



ELSEVIER

Contents lists available at ScienceDirect

Psychiatry Research

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

Brief report

Subjective pleasure experience in patients with recent-onset schizophrenia: A preliminary report



Simon S.Y. Lui^{a,b,c}, Yi Wang^a, Yan-fang Shi^{a,b}, Angie C.W. Au^c, Peony T.Y. Wong^c,
Zoe L.S. Chu^c, Ann M. Kring^d, Eric F.C. Cheung^c, Raymond C.K. Chan^{a,*}

^a Neuropsychology and Applied Cognitive Neuroscience Laboratory, Key Laboratory of Mental Health, Institute of Psychology, Chinese Academy of Sciences, Beijing, China

^b University of Chinese Academy of Sciences, Beijing, China

^c Castle Peak Hospital, Hong Kong Special Administration Region, China

^d Department of Psychology, University of Berkeley, CA, USA

ARTICLE INFO

Article history:

Received 22 January 2015

Received in revised form

3 April 2015

Accepted 9 April 2015

Available online 16 April 2015

Keywords:

Anticipatory pleasure

Consummatory pleasure

Schizophrenia

ABSTRACT

Little is known about subjective pleasure experience in recent-onset schizophrenia, and its relationship with neurocognitive functions. Twenty-seven recent-onset schizophrenia people and 26 controls completed the TEPS and neuropsychological tests. The results showed that schizophrenia people self-reported less anticipatory pleasure than controls. Semantic verbal fluency was apparently correlated with anticipatory pleasure.

© 2015 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Anhedonia refers to the diminished ability to experience pleasure, and constitutes one of the negative symptoms of schizophrenia (Kirkpatrick et al., 2006). Hedonic capacity has been conceptualised as a construct comprising the “anticipatory” component (wanting) and the “consummatory” component (liking) (Berridge, 2003, 2007; Kring and Barch, 2014). People with schizophrenia commonly report difficulties in experiencing pleasure in everyday life (Horan et al., 2008), but have intact affective experiences in response to emotionally evocative stimuli (Cohen and Minor, 2010; Llerena et al., 2012). The evidence appears to support a dissociation of anticipatory and consummatory pleasure experience in people with schizophrenia. Compared to consummatory pleasure, anticipatory pleasure has been proposed to be more closely related to motivated behaviour (Barch and Dowd, 2010; Kring and Barch, 2014). The Temporal Experiences of Pleasure Scale (TEPS; Gard et al., 2006, 2007) was developed to tap into the anticipatory–consummatory differentiation of anhedonia.

Using the TEPS, Gard et al. (2007) found that people with chronic schizophrenia anticipated less pleasure from everyday activities, whereas Strauss et al. (2011) found that people with

chronic schizophrenia reported experiencing less consummatory pleasure. In another study, Chan et al. (2010) administered the TEPS on people with chronic schizophrenia and found that people with prominent negative symptoms anticipated less pleasure than those without, but the two groups did not differ in consummatory pleasure. To date, only three studies (Cassidy et al., 2012; Schlosser et al., 2014; Mote et al., 2014) have recruited people with recent-onset (duration of illness < 5 years) schizophrenia and the findings reported have been inconsistent. Using the TEPS, Schlosser et al. (2014) and Cassidy et al. (2012) found that people with recent-onset schizophrenia self-reported similar anticipatory and consummatory pleasure as controls. However, Mote et al. (2014) reported that people with early schizophrenia-spectrum disorders anticipated less pleasure than controls, but had intact consummatory pleasure.

The inconsistent findings may be related to several methodological limitations, i.e., the group difference in age (Schlosser et al., 2014; Mote et al., 2014) and the confounding effect of active cannabis misuse (Cassidy et al., 2012). In this study, we re-examined the important issue of anticipatory and consummatory pleasure in recent-onset schizophrenia, using samples that were better matched in demographics and having no past history of illicit substance misuse. Gooding and Plfum (2012) have begun to examine the relationship between the ability to experience anticipatory and consummatory pleasure, and working memory, in individuals reporting higher level of social anhedonia. However,

* Correspondence to: Institute of Psychology, Chinese Academy of Sciences, 16 Lincui Road, Beijing 100101, China.

E-mail address: rckchan@psych.ac.cn (R.C.K. Chan).

there is a paucity of evidence for people with schizophrenia in this interesting area. We also examined the relationship between neurocognitive functions, and anticipatory and consummatory pleasure, in people with recent-onset schizophrenia. We hypothesised that (1) people with schizophrenia have difficulties in experiencing pleasure, and that these deficits would be apparent in the anticipatory rather than the consummatory domains of pleasure experience; and (2) working memory, rather than other neurocognitive functions, is correlated with the ability to experience anticipatory pleasure but not consummatory pleasure.

2. Methods

2.1. Participants

We recruited 27 clinically stable outpatients with a DSM-IV diagnosis of schizophrenia from an early psychosis intervention programme in Hong Kong. Diagnoses were based on structured interviews (First et al., 1995), supplemented by information from medical records. Exclusion criteria were (1) a life-time history of substance abuse, (2) a history of electroconvulsive therapy in the past six months, (3) neurological disorder, (4) a history of head injury with loss of consciousness for more than 30 min, and (5) mental retardation. We also recruited 26 healthy individuals from nursing schools and community youth centres as controls. Interviews by a qualified psychiatrist ascertained that no controls had any lifetime or family history of psychosis. All participants were Chinese in ethnicity. Demographics, treatment histories, and antipsychotic medications in terms of chlorpromazine equivalent (Gardner et al., 2010) were ascertained from case records. All the people with recent-onset schizophrenia (duration of illness < 5 years) had medication history, with two receiving first-generation antipsychotics, 23 receiving second-generation antipsychotics and two receiving clozapine. Thirteen people additionally received anticholinergics (benhexol) at a daily dosage range of 2–8 mg. None received any benzodiazepines. Table 1 shows the participants' characteristics.

2.2. Measures and procedure

Participants completed the Temporal Experience of Pleasure Scale (TEPS) (Gardner et al., 2006, 2007). The Chinese version of the TEPS (Chan et al., 2012) modified the original 18-item questionnaire, and used nine items to generate the anticipatory

pleasure subscale score, and 10 items to generate the consummatory pleasure subscale score. Chan et al. (2012) found a four-factor rather than two-factor solution for the TEPS (contextual anticipatory, abstract anticipatory, contextual consummatory, abstract consummatory), based on a non-clinical Chinese sample comprising 1119 students. The Chinese version of the TEPS was demonstrated to have satisfactory validity and reliability, internal consistency in factor structure and discriminatory ability in the Chinese population (Chan et al., 2010, 2012).

The Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987) was administered by trained psychiatrists. We estimated intelligence using a prorating method based on the arithmetic, similarity and digit span subscales of the Chinese version of the Wechsler Adult Intelligence Scale-Revised (WAIS-R) (Gong, 1992).

Participants also completed a battery of neurocognitive tests. For the Logical Memory (LM) and Visual Reproduction (VR) subtests of the Chinese version of the Wechsler Memory Scale-Revised (Gong et al., 1989), we read out a story and presented two figures, one at a time, to the participants, and the participants were required to recall the materials immediately and after 30 min. In the Letter-Number Span Test (LNT; Gold et al., 1997), a series of alternating numbers and letters were read to the participants, and they were asked to rearrange the letters and numbers in successive order. We recorded the LNT accuracy and LNT category passed. The one-minute semantic (animal) Verbal Fluency Test (VF; Henry and Crawford, 2004) was used to assess initiation ability. In the VF Test, participants were asked to generate as many items (belonging to the animal category) as they could in a one-minute period. The modified version of the Wisconsin Card Sorting test (WCST; Nelson, 1976) was used to assess cognitive flexibility and task switching. We recorded the WCST perseverative error and the WCST category passed. The local ethics committee approved all study procedures.

2.2.1. Data analysis

To examine group difference in the ability to experience anticipatory and consummatory pleasure, the four TEPS subscale scores (abstract anticipatory, contextual anticipatory, abstract consummatory, contextual consummatory) between the groups were compared by a series of univariate ANOVAs. Because of the trend of significance that the schizophrenia group consisted of more males than the control group, we conducted follow-up ANCOVAs, with gender as a covariate. To examine the contribution of neurocognitive functions to anticipatory and consummatory pleasure in the schizophrenia group ($n=27$), we entered the independent variable (estimated IQ, immediate and delayed LM, immediate and delayed VR, LNT accuracy, LNT category passed, VF, WCST perseverative error, WCST category passed) into "force-entry" linear regression models, with either the TEPS abstract anticipatory, the TEPS contextual anticipatory, the TEPS abstract consummatory, or the TEPS contextual consummatory subscale score as the dependent variable. Finally, we report the psychometric properties of the TEPS in healthy sample and in people with schizophrenia in terms of Cronbach's alpha, split-half

Table 1
Characteristics of participants.

	Healthy controls ($n=26$)		Recent-onset schizophrenia ($n=27$)		F/χ^2 *	p	Cohen's d
	Mean	S.D.	Mean	S.D.			
Age	21.35	2.897	22.96	4.50	2.40	0.127	
Gender (male v female)	12 v 14		19 v 8		3.20*	0.074	
Handedness (right v left)	25 v 1		25 v 2		0.98*	0.612	
Education	13.35	1.81	12.19	1.96	5.00	0.030	
Estimated IQ	119.27	11.16	110.07	13.61	7.20	0.010	
Immediate logical memory	15.38	3.06	14.15	4.53	1.35	0.251	−0.319
Delayed logical memory	14.46	3.84	11.93	4.87	4.41	0.041	−0.577
Immediate visual reproduction	21.85	2.56	19.96	3.08	5.84	0.019	−0.664
Delayed visual reproduction	21.85	2.41	19.81	3.36	6.34	0.015	−0.692
LNT correct response	7.00	1.20	6.19	1.15	7.83	0.007	−0.695
LNT category passed	36.31	1.09	34.78	3.76	6.40	0.015	−0.549
WCST perseverative error	0.35	0.75	0.22	0.51	0.51	0.481	−0.195
WCST category passed	5.96	0.20	5.74	0.90	1.49	0.228	−0.335
Verbal fluency	22.00	6.13	16.37	4.93	13.62	0.001	−1.014
TEPS abstract anticipatory	4.87	0.65	4.30	1.26	6.84	0.012	−0.563
TEPS contextual anticipatory	3.65	0.77	3.10	0.79	4.20	0.045	−0.718
TEPS abstract consummatory	3.77	0.91	3.43	0.84	2.06	0.158	−0.394
TEPS contextual consummatory	3.77	0.91	3.43	0.84	2.06	0.158	−0.394
PANSS positive subscale			11.52	3.66			
PANSS negative subscale			16.16	6.68			
PANSS neutral subscale			23.52	5.80			
Duration of illness (years)			1.33	0.73			
Medications (chlorpromazine equivalent) (mg)			306.7	302.1			

$p < 0.05$ are bold.

Note: IQ=intelligence; LNT=Letter-number span test; WCST=the Wisconsin Card Sorting test; TEPS=the Temporal Experience of Pleasure Scale; PANSS=the Positive and Negative Syndrome Scale, $p=p$ -value.

* χ^2 test

reliability, and intra-class correlation. All statistical analyses were conducted using SPSS version 20.

3. Results

As shown in Table 1, ANOVAs showed that people with schizophrenia self-reported less pleasure on the TEPS abstract anticipatory subscale ($F[1,51]=4.117$, $p=0.012$, Cohen's $d=-0.563$) and the TEPS contextual anticipatory subscale ($F[1,51]=4.204$, $p=0.045$, Cohen's $d=-0.718$) than controls, but not the TEPS abstract consummatory subscale ($F[1,51]=0.694$, $p=0.158$, Cohen's $d=-0.394$) or the TEPS contextual consummatory subscale ($F[1,51]=0.694$, $p=0.158$, Cohen's $d=-0.394$). After Bonferroni adjustments, only the group difference on the TEPS abstract anticipatory subscale remained statistically significant.

ANCOVAs showed that, after accounting for gender ratio in the two groups, people with schizophrenia self-reported less pleasure on the TEPS abstract anticipatory subscale ($F[1,50]=3.251$, $p=0.077$) and the TEPS contextual anticipatory subscale ($F[1,50]=4.472$, $p=0.039$) than controls. After Bonferroni adjustments, only the group difference on the TEPS contextual anticipatory subscale showed a trend of significance.

For the TEPS abstract anticipatory subscale score, the forced-entry linear regression model showed that all the neurocognitive functions together explained 40.0% of the variance ($F[10,16]=1.066$, $p=0.438$) in the schizophrenia group ($n=27$). Among the neurocognitive functions entered into the regression model, only VF showed a trend of significance as a predictor of the TEPS abstract anticipatory subscale score (standardised Beta=0.482, $p=0.097$). For the TEPS contextual anticipatory subscale score, the regression model with all neurocognitive functions entered as independent variables explained 31.1% of the variance ($F[10,16]=1.066$, $p=0.693$); only VF showed a trend of significance as a predictor in this model (standardised Beta=1.920, $p=0.073$). For the TEPS abstract consummatory subscale score, the regression model explained 24.4% of the variance, and none of the neurocognitive functions reached statistical significance in the model ($ps > 0.1$). Similarly for the TEPS contextual consummatory subscale score, the regression model only explained 24.4% of the variance, and none of the neurocognitive functions reached statistical significance in the model ($ps > 0.1$).

In the sample with schizophrenia ($n=27$), we found a high reliability of the TEPS, because of a Cronbach's alpha of 0.881, a split-half reliability (Spearman–Brown coefficient) of 0.787, and an intra-class coefficient (average measures) of 0.881.

In the healthy sample ($n=26$), we found a Cronbach's alpha of 0.796, a split-half reliability (Spearman–Brown coefficient) of 0.810, and an intra-class coefficient (average measures) of 0.796.

4. Discussion

This study is one of only a few studies that examines self-reported anticipatory and consummatory pleasure in recent-onset schizophrenia; it is the only study to do so in China. Compared to previous studies (Cassidy et al., 2012; Schlosser et al., 2014; Mote et al., 2014), there was better matching of age and gender between the groups, and none of the participants misused substance. Moreover, we have also examined the relationship between self-reported anticipatory and consummatory anhedonia and neurocognitive functions.

Consistent with Mote et al. (2014)'s study, our findings appear to suggest that people with recent-onset schizophrenia exhibit anticipatory deficits. Apparently, our findings do not support Cassidy et al. (2012) and Schlosser et al.'s (2014) previous findings of consummatory pleasure deficits in people with schizophrenia.

Moreover, our preliminary findings appear to show that neurocognitive dysfunctions may contribute to anticipatory pleasure deficits in people with schizophrenia. However, further study using a larger scale is needed to validate our current findings. Contrary to our expectation, verbal fluency (a proxy of initiation ability) but not working memory appeared to be a predictor of the ability to anticipate pleasure in people with recent-onset schizophrenia people. This is a novel finding. It is plausible that "initiation" is a proxy measure of one's volition, and it is noteworthy that avolition and anhedonia are both negative symptoms (Barch and Dowd, 2010). In the development of the Clinical Assessment of Interview for Negative Symptoms (CAINS), Blanchard et al. (2011) argued that the lack of pleasure reported by people with schizophrenia is actually a multi-faceted phenomenon, influenced by numerous environmental factors relatively independent from the illness per se. In reality, the likelihood for an individual to experience pleasure in everyday life closely depends on the availability of potentially pleasurable activities. It is plausible that those having defective initiation ability are more likely to deprive themselves of such opportunities, and therefore self-report fewer pleasurable experiences. Unlike laboratory paradigms, self-report instruments like the TEPS are unable to control for environmental confounds, e.g., an individual given limited opportunity to encounter pleasurable events in everyday life tends to have low ratings in the TEPS.

This study had several limitations. First, the sample size was small, and several findings were trends of significance. Secondly, we employed multiple comparisons, and alpha inflation errors should be borne in mind. Replication of our preliminary findings in a larger sample is clearly indicated. Thirdly, we only administered the TEPS to measure the dissociation of anticipatory and consummatory pleasure experience, but did not cover other types of pleasure (e.g. social pleasure versus non-social pleasure, remembered versus directly experienced pleasure). The inclusion of additional self-report instruments, such as the ACIPS (Gooding and Pflum, 2014; Bedwell et al., 2014), is recommended for future studies. Lastly, other behavioural studies (Heerey and Gold, 2007) have demonstrated anticipatory pleasure deficits, using well-controlled laboratory-based paradigms. However, the relationship between anticipatory and consummatory pleasure, and neurocognitive functions in everyday life settings may differ from that in a well-controlled laboratory-based settings.

Acknowledgements

This study was supported by grants of the Strategic Priority Research Program (B) of the Chinese Academy of Science (XDB02030002), the National Science Fund China (81088001 and 91132701), the Key Laboratory of Mental Health, and the Knowledge Innovation Project of the Chinese Academy of Sciences (KSCX2-EW-J-8). These funding agents had no role in the study design; collection, analysis, and interpretation of the data; writing of the manuscript; or decision to submit the paper for publication.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.psychres.2015.04.013>.

References

- Barch, D.M., Dowd, E.C., 2010. Goal representations and motivational drive in schizophrenia: the role of prefrontal-striatal interactions. *Schizophrenia Bulletin* 35 (5), 919–934.

- Bedwell, J.S., Gooding, D.C., Chan, C.C., Trachik, B.J., 2014. Anhedonia in the age of RDoC. *Schizophrenia Research* 160 (1–3), 226–227.
- Berridge, K.C., 2003. Pleasures of the brain. *Brain and Cognition* 52 (1), 106–128.
- Berridge, K.C., 2007. The debate over dopamine's role in reward: the case for incentive salience. *Psychopharmacology* 191 (3), 391–431.
- Blanchard, J.J., Kring, A.M., Horan, W.P., Gur, R., 2011. Toward the next generation of negative symptom assessments: The collaboration to advance negative symptom assessment in schizophrenia. *Schizophrenia Bulletin* 37 (2), 291–299.
- Cassidy, C.M., Lepage, M., Harvey, P.O., Malla, A., 2012. Cannabis use and anticipatory pleasure as reported by subjects with early psychosis and community controls. *Schizophrenia Research* 137 (1–3), 39–44.
- Chan, R.C.K., Wang, Y., Huang, J., Shi, Y., Wang, Y., Hong, X., Ma, Z., Li, Z., Lai, M.K., Kring, A.M., 2010. Anticipatory and consummatory components of the experience of pleasure in schizophrenia: cross-cultural validation and extension. *Psychiatry Research* 175 (1–2), 181–183.
- Chan, R.C.K., Shi, Y.F., Lai, M.K., Wang, Y.N., Wang, Y., Kring, A.M., 2012. The temporal experience of pleasure scale (TEPS): exploration and confirmation of factor structure in a healthy Chinese sample. *PLoS One* 7 (4), e35352.
- Cohen, A.S., Minor, K.S., 2010. Emotional experience in patients with schizophrenia revisited: meta-analysis of laboratory studies. *Schizophrenia Bulletin* 36 (1), 143–150.
- First, R.L., Spitzer, M., Gibbon, J.B., Williams, J.B., 1995. *Structured Clinical Interview for DSM-IV (SCID-I) (User's Guide and Interview) Research Version*. Biometrics Research Institute, New York State Psychiatric Institute, New York, NY.
- Gard, D.E., Gard, M.G., Kring, A.M., John, O.P., 2006. Anticipatory and consummatory components of the experience of pleasure: a scale development study. *Journal of Research on Personality* 40 (6), 1086–1102.
- Gard, D.E., Kring, A.M., Gard, M.G., Horan, W.P., Green, M.F., 2007. Anhedonia in schizophrenia: distinctions between anticipatory and consummatory pleasure. *Schizophrenia Research* 93 (1–3), 253–260.
- Gardner, D.M., Murphy, A.L., O'Donnell, H., Centorrino, F., Baldessarini, R.J., 2010. International consensus study of antipsychotic dosing. *American Journal of Psychiatry* 167 (6), 686–693.
- Gold, J.M., Carpenter, C., Randolph, C., Goldberg, T.E., Weinberger, D.R., 1997. Auditory working memory and Wisconsin card sorting test performance in schizophrenia. *Archives in General Psychiatry* 54 (2), 159–165.
- Gooding, D.C., Pflum, M.J., 2012. The nature of diminished pleasure in individuals at risk for or affected by schizophrenia. *Psychiatry Research* 198 (1), 172–173.
- Gooding, D.C., Pflum, M.J., 2014. The assessment of interpersonal pleasure: introduction of the anticipatory and consummatory interpersonal pleasure scale (ACIPS) and preliminary findings. *Psychiatry Research* 215 (1), 237–243.
- Gong, Y.X., Gong, Y.X., Jiang, D.W., Deng, J.L., Dai, Z.S., Zhou, Q.Z., Xie, G.R., Li, Y., Hua, X.X., 1989. *Manual of Wechsler Memory Scale-Chinese Version*. Hunan Medical College Press, Changsha.
- Gong, Y.X., 1992. *Manual of Wechsler Adult Intelligence Scale-Chinese Version*. Chinese Map Press, Changsha.
- Kay, S.R., Fiszbein, A., Opler, L.A., 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin* 13, 261–327.
- Kirkpatrick, B., Fenton, W., Carpenter, W.T., Marder, S.R., 2006. The NIMH-MATRICES consensus statement on negative symptoms. *Schizophrenia Bulletin* 32 (2), 296–303.
- Kring, A.M., Barch, M.B., 2014. The motivation and pleasure dimension of negative symptoms: neural substrates and behavioral outputs. *European Neuropsychopharmacology* 24 (5), 725–736.
- Heerey, E.A., Gold, J.M., 2007. Patients with schizophrenia demonstrate dissociation between affective experience and motivated behavior. *Journal of Abnormal Psychology* 116 (2), 268–278.
- Henry, J.D., Crawford, J.R., 2004. A meta-analytic review of verbal fluency performance following focal cortical lesions. *Neuropsychology* 18 (2), 284–295.
- Horan, W.P., Blanchard, J.J., Clark, L.A., Green, M.F., 2008. Affective traits in schizophrenia and schizotypy. *Schizophrenia Bulletin* 34 (5), 856–874.
- Llerena, K., Strauss, G.P., Cohen, A.S., 2012. Looking at the other side of the coin: a meta-analysis of self-reported emotional arousal in people with schizophrenia. *Schizophrenia Research* 142 (1–3), 65–70.
- Mote, J.M., Minzenberg, M., Carter, C.S., Kring, A.M., 2014. Deficits in anticipatory but not consummatory pleasure in people with recent-onset schizophrenia spectrum disorders. *Schizophrenia Research* 159 (1–3), 76–79.
- Nelson, H.E., 1976. A modified card sorting task sensitive to frontal lobe defects. *Cortex* 12, 313–324.
- Schlosser, D.A., Fisher, M., Gard, D., Fulford, D., Loewy, R.L., Vinogradov, S., 2014. Motivational deficits in individuals at-risk for psychosis and across the course of schizophrenia. *Schizophrenia Research* 158 (1–3), 52–57.
- Strauss, G.P., Wilbur, R.C., Warren, K.R., August, S.M., Gold, J.M., 2011. Anticipatory vs. consummatory pleasure: what is the nature of hedonic deficits in schizophrenia? *Psychiatry Research* 187 (1–2), 36–41.