined events in comparison to non-clinical controls (Allé et al., 2016) and these difficulties extend to the performance of foresightful preparatory behaviors (Lyons et al., 2016). However, few studies regarding the emotional valence of future imagined events have been conducted among schizophrenia patients. Raffard et al. (2013) recently showed that difficulties in imagining future positive pleasant events were associated with reduced goal-directed behaviors in schizophrenia patients. More recently, Goodby and MacLeod (2016) demonstrated that patients were impaired in their ability to imagine both positive and negative future

events particularly with respect to the coming year. Importantly, increased self-reported hopelessness was associated with reduced positive future thinking and increased negative future thinking, thus confirming the major importance of emotion for episodic foresight in clinical conditions.

From a clinical point of view further understand MTT in schizophrenia could represent the possibility of new treatment strategies. Psychological interventions targeting the improvement of episodic foresight capacity through the generation of more emotionally vivid prospective positive imagery could be of particular interest for social functioning in schizophrenia (Ricarte et al., 2017), one of the most resistant variables to psychological and pharmacological interventions (Kurtz et al., 2016). Therefore, identifying the factors associated with MTT in schizophrenia deserves particular attention.

The present study focused specifically on the relationship between emotional valence of future imagined events and personality traits based on the dominant five-factor model of personality, which posits five main, relatively independent, broad personality dimensions: neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience (see e.g., John and Srivastava, 1999; McCrae and Costa, 1999). Of these traits, neuroticism and extraversion are closely related to emotional experiences. Indeed, there is a robust relationship between extraversion and positive affect, and between neuroticism and negative affect (DeNeve and Cooper, 1998; Steel et al., 2008). Regarding schizophrenia, several studies have reported that patients with schizophrenia present a personality profile that differs from healthy subjects. Specifically, a recent meta-analysis (Ohi et al., 2016) reported that in comparison to healthy subjects, schizophrenia patients showed a higher score for neuroticism and lower scores for extraversion, openness to experience, agreeableness and conscientiousness.

Existing research suggests that personality traits may be related to the ability to project oneself into the future. Indeed, the findings of Quoidbach et al. (2008) indicated that non-clinical individuals with high levels of Neuroticism generated a greater amount of negative future projections whereas no significant association between positive valence and Extraversion was found. Conversely, Thomsen et al. (2014) found a positive relationship between Extraversion and emotional content of positive future events but not between Neuroticism and emotional content of negative future events. However, to our knowledge no study so far has explored the possible relationships between MTT and personality traits in schizophrenia.

Consequently, the main aim of this study was to explore the relationship between episodic foresight and personality traits in individuals with schizophrenia. To this aim, we used self-defining projections (SDFPs) introduced by D'Argembeau et al. (2012), which are conceived as the future counterparts of self-defining memories (SDMs, Blagov and Singer, 2004), that is, mental representations of plausible and highly significant future events that shape an individual's sense of identity. Due to the discrepancies between the findings of Quoidbach et al. (2008) and Thomsen et al. (2014), and according to Steel et al. (2008), we hypothesized that Extraversion is positively associated with positive valence of future imagined events and Neuroticism with negative valence

Methods

STUDY POPULATION

Twenty-five outpatients with confirmed diagnosis of schizophrenia by the Statistical Manual of Mental Disorders Fourth Edition (DSM-IV- TR) were recruited from the University Department of Adult Psychiatry. The protocol was approved by the local Research Ethics Board. Exclusion criteria were: (1) neurological disorder, (2) acute substance use disorder, and (3) inability to effectively agree and participate in the assessment due to severe psychopathology. Note that the data analyzed in this study were taken from the same sample used in Raffard et al. (2016).

MATERIALS

Episodic future thinking TASK

Episodic foresight was based on the procedure designed by D'Argembeau et al. (2012) and adapted for use in the current study. Fuller descriptions of the task appear in Raffard et al. (2016). Briefly, participants were asked to write down three self-defining future projections (SDFPs) that might conceivably happen in the future. SDFP definition was explained orally to the participants. It refers to personal future events with certain specific attributes. First, the temporal distance from the present of an SDFP should be at least 1 year. Second, an SDFP should be important and vividly represented. Third, it should refer to an event that helps oneself and significant others to explain who one is as an individual. Fourth, it should be an event related to an important and enduring theme from one's life. Fifth, it could be either a positive or a negative event; the only important aspect is that it generates strong feelings. Thereafter, participants had to rate the affective response while imagining the event as if the event was actually happening on a 7-point ratings scale (-3=very negative, 0= neutral, 3= very positive).

In addition, SDFPs were rated on dimensions of specificity and autobiographical reasoning on the basis of the Singer and Blagov (2000) scoring manual. The responses were rated as specific when they referred to an event lasting less than 24 h that would occur on a particular day at a particular time and place. An SDFP was considered to contain an autobiographical reasoning if the participant stepped back from the event description and added a statement about the significance of the event to him or her. The 'autonoetic' characteristics of events were also rated on one single item related to the *feeling of pre-experiencing the event when imagining* (1=not at all, 7=a lot).

RELIABILITY. Two independent raters (licensed psychologists) blind to the hypotheses and to the status of the participants scored all of the SDFPs in order to measure inter-rater agreement (Cohen's Kappa). Inter-rater reliability was very good for specificity (0.84), and integrative meaning (0.85).

PERSONALITY

The French version of the Big Five Inventory (BFI; Plaisant et al., 2010), initially developed by John et al.

(1991), was used in the present study. Its 45 items are short, easy-to-understand phrases that assess the five personality traits of extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness. Each item was rated on a 5-point scale ranging from 1 (*strongly DISAGREE*) to 5 (*strongly AGREE*). Internal consistency was satisfactory for the neuroticism, extraversion, and openness to experience, agreeableness, and conscientiousness subscales respectively (Cronbach's $\alpha=0.82, 0.82, 0.74, 0.75, 0.80$).

CLINICAL VARIABLES

Severity of schizophrenia symptoms was evaluated with the PANSS (Kay et al., 1987). Global cognitive functioning was assessed with the Montreal Cognitive Assessment (MoCA, Nasreddine et al., 2005).

Results

Patients were between 18 and 60 years old ($M=31.48, SD=9.90$) and had in average 10.64 years of education. Most of the sample was composed by men ($N=22, 88\%$). Descriptive statistics first showed that schizophrenia patients in our sample showed almost similar levels of neuroticism, openness to experience, agreeableness, and conscientiousness than participants from the reference sample of Plaisant et al. (2010). Their levels of extraversion were quite balanced.

CORRELATION ANALYSES between PERSONALITY TRAITS, SDFPs dimensions AND CLINICAL symptoms

Correlation analyses were performed using either Pearson's correlation or Spearman's rank correlation depending on the distribution of the sample. Bonferroni correction was applied to multiple correlations between each SDFPs measure and each personality trait ($p<0.01$).

No significant correlations were found between Specificity, Autobiographical reasoning and personality dimensions (Table 1). Likewise, no significant correlations were found between auto-noetic consciousness and personality dimensions. As hypothesized, extraversion was positively associated with emotional valence indicating that evoking a more positive SDFP was associated with a more outgoing personality. A negative trend was found between neuroticism and emotional valence.

Table 1

Descriptive data and clinical symptoms and Correlations between Personality traits and Self-Future Projection Measures and Clinical Symptoms in schizophrenia patients (N=25).

	M	SD	Extraversion	Agreeableness	Awareness	Neuroticism ^a	Openness
Self-Future Projection Measures							
Specificity ^a	1.91	0.63	0.056	-0.133	-0.233	-0.062	0.147
Autobiographical Reasoning ^a	0.15	0.24	0.195	0.184	0.22	0.347	0.229
Autonoetic Consciousness	4.76	1.35	0.035	0.483	-0.092	-0.282	0.272
Emotional Valence	1.44	1.18	0.521^{**}	0.126	0.079	-0.409	0.274
Personality dimensions							
Extraversion	2.79	0.62					
Agreeableness	3.94	0.47					
Conscientiousness	3.28	0.73					
Neuroticism	2.91	0.77					
Openness	3.30	0.67					
MOCA	24.44	3.99					
PANSS							
Positive Symptoms	13.32	3.36	-0.297	-0.101	-0.339	0.168	-0.606^{**}
Negative Symptoms	13.6	4.84	-0.052	0.127	0.189	-0.408	-0.342
General Psychopathology	27.96	5.26	-0.103	0.06	0.253	-0.054	-0.187

Notes:

^{**} $p > 0.01$

^a Variables that do not follow a normal distribution. Spearman correlations were used in these cases.

Significant correlations were found between positive symptoms and Openness indicating that higher levels of positive symptoms were associated with reduced Openness to experience.

Discussion

Although available evidence suggests that the emotional valence of autobiographical memories and future imagined events might be influenced by personality differences (Denkova et al., 2012; Quoidbach et al., 2011; Rubin, 2014), these relationships remain poorly understood particularly for future thinking.

The present study is the first to examine the relationship between personality dimensions and episodic future thinking in schizophrenia patients. As hypothesized, we found that some personality traits were related to the emotional content of future imagined events in patients. Participants with higher trait of extraversion had more positive affective responses about future events. In this sense, schizophrenia participants with a more outgoing personality tend to have more positive expectations about the future. This result is consistent with past observations in healthy participants indicating that optimism is linked to high Extraversion/Positive Emotionality personality dimension (Boland and Capeliez, 1997; Sharpe et al., 2011).

However, our findings contrast with those obtained among healthy participants by Quoidbach et al. (2008), which revealed that neuroticism but not extraversion was related to the affective charge of future imagined events. Contrary to their findings, but similarly to those of Thomsen et al. (2014), we found

that imagining more positive future events was associated with a more outgoing personality (e.g. Extraversion) whereas only a trend between Neuroticism and negative valence was found. Our results are thus consistent with one of the most robust findings in personality psychology demonstrating a significant relationship between extraversion and positive affect, and between neuroticism and negative affect (DeNeve and Cooper, 1998).

Concerning the relationships between personality traits and the other dimensions of future projections (i.e. autobiographical reasoning, specificity and auto-noetic consciousness), no significant results were found suggesting that personality traits influence specifically the emotional aspects of future projection rather than its cognitive components. It is important to note that we were not able to reproduce for episodic future thinking, the findings of McLean & Fournier (2008) who found that Extraversion and Openness were related to making more positive past self-event connections in healthy participants. Autobiographical reasoning impairments constantly found in schizophrenia patients for both autobiographical memory (Raffard et al., 2010; Berna et al., 2011) and future thinking (Raffard et al., 2016) may explain this result. Note also, that as the code for autobiographical reasoning does not appear to take valence of reasoning into account, our results are therefore not directly comparable to the McLean and Fournier study.

In addition, correlations analyses showed that higher levels of positive symptoms were associated with reduced openness. Due to the cross-sectional nature of our study, we cannot determine if positive symptoms such as hallucinations or delusions influence Openness or if this later dimension directly influences levels of positive symptoms. Even if psychotic symptoms seem to exert limited effect on the stability of personality traits in patients with psychotic disorders (Boyette et al., 2015), longitudinal studies with largest samples are needed before any firm conclusions can be drawn. Note that in our sample and contrary to the meta-analysis of (Ohi et al., 2016), schizophrenia patients showed overall almost similar levels of extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness than participants from the reference sample of Plaisant et al. (2010). These findings confirm the significant heterogeneity in all personality dimensions among the existing studies in schizophrenia (Ohi et al., 2016).

Several limits must be highlighted. First, the small sample size. Thus, future studies with larger samples are needed. Second, due to the exploratory nature of our study, personality traits were not assessed in our healthy controls group. Past research on narrative identity has shown that participants with high optimism scores tended to have high narrative redemption scores (bad scenes that move to good outcomes) (McAdams et al., 2001), which in turn were linked with higher well-being and personal growth. It will be particularly interesting to assess in future studies the relationships between personality dimensions, well-being and redemption sequences in future imagined events in both clinical and non-clinical samples and to explore if schizophrenia is associated with different patterns of relationships between personality traits and mental time travel in comparison with healthy controls.

Overall, our findings suggest that as in non-clinical samples, personality traits may play an important role for mental time travel into the future in schizophrenia patients and must be taken into account in future studies on this subject. Our results also highlight that schizophrenia patients as a group, are not homogeneous, but – like for healthy samples – that personality is related to

characteristics of mental time travel.

From a clinical perspective, current evidence suggests that imagining a positive future is important in developing an optimism bias (Sharot et al., 2007). Thus, incorporating procedures to encourage the generation of more emotionally vivid prospective positive imagery in schizophrenia patients, particularly with those with low traits of Extraversion (Holmes and Mathews, 2010) could constitute important targets for clinical interventions (Ricarte et al., 2017).

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