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Investigating the empirical support for therapeutic targets proposed by the temporal experience of pleasure model in schizophrenia: A systematic review

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ABSTRACT

Background: Anhedonia and amotivation are substantial predictors of poor functional outcomes in people with schizophrenia and often present a formidable barrier to returning to work or building relationships. The Temporal Experience of Pleasure Model proposes constructs which should be considered therapeutic targets for these symptoms in schizophrenia e.g. anticipatory pleasure, memory, executive functions, motivation and behaviours related to the activity. Recent reviews have highlighted the need for a clear evidence base to drive the development of targeted interventions.

Objective: To review systematically the empirical evidence for each TEP model component and propose evidence-based therapeutic targets for anhedonia and amotivation in schizophrenia.

Method: Following PRISMA guidelines, PubMed and PsycInfo were searched using the terms "schizophrenia" and "anhedonia". Studies were included if they measured anhedonia and participants had a diagnosis of schizophrenia. The methodology, measures and main findings from each study were extracted and critically summarised for each TEP model construct.

Results: 80 independent studies were reviewed and executive functions, emotional memory and the translation of motivation into actions are highlighted as key deficits with a strong evidence base in people with schizophrenia. However, there are many relationships that are unclear because the empirical work is limited by over-general tasks and measures.

Conclusions: Promising methods for research which have more ecological validity include experience sampling and behavioural tasks assessing motivation. Specific adaptations to Cognitive Remediation Therapy, Cognitive Behavioural Therapy and the utilisation of mobile technology to enhance representations and emotional memory are recommended for future development.

1. Introduction

The ability to derive pleasure from activities is a key part of the human experience; it has positive effects on an individual's mood and increases motivation to engage with the world around them (Foussias et al., 2011; Frederickson, 2001). Hence any difficulty engaging with pleasurable experiences is likely to lead to reduced activity levels and social isolation. Social withdrawal and reduced functioning have been observed in individuals with schizophrenia, particularly those who report high levels of anhedonia (Krupa and Thornton, 1986).

Anhedonia is currently defined as a loss of the ability to feel pleasure and is considered to be part of the negative symptom cluster in schizophrenia which also includes apathy, avolition, asociality, poverty of speech and blunted affect (Kirkpatrick et al., 2006). Anhedonia is a stable trait in people with schizophrenia which persists independently of changes in positive symptoms, other negative symptoms and cognitive deficits (Berenbaum et al., 2008). Difficulty experiencing pleasure and motivational deficits are the most prominent among the negative symptoms in predicting poor functional outcomes (Foussias et al., 2011; Loas et al., 2009; Rocca et al., 2014). In at-risk and first-episode individuals, anhedonia has been shown to be an important predictor of future diagnosis of schizophrenia (Gelber et al., 2004; Velthorst et al., 2009). These data support anhedonia as a key therapy target but two recent reviews have concluded that the effectiveness of interventions which have reported an outcome for negative symptoms is very limited (Elis et al., 2013; Fusar-Poli et al., 2014). Indeed, both these reviews highlighted the lack of an evidence base for intervening in negative symptoms as a factor which contributes to the lack of targeted, effective treatments.

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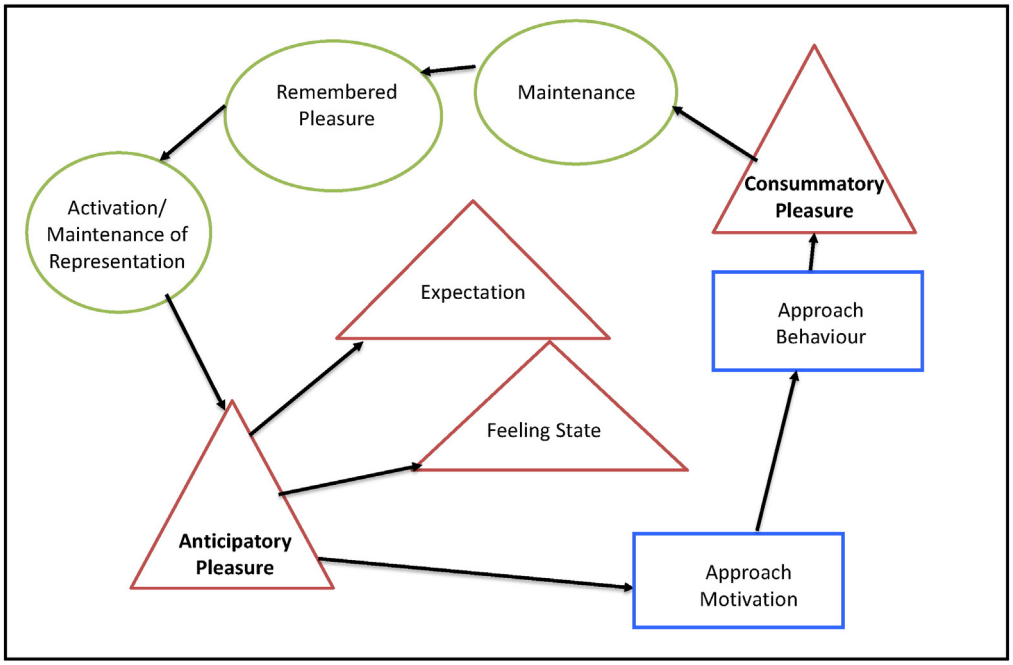

Fig. 1. The Temporal Experience of Pleasure Model. (Kring and Caponigro, 2010).

The Temporal Experience of Pleasure model (see Fig. 1) includes an important distinction between intact consummatory ("in the moment") pleasure and a specific deficit in anticipatory pleasure experienced by people with schizophrenia (Kring and Caponigro, 2010). The model is cyclical and suggests that after an experience is initiated and enjoyed, the memory of that experience, and the ability to create and maintain a representation of it, contribute to anticipatory pleasure. Once pleasure has been anticipated, motivation to seek out and complete that activity is generated. The model has been extended to include findings from the reward and neuroimaging literature which proposes additional constructs such as value computation and effort computation for inclusion in the model (Kring and Barch, 2014). Research has focused on gathering evidence across several methodologies to support the concepts described in the model and this has been reviewed in two narrative papers (Cohen et al., 2011; Strauss et al., 2011). However, the TEP model proposes many constructs that contribute to the experience of pleasure and they have yet to be assessed systematically to detect which are empirically supported and should be prioritised as the foundation for an evidence-based intervention.

The aim of this review is to recommend interventions which may be effective on the basis of empirical evidence and highlight the gaps in knowledge that require further research. This will be achieved by systematically reviewing all experimental studies that include individuals with schizophrenia, measure anhedonia using a validated assessment tool and one of the components of the TEP model—consummatory pleasure, memory, executive functions/reward representation,: anticipatory pleasure or approach motivation and behaviours.

Table 1
List of psychometrically validated scales to assess anhedonia in schizophrenia.

Name of measure	Reference: validation study
Positive and Negative Syndrome Scale	Kay et al. (1987)
Scale for the Assessment of Negative Symptoms	Andreasen (1982)
Physical and Social Anhedonia Scales	Chapman et al. (1976)
Temporal Experience of Scale	Gard et al. (2006)
Clinical Assessment Interview for Negative Symptoms	Horan et al. (2011)
Snaith Hamilton Pleasure Scale	Snaith et al. (1995)
Brief Negative Symptoms Scale	Kirkpatrick et al. (2011)

2. Method

This systematic review was conducted following PRISMA guidelines (Moher et al., 2009), see Appendix 2 for a completed PRISMA checklist.

2.1. Study eligibility

Studies were considered eligible if they:

- Included a majority of individuals with a diagnosis of schizophrenia according to the Diagnostic and Statistical Manual of Mental Disorder (American Psychiatric Association, 2013), Research Diagnostic Criteria (Spitzer et al., 1978) or International Classification of Diseases (World Health Organisation, 1992).
- Assessed anhedonia using validated instruments shown by at least one published validation study in people with schizophrenia (self-report or clinical interview; see Table 1).
- Were written in English
- Reported empirical data
- Did not only include individuals with primary co-morbid disorders e.g. substance abuse.

2.1.1. Search criteria

Both PubMed/Medline and PsycINFO were searched up to April 2015 by CE using the following keywords: schizophrenia and anhedonia. Alternative search terms for anhedonia (e.g. pleasure, positive affect, and reward) were excluded after initial searches produced a very high proportion of irrelevant papers (i.e. 90%). Studies that only included participants with co-morbid substance or alcohol abuse diagnoses (i.e. investigated the impact of these co-morbid diagnoses on emotional experience) were excluded as anhedonia may be present due to this primary diagnosis and thus confound the investigation of the nature of anhedonia in people with schizophrenia. This focus on anhedonia in the context of negative symptoms of schizophrenia and not as the result of affective disorders is also the reason for narrowing the search to "schizophrenia" only. Recently both a systematic review and meta-analysis (Elis et al., 2013; Fusar-Poli et al., 2014) have summarised the limited effectiveness of currently available interventions for negative

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