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Psychometric properties, validity, and reliability of the Temporal Experience of Pleasure Scale state version in an opioid-dependent sample

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ABSTRACT

Background: Individuals with substance dependence commonly experience anhedonia. Theories of anhedonia distinguish between anticipatory and consummatory reward deficits, with the Temporal Experience of Pleasure Scale (TEPS) the first self-report scale to separately measure these two constructs. Several psychometric studies have analysed the trait version of the TEPS, but the state version of the TEPS has not been previously validated.
Methods: We examined the psychometric properties of the state version of the TEPS in 121 individuals with opiate dependence (81% Australian-born), to confirm its 2-factor structure and examine the internal consistency, convergent and divergent validity, test-retest reliability, and performance as a state measure.
Results: Confirmation of the 2-factor solution required removal of two items and allowing correlation between residuals of three pairs of highly-similar items. The resulting consummatory and anticipatory scales correlated strongly with each other ($r = .76$), suggesting poor divergent validity between them. Nevertheless, the scale showed good internal consistency (Chronbach's α: anticipatory = .90; consummatory = .84; total = .92), convergent (TEPS total and Snaith–Hamilton Pleasure Scale $r = -.76$) and divergent validity ($-.38 < r < -.10$ for measures of negative affect, anxiety, and alexithymia) with other psychological measures, and test-retest reliability. Changes in TEPS scores between baseline and 1-month follow-up correlated well with changes in scores on other state anhedonia and positive affect measures, suggesting that the TEPS state version functions well as a state measure.
Conclusion: In opioid-dependent participants, the TEPS state version appeared to have good validity as a measure of state anhedonia. However, evidence for its ability to distinguish between consummatory and anticipatory anhedonia was weak.

1. Introduction

A growing body of research highlights the role of anhedonia (impaired capacity to experience pleasure) in substance use disorders. Anhedonia is elevated during active dependence and withdrawal, and subsequently declines with prolonged abstinence (Garfield et al., 2014), with higher levels of anhedonia predicting relapse risk during abstinence attempts (Cook et al., 2010; Leventhal et al., 2009). Researchers have also recently sought to delineate this construct into separable and independent subtypes, aligned to proposed differences between "wanting" and "liking" involved in reward processing (Berridge and Robinson, 2003) or anticipatory and consummatory stages of reward-directed behaviour (Barbano and Cador, 2007). For example, Treadway and Zald (2011) distinguish between consummatory anhedonia, motivational anhedonia (lack of motivation for, interest in, or "wanting" of a reward) and decisional anhedonia (impaired ability to make reward-related decisions). Similarly, Der-Avakian and Markou (2012) argue that reward deficits may be consummatory, anticipatory, motivational, or learning-related.

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Commonly-used self-report measures of anhedonia, such as the Chapman Anhedonia Scales (Chapman et al., 1976), the Fawcett-Clark Pleasure Scale (Fawcett et al., 1983), and the Snaith–Hamilton Pleasure Scale (SHAPS, Snaith et al., 1995), treat anhedonia as a uni-dimensional construct, without distinguishing between consummatory anhedonia and other dimensions of anhedonia (Treadway and Zald, 2011). The Temporal Experience of Pleasure Scale (TEPS; Gard et al., 2006) is the first self-report questionnaire that attempts to measure anticipatory and consummatory anhedonia separately. Its 18 items include 10 items designed to measure anticipatory pleasure (ability to anticipate, and/or take pleasure in anticipating, future pleasure) and 8 items designed to measure consummatory pleasure. While both trait and state TEPS versions have been published (intended to measure anhedonia as a long-lasting personality trait and as a temporary state, respectively), to our knowledge, only the trait version has been previously subjected to psychometric analysis. Gard et al. (2006) reported that in American university students, the TEPS had a two-factor structure which corresponded to the consummatory and anticipatory sub-scales, and showed good internal consistency, test-retest reliability, and convergent and divergent validity. To our knowledge, only one other evaluation of the factor structure of the English-language version of the TEPS has been published, but found inconsistent evidence for the TEPS scales' convergent and divergent validity in university students from the United Kingdom and Australia, and found that several consummatory items loaded poorly on the consummatory factor and cross-loaded on the anticipatory factor (Ho et al., 2015).

The TEPS's purported ability to separably measure anticipatory and consummatory anhedonia should be of interest to those researching the role of anhedonia in substance dependence, because different substances may differentially impact these dimensions of anhedonia, which may have different clinical implications. A common result of chronic use of all addictive substances is persistent impairment in dopaminergic transmission within the nucleus accumbens (Diana, 2011). According to contemporary theories of reward processing, this should produce anticipatory anhedonia, without necessarily impacting consummatory pleasure (Barbano and Cador, 2007; Berridge and Robinson, 1998, 2003; Di Chiara and North, 1992; Treadway and Zald, 2011). Thus, while chronic use of any addictive substance could cause anticipatory anhedonia, whether or not it also produces consummatory anhedonia would depend on whether the specific substance also impacts the neural substrates of consummatory pleasure. Given that activation of μ opioid receptors is considered a key neural substrate of consummatory pleasure (Barbano and Cador, 2007; Der-Avakian and Markou, 2012; Di Chiara and North, 1992; Koob and Le Moal, 2008; Treadway and Zald, 2011), and chronic opioid use impairs the availability and sensitivity of μ opioid receptors (Williams et al., 2013), it is likely that opioid dependence results in both consummatory, as well as anticipatory anhedonia.

While the trait version of the TEPS has been used in studies of cannabis users (Cassidy et al., 2012) and tobacco smokers (Leventhal et al., 2014), to our knowledge, it has not been studied in populations with opioid dependence. Moreover, no studies have yet been published using the TEPS state version. The distinction between state and trait anhedonia may have relevance clinically, and for selecting an appropriate measure for research purposes. Anhedonia may be a stable trait in some disorders (e.g., schizophrenia), but more dependent on the clinical state in others (e.g., depression; Blanchard et al., 2001; Loas et al., 2009). Reductions in anhedonia in substance-dependent samples during prolonged abstinence suggest that anhedonia in these samples is a state associated with active dependence and/or acute withdrawal (Garfield et al., 2014). Studies of anhedonia in substance-dependent samples may therefore benefit from using state measures of anhedonia instead of, or in addition to, trait measures. However, no psychometric analyses of either the state or trait version of the TEPS have been conducted in a substance dependent sample.

Here we report analyses of the factor structure, internal consistency, convergent and divergent validity, 1-month test-retest reliability, and performance of the state version of the TEPS as a measure of state anhedonia, in a sample of opioid dependent participants. A particular objective was to test whether the TEPS state version showed the 2-factor structure corresponding to the anticipatory and consummatory sub-scales. We predicted that good convergent and divergent validity as an anhedonia measure would be demonstrated by high correlations between TEPS and SHAPS (another state measure of anhedonia) scores, moderate associations with depression and positive affect, and lower correlations with measures of other psychological constructs. We also predicted that good performance as a state measure would be demonstrated by strong correlations between changes in TEPS scores and changes in SHAPS, depression, and positive affect scores.

2. Methods

2.1. Participants

Participants were required to be aged between 18 and 55 years and have current or past year opioid dependence, determined using DSM-IV-TR criteria. They were a convenience sample recruited through pharmacies administering opioid maintenance programs and other substance use-related treatment and outreach services in the Melbourne metropolitan area. Leaflets and posters were placed in these services inviting clients to contact the researcher if interested in participating. Those who contacted the researcher were screened for inclusion and exclusion criteria. Individuals were excluded if they had a history of a psychotic or bipolar disorder, or current primary (i.e., non-substance-induced) major depressive episode. Participants were recruited as part of a larger study examining the relationship between anhedonia and clinical outcomes over 12 months, for which a sample size of 120 opioid-dependent participants was estimated as necessary. Recruitment was thus ceased after enrolment of 121 participants which, given the TEPS has 18 items, provided a participant-to-item ratio of 6.7, above the ratio of 5 recommended by Tabachnick and Fidell (2007) as the minimum necessary for factor analysis. Ninety-eight (81%) participants were born in Australia and 113 (93%) reported English as their first language.

2.2. Measures

2.2.1. Anhedonia. The TEPS comprises 18 items with each item measured on a scale from 1 ('very false for me') to 6 ('very true for me'). A total score is derived by averaging item scores. Higher scores indicate less anhedonia. The wording of most items in the state version of the TEPS is slightly different to their wording in the trait version, to help prompt those completing it to consider only their responses in the past week, rather than their general tendencies. The order of the items also differs between the two versions. The content of items 5, 9, and 11 (in the state version) differs more substantially from the equivalent items in the trait version, being much more generally-worded.

The 14 item SHAPS, a self-report measure of state anhedonia, was used to assess convergent validity of the TEPS (Snaith et al., 1995). Each item is rated on a scale from 1 ('definitely agree') to 4 ('strongly disagree'). Originally, Snaith et al. (1995) recoded item scores to dichotomous values ('agree' and 'definitely agree' = 0; 'disagree' and 'strongly disagree' = 1), to calculate a total score ranging from 0–14, with higher scores indicating greater anhedonia. However, to allow greater dispersion and normal distribution of scores,