



Association between hair cortisol concentration and perceived stress in female methamphetamine addicts



Liuna Geng, Ph.D.^{a,*}, Peng Xiang, M.S.^a, Jin Yang, M.S.^b, Hui Shen, Ph.D.^c, Zhiqin Sang, B.A.^a

^a Department of Psychology, Nanjing University, Nanjing, China

^b Research Centre for Learning Science, Southeast University, Nanjing, China

^c Department of Social Work and Policy, Nanjing University, Nanjing, China

ARTICLE INFO

Article history:

Received 2 May 2016

Received in revised form 9 October 2016

Accepted 30 October 2016

Keywords:

Hair cortisol
Chronic stress
Implicit Association Test
Self-reported stress
Implicit stress
Explicit stress

ABSTRACT

Objective: The present study aims to explore whether hair cortisol concentration is associated with explicit stress or implicit stress in female methamphetamine addicts.

Methods: Hair samples were collected from 51 female methamphetamine addicts from inpatient addiction treatment programs. Perceived stress was assessed by both explicit and implicit measures through the Perceived Stress Scale (PSS) and the Implicit Association Test (IAT), respectively.

Results: The positive relationship between hair cortisol concentration with D-scores of the IAT reached statistically significant difference. A marginal correlation between hair cortisol concentration and scores of the PSS was observed. Additionally, linear regression analysis indicated that D-scores of the IAT are strongly predictive of hair cortisol concentration.

Conclusion: Hair cortisol concentration is strongly related to implicit stress but only weakly related with explicit stress.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

In recent years, hair cortisol as a biologic marker of chronic stress is gaining increasing attention [15,18,21,30]. As cortisol is incorporated into the hair shaft during hair growth, the assessment of cortisol concentrations in a specific hair segment is believed to provide a retrospective measure of its systemic secretion over the respective hair growth period [33]. Although a body of evidence has confirmed that hair cortisol is indicative of chronic stress, it is still an open question as to whether hair cortisol concentration (HCC) is related to perceived stress. A significantly positive correlation has been reported [13,22,29], while other studies reported non-significant and even negative association [23,26,33,40]. As to substance abusers, there are similar pattern of results. Grassioliveira et al. [14] found that HCC is positively related with the number of negative life events during the 3 months prior to admission to a detoxification program in crack cocaine users, while Yang et al. [42] demonstrated that HCC of the heroin addicts from methadone maintenance treatment program isn't significantly correlated with perceived stress. Methodological issue might be one of the possible causes for these controversial results [34], in particular the limitations of the existing measures of perceived stress. Traditionally, perceived stress is assessed through self-reported questionnaires, an explicit means of

measurement, that are prone to bias effects due to social desirability [3,10,11] and retrospective recall [43]. Gibson et al. [11] found that addicts tend to deny negative details about themselves. Sato and Kawahara [31] argued that participants are likely to consciously distort their responses to some questionnaire items to understate their stress.

Based on the above descriptions, we propose that these limitations may be avoided by the Implicit Association Test (IAT). The IAT is a computer-based classifying task used to measure an individual's implicit attitudes through detecting automatic associations between concept words (e.g. *self* or *other*) and attribute words (e.g. *good* or *bad*) [17]. The assumption under the IAT is that classifying compatible words (e.g. *self-good* or *other-bad*) is performed more accurately and quickly than classifying incompatible words (e.g. *self-bad* or *other-good*). This assumption is reflected by the response times and errors in performing such categorizations. Given methodological advantages over the explicit measure, the IAT has been used to assess implicit attitudes (e.g., stereotype) [4,27] and affective state (e.g., self-esteem, anxiety) [8,16,24] which participants may not be aware of, or ones they are not willing to explicitly report. Moreover, the IAT has also been introduced in addiction researches, indicating that substance users/abuser would show stronger positive implicit associations toward substance use than non-use controls [1,2].

To our knowledge, Sato and Kawahara's [31] study was the first to demonstrate the stress IAT effect, and indicated that IAT scores were significantly greater in the high-stress group than in the low-stress group, suggesting that individuals in a high-stress state, compared to those in a low-stress state, associate the concepts related to *self* with the concept

* Corresponding author at: Department of Psychology, Nanjing University, Xianlin Road No. 163, Qixia District, Nanjing, Jiangsu Province, China.
E-mail address: gengliuna@nju.edu.cn (L. Geng).

related to stress more quickly and strongly [31]. Thus, the present study tried to further examine the relationship between HCC and perceived stress by the IAT among female methamphetamine (MAP) addicts. We hypothesized that HCC may be positively associated with implicit stress measured by the IAT rather than with explicit stress evaluated by the PSS. Chronic stress in the present context was evoked by detoxification in MAP addicts undergoing a systemic program. By definition, withdrawal syndrome triggered by detoxification would trigger stress responses, both biologically (e.g. increased cortisol concentration) [33] and psychologically (e.g. anxiety and depression). When considering prior work suggestions [29], MAP addicts were recruited when they had undergone detoxification for one month. Simultaneously, 1 cm-long hair that demonstrated cortisol exposure over a corresponding one-month period was sampled and analysed, thus providing a well-suited subject for investigating chronic stress.

2. Methods

2.1. Participants

Participants were recruited from inpatient treatment program for female MAP addicts in Nanjing, China. In line with previous researches (e.g. [42]), the inclusion criteria for participants in the present study were as follows: (a) history of MAP dependence that met DSM-IV criteria for longer than 6 years, (b) hair in the posterior vertex was longer than 1 cm, (c) body mass index (BMI) was under 28 kg/m², (d) hair was not dyed, permed, or bleached, (e) no history of medication use, including glucocorticoid drugs, antidepressants, or medication for hepatitis, human immunodeficiency virus-infection, and mental disorders over the past month, (f) no other comorbid substance use, such as amphetamines, cocaine, benzodiazepines, or cannabis over the past six months. A total of 51 female MAP addicts ($M_{\text{age}} \pm SD = 28.69 \pm 7.32$ years) who conform to the inclusion criteria participated in the present study for hair cortisol analysis. Demographic and psychological variables were obtained, including age, severity of drug craving (a 10-point scale, from 1 = *not strongly craving* to 10 = *strongly craving*), duration of MAP consumption, and BMI, to allow the investigation of potential confounding influences. All participants agreed and signed informed consent before participating in the study. This study followed the Declaration of Helsinki and was carried out in accordance with the approved guidelines by the Institutional Review Board of Nanjing University.

2.2. Questionnaire measurements

Chronic stress was measured both explicitly and implicitly. The PSS, containing 14 items, was used to measure explicit stress [6]. This questionnaire required that participants report how often they felt nervous and “stressed” in the last month. In each case, participants were asked to indicate the extent of stress experienced using 0–4 Likert scales (0 = *Never*, 1 = *Almost Never*, 2 = *Sometimes*, 3 = *Fairly Often*, 4 = *Very Often*). Scores of the PSS range from 0 to 56, with higher scores indicating more severe stress. In line with previous studies, anxiety and depression were also respectively assessed by the Self-Rating Anxiety Scale (SAS) [45] and Self-Rating Depression Scale (SDS) [44]. Both scales were designed to measure the degree to which a person felt anxious or depressed during the past month. The SAS contains 20 items, providing a raw total score of 20 to 80. The SDS consists of 20 items, and raw total scores vary between 20 and 80. These scales have been regularly used among substance abusers [5,20], moreover, the Chinese version of these scales have also been accepted in relevant researches (e.g., [42]).

2.3. Hair cortisol collect and analysis

Given that the average hair growth rate is 1 cm per month [41], the 1-cm hair segment closest to the scalp would reflect cortisol levels from

the last month. As 1–3 mm of the hair strand is deeply embedded in the skin and 1–2 mm of the hair strands closest to the scalp cannot be completely cut with scissors, hair collection was performed two weeks after the completion of survey data collection to ensure that the cortisol content of the collected hair samples fully reflected the psychological state of the participants during the time of survey data collection. Hair samples were stored at -20°C prior to analysis, and were prepared and analysed in Research Centre for Learning Science, Southeast University (see [42], for a more detailed description). The intra-assay and inter-assay coefficients of variation of this assay were < 10%.

2.4. IAT

A modified version of the computerized IAT for Chinese context was employed. Participants were asked to finish two categorization tasks: one distinguishing between Chinese words suggesting *self* (e.g., me, self, our, my and we) and words indicating *other* (e.g., they, others, outsider, other people and them), and one distinguishing between Chinese words suggesting *stress* (e.g., uneasy, nervous, anxious, worried and terrible) and words indicating *relaxed* (e.g., easy, calm, eased, comfortable and quiet). Participants were then required to respond to two kinds of pairings by clicking different keys according to instructions: one pair was compatible (self-relaxed/other-stress), and the other pair was incompatible (self-stress/other-easy). The extent to which compatible pairs were slower and more difficult to identify is thought to indicate how implicitly the individuals associate themselves with stress. The main indicator of association strength in the IAT is the D-score (ranging from -2 to 2), which is the difference between the mean response time for incompatible trials and the mean response time for compatible trials. Greater D-scores indicate a closer implicit relationship between the individual and perceived stress [17].

2.5. Statistical analysis

Data were analysed using the statistical package SPSS 20.0 for Windows. The data distribution normality was examined with a one-sample Shapiro–Wilk test. Spearman rank correlation was conducted to examine the association between hair cortisol concentration and age, BMI, PSS, SAS, and SDS scores.

3. Results

Table 1 presents the participants' demographic and psychological characteristics.

Hair cortisol contents were log-transformed because of a non-normal distribution. The log-transformed hair cortisol contents ($M_{\text{HCC}} \pm SD = 0.91 \pm 0.25$ pg/mg) were not significantly correlated with age ($r = 0.09$, $p = 0.55$), BMI ($r = 0.25$, $p = 0.08$), or duration of MAP consumption ($r = 0.18$, $p = 0.20$). As listed in Table 2, partial correlation analyses between hair cortisol contents, D-scores of the IAT, and scores of the PSS were conducted, with duration of MAP consumption and severity of drug craving as control variables. The results are shown in Table 2. As seen in the table, HCC was significantly correlated with D-scores of the IAT ($r = 0.55$, $p < 0.001$), but marginally with the PSS ($r = 0.27$, $p = 0.06$). Meanwhile, a significant correlation was observed

Table 1
Characteristics of the participants ($n = 51$).

Characteristics	Descriptive result($M \pm SD$)
Body mass index (BMI)	22.64 \pm 4.44
Duration of MAP consumption (years)	3.47 \pm 2.21
Severity of drug craving	1.81 \pm 1.44
PSS score	24.49 \pm 8.18
SAS score	43.19 \pm 9.25
SDS score	53.80 \pm 8.46
IAT D-score	0.57 \pm 0.42

Download English Version:

<https://daneshyari.com/en/article/5046107>

Download Persian Version:

<https://daneshyari.com/article/5046107>

[Daneshyari.com](https://daneshyari.com)