



## Consummatory and anticipatory anhedonia in schizophrenia: Stability, and associations with emotional distress and social function over six months

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### ABSTRACT

Recent work has suggested that anhedonia in schizophrenia can be understood as involving two separate constructs: deficits in anticipatory and consummatory pleasure. Little is known about the relative stability of these different constructs and their links with clinical features and social function over time. To examine these questions, 51 participants with a diagnosis of schizophrenia or schizoaffective disorder in a non-acute phase of illness were administered the Temporal Experience of Pleasure Scale, the Positive and Negative Syndrome Scale, and Quality of Life Scale at two time points six months apart. Results revealed that baseline scores of both anticipatory and consummatory pleasure were significantly correlated with follow-up scores six months later, suggesting each construct is stable in the short term. The association of anticipatory pleasure at baseline and six months was significantly higher than the relationship between consummatory pleasure at baseline and at six months. Anticipatory pleasure predicted concurrent and prospective levels of positive symptoms, emotional discomfort, and interpersonal function, but not emotion recognition. Consummatory pleasure predicted only concurrent positive symptoms. The link of baseline anticipatory pleasure with emotional discomfort at six months persisted even after controlling for baseline emotional discomfort. Implications for the measurement and conceptualization of anhedonia in schizophrenia are discussed.

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### 1. Introduction

Anhedonia, defined as the diminished capacity to experience pleasant emotions, is a clinically significant aspect of schizophrenia most frequently characterized as a negative symptom of the illness (Horan et al., 2006). Considered by early theorists to be a central feature of schizophrenia (Meehl, 1962; Rado, 1962), anhedonia is characterized in behavioral terms by less engagement in pleasurable activities (Miller, 1987). It has been suggested to be a relatively stable phenomenon over time in persons with schizophrenia and linked with significant impairment in social functioning (e.g. Chapman et al., 1994; Blanchard et al., 1998; Cohen et al., 2003).

One question that has emerged in recent research concerns the expression, experience and measurement of anhedonia in schizophrenia. Exploration in this area has complicated our understanding of this construct. While persons with schizophrenia report lower levels of trait-like hedonic experience as well as score more highly on interview-rated measures of anhedonia compared to

controls (Blanchard and Cohen, 2006; Horan et al., 2006, 2008), they also report experiencing as much pleasant emotion as controls in response to evocative stimuli (Berenbaum and Oltmanns, 1992; Kring and Moran, 2008; Cohen and Minor, 2010). This finding – broadly described as the emotion paradox – has been replicated in studies of self-reported experiences of pleasure over time and for one-time responses to emotionally evocative stimuli (Kring and Neale, 1996; Earnst and Kring, 1999). Differing from self-report measures, experience-sampling methodology has shown relatively normal report of positive emotion in patients (Myin-Germeys et al., 2000, 2011). Similarly, Aghevli et al. (2003) have found that while participants with schizophrenia report experiencing similar amounts of emotion to controls in role-plays, they appear significantly less emotionally expressive during those interactions. This pattern of results has led many to conclude that people with schizophrenia have different levels of deficit between trait and state hedonic experience.

This emotion paradox has led somewhat directly to the development and expansion of an understanding of anhedonia as consisting of anticipatory and consummatory components (Gard et al., 2006, 2007). Working in the field of depression, Klein (1984) initially distinguished between these two, arguing that anticipatory pleasure involves motivated behavior and desire

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for a future stimulus, while consummatory pleasure describes the positive emotion experienced at satiation. Gard et al. (2006) point out that while often related, motivated behavior and anticipatory pleasure can be differentiated. There are several components that connect anticipatory pleasure to the satiation of the desire for the positive stimulus. Anticipatory pleasure involves both the expectation of a positive stimulus in the future as well as pleasure because that the stimulus will soon be experienced. Understood temporally, anticipatory pleasure occurs when first expectation of reward engenders approach motivation and facilitates goal-directed behavior toward a rewarding stimulus (Depue and Iacono, 1989). Secondly, expectation of the stimulus itself produces a positive feeling state that has been labeled appetitive pleasure. Kring and Caponigro (2010) incorporated these components into a temporal model of anticipation, representation, and successful satiation. According to this model, remembered pleasure maintains the representation of certain stimuli as positive, and allows for the individual to anticipate pleasure. The sub-components of anticipatory pleasure, a feeling state and a prediction, thusly lead an individual to approach motivation and approach behavior, which cyclically produces consummatory pleasure and memory of the said consummatory pleasure. Further support for the distinction between these two forms of anhedonia has been taken from work using animal models that suggests that a dopamine pathway could be responsible for anticipatory pleasure and its associated motivated behaviors (Berridge and Robinson, 1998, 2003). Particularly of interest, the authors found a pattern of brain activation in which wanting (anticipatory pleasure) activated the nucleus accumbens but not the prefrontal cortex, while liking (consummatory pleasure or satiation) did the opposite, activating the prefrontal cortex but not the nucleus accumbens.

This distinction between the experience and anticipation of pleasure has been studied with the Temporal Experience of Pleasure Scale (TEPS; Gard et al., 2006). Using the TEPS, studies have shown people with schizophrenia to have deficits in self-reported anticipatory, but not consummatory pleasure (Gard et al., 2006). Also, anticipatory pleasure scores have been significantly correlated with behavioral activation, reward responsiveness, drive, and some measures of negative symptoms, but most importantly, with assessment of social and family role functioning. Meanwhile, consummatory pleasure has been only correlated with physical anhedonia (Gard et al., 2007). The TEPS has been found to have an interpretable factor structure, good internal consistency and both TEPS subscales have been found to be moderately correlated with other anhedonia scales (Gard et al., 2006). However, studies of the relationship of the TEPS with other indicators of psychopathology have been equivocal. Strauss et al. (2011) found that patients differed from controls in report of consummatory but not anticipatory pleasure. They also failed to replicate finding linking anticipatory pleasure and the related constructs explored earlier by Gard et al. (2007). However, Chan et al. (2010) found patients with negative symptoms had greater levels of anticipatory pleasure deficits while in a study of a French version of the TEPS the anticipatory factor was negatively related to assessments of both avolition and anhedonia (Favrod et al., 2009).

Other accounts of anhedonia in schizophrenia draw attention not only to the complexity of the phenomenon, but also the complexity of its measurement. In a more recent meta-analysis, Cohen and Minor (2010) found similar positive ratings in response to pleasurable stimuli between patients and controls, yet in patients there was simultaneously a report of relatively strong aversion to both positive and neutral stimuli. Elsewhere, Cohen et al. (2011) have reviewed the distinction between trait and state anhedonia extensively, remarking importantly that

much of the inconsistency of results regarding affective experience in schizophrenia is due to differences between trait-based self-report or clinical interviews and examinations of emotions in specific laboratory conditions. While the mechanism for producing these differences is unknown, some theoretical explanations have been offered. These explanations include not only the aforementioned (1) anticipatory pleasure deficits, but also (2) deficits in regulating or attenuating negative emotions, (3) encoding-retrieval deficits with regard to positive memories, (4) deficits in cognitive representations of stimuli and their associated valence and (5) social-specific hedonic deficits (c.f. Cohen et al., 2011).

Other findings calling for testing of this anticipatory-consummatory paradigm include Strauss and Gold's (2012) recent argument in an extensive review that anhedonia is conceptualized less correctly as a lack of the "capacity" to experience pleasure, but rather more a matter of appraisal of past or imagined possible future events in general. According to this view, anhedonia reflects a set of beliefs maintained by access to memories and contextual information, rather than a specific trait-like capacity. Much of the confusion in this field has resulted from a previous lack of acknowledgment of meaningful distinctions between varying kinds of emotional self-report. Robinson and Clore (2002) point out that self-reports of current feelings and non-current feelings may differ as a result of different kinds of information that form the basis of the judgments being made. While individuals typically try to draw upon the kind of information that is most specific and relevant when possible, some measures involve reports of hypothetical, forgotten or prospective scenarios about which one can typically only access situation-specific or identity-related beliefs. As an illustration, the kind of mental information accessible when deciding how enjoyable it is to eat an ice cream cone is immediate and experiential; whereas the kind of mental information accessed when making a judgment about whether one might enjoy going out to get ice cream in the future involves beliefs about social situations, associations, and related memories. In this sense, when using the TEPS to examine anhedonia it is important to consider the conceptual limitations of this measure as well as the impact of its structure on potential findings.

To date, while the study of these types of anhedonia has led to promising developments in understanding anhedonia as a key feature of schizophrenia, work has been limited by a lack of longitudinal studies that examine these as distinct constructs, particularly in light of new conceptualizations of the underlying structure and roots of anhedonia in schizophrenia. It remains unclear how stable these deficits are over time, as well as how stable their relationships with clinical outcomes are over time. Secondly, it is important as well to examine these relationships in order to better test differing accounts of anhedonia in schizophrenia, including those which view it as a trait-like deficit of motivational processes and those that view anhedonia as the result of a collection of beliefs rooted in negative affective experience. Only Strauss et al. (2011) have more recently explored stability coefficients of each subscale of the TEPS, showing a significantly higher stability for consummatory pleasure than anticipatory pleasure, though both were intraclass correlations greater than 0.70. To our knowledge, no study has thoroughly explored how these relationships between other domains and different kinds of anhedonia might change over time. An exploration of these relationships over time could also more generally broaden our understanding of the qualities of self-report measures of anticipatory and consummatory anhedonia in schizophrenia, and could contribute to our growing theoretical understanding of schizophrenia by testing the constructs underlying this account (c.f. Cohen et al., 2011). Analyses of the relationships between measures of anhedonia and other clinical measures can help focus and direct testing of theoretical models of anhedonia going forward.

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