



## Trajectories in cigarette dependence as a function of anxiety: A multilevel analysis



Chiara S. Haller<sup>a,b,c,d,\*</sup>, Jean-François Etter<sup>e</sup>, Delphine Sophie Courvoisier<sup>f</sup>

<sup>a</sup> Department of Psychology, Harvard University, 33 Kirkland Street, Cambridge, MA 02138, USA

<sup>b</sup> Harvard Medical School, Boston, MA 02115, USA

<sup>c</sup> Division of Public Psychiatry, Massachusetts Mental Health Center, 75 Fenwood Road, Boston, MA 02115, USA

<sup>d</sup> Department of Psychiatry, Beth Israel Deaconess Medical Center, 330 Brookline Avenue, Boston, MA 02215, USA

<sup>e</sup> Faculty of Medicine, University of Geneva, IMSP-CMU, 1 rue Michel-Servet, CH-1211 Geneva 4, Switzerland

<sup>f</sup> Division of Clinical Epidemiology, University of Geneva and Geneva University Hospitals, 4 rue Perret-Gentil, 1205 Geneva, Switzerland

### ARTICLE INFO

#### Article history:

Received 8 November 2013

Received in revised form 9 March 2014

Accepted 10 March 2014

Available online 22 March 2014

#### Keywords:

Cigarette  
Dependence  
Prospective  
Anxiety

### ABSTRACT

**Background:** We assessed the association of anxiety with cigarette dependence over time, depending on smoking status (daily, occasional or ex-smoker); and the association of anxiety with (a) smoking cessation, (b) reduction, and (c) relapse.

**Methods:** A prospective Internet survey of 1967 ever smokers was assessed three times at 2 weeks interval, in 2007–2010. Cigarette dependence was assessed using the cigarette dependence scale. Predictors included time, smoking status (daily, occasional or ex-smoker) and anxiety. All measures were assessed at each time point.

**Results:** Dependence decreased over time (slope =  $-0.21$ ,  $p < 0.001$ ), as did feeling prisoner of cigarettes (slope =  $-0.25$ ,  $p < 0.001$ ). Both decreased faster between week 0 and week 2 than between week 2 and week 4 (slopes =  $0.25$ , and  $0.13$ ;  $p < 0.01$ ). Differences in anxiety across individuals were associated with dependence (slope =  $0.28$ ,  $p = 0.001$ ), feeling prisoner of cigarettes (slope =  $0.38$ ,  $p < 0.001$ ), cessation (OR =  $0.42$ ,  $p < 0.001$ ), relapse (OR =  $1.81$ ,  $p < 0.01$ ), but not with smoking reduction (OR =  $0.85$ ,  $p = 0.35$ ). Change over time in anxiety (within individuals) was associated with dependence (slope =  $-0.11$ ,  $p = 0.04$ ), nor feeling prisoner of cigarettes (slope =  $-0.21$ ,  $p = 0.02$ ), predicted smoking cessation (OR =  $0.51$ ,  $p < 0.001$ ), smoking reduction (OR =  $0.67$ ,  $p = 0.047$ ), and relapse (OR =  $1.52$ ,  $p = 0.03$ ).

**Conclusions:** Cross-sectionally, cigarette dependence, feeling prisoner of cigarettes, and smoking cessation were associated with anxiety; whereas prospectively, smoking cessation, reduction, and relapse were predicted by state anxiety. Thus, anxiety is an important factor that is associated with smoking behavior. Implications for treatment are discussed.

Published by Elsevier Ireland Ltd.

### 1. Introduction

Understanding factors that influence the variability of smoking behavior can be useful for clinicians who treat dependent smokers. Studies of day-to-day variation in smoking behavior, in particular studies using ecological momentary assessment (EMA) have shown that the number of cigarettes smoked is quite stable (Hughes et al., 1991; Shiffman et al., 2008; Stone and Shiffman, 1994). However,

the predictors of the variability of smoking behavior and tobacco dependence over time are incompletely documented. Determinants of a specific smoking event include negative affect regulation (Colvin and Mermelstein, 2010; Hedeker et al., 2009; Shiffman, 2009; Shiffman and Waters, 2004), mood variability (i.e., different ratings of mood across time), mood regulation (i.e., using strategies to modulate a personal mood state), and depression (Weinstein and Mermelstein, 2013). Mood variability is closely connected to variability in anxiety, in that difficulties to use certain strategies to regulate ones mood, may be related to difficulties to regulate ones anxiety. This, in turn, may predict variability in smoking behavior.

Dependent smokers seek to maintain a satisfactory blood level of nicotine. However, chronic administration of nicotine leads to an increase in the number of nicotinic receptors, which in turn reinforce nicotine withdrawal symptoms (Dani and De Biasi, 2001)

\* Corresponding author at: Harvard University, Department of Psychology, 33 Kirkland Street, Cambridge; Harvard Medical School, Beth Israel Deaconess Medical Center, and Massachusetts Mental Health Center, 75 Fenwood Road, MMHC 612, Boston, MA 02115, USA. Tel.: +1 617 754 1258; fax: +1 617 754 1250.

E-mail addresses: [cshaller@bidmc.harvard.edu](mailto:cshaller@bidmc.harvard.edu), [haller@fas.harvard.edu](mailto:haller@fas.harvard.edu) (C.S. Haller).

that include anxiety and anxiogenic responses (Costall et al., 1989). Smokers could also be smoking predominantly for pleasure and relaxation effects that approach the effects produced by anxiolytics (Juniper et al., 2005). Thus, smoking behavior may be stable over time, due to the entrenched habits, the short half-life of nicotine and the possibility of reduced withdrawal symptoms, but it may also be variable, due to its association with anxiety and stress, which vary over time (Huang, 2011; Iversen, 2009). People may for example smoke occasionally to reduce anxiety in given moments, but since nicotine has been shown to be anxiety provoking, they may momentarily reduce anxiety, only to then find themselves with greater anxiety levels (Moylan et al., 2012).

Risk factors for being a smoker include depression, anxiety (McClave et al., 2009), and stress (Childs and De Wit, 2010; Parrott, 1999; Parrott and Murphy, 2012). The immediate positive reinforcement of smoking includes the reduction of anxiety, increased alertness and concentration, whereas smoking withdrawal evokes anxiety, restlessness, impatience, and depressed mood (Hughes et al., 1991). Furthermore, the prevalence of smoking is high among people with psychiatric disorders, (Leonard, 2002; Lichlyter, 2010; McKenzie et al., 2010), including those with anxiety disorders (Kenfield et al., 2010; McKenzie et al., 2010). However, this association between anxiety and smoking could be due to anxious individuals being more prone to smoking (this effect could be called an inter-individual effect of anxiety). But increased anxiety and/or stress within individuals over time could also lead to increased smoking (intra-individual effect). The current study therefore investigated both inter-individual differences and within-individual fluctuations in anxiety, and how these were related to smoking behavior.

## 2. Methods

Between 2007 and 2010, all visitors of a smoking cessation website were invited to answer the survey. Previous research showed that visitors of this website were more motivated to quit than smokers in the general population (Wang and Etter, 2004).

The Internet self-report questionnaire, in French, is available here: <http://www.stoptabac.ch/fr/TabHum/q-delphine-200-08-06.htm>. Participants who provided an e-mail address were invited to complete two follow-up surveys, 2 and 4 weeks after their initial participation. Participants were not paid but received feedback on their level of dependence after the completion of the last survey at 4 weeks. Analyses were restricted to participants who answered at least two surveys, because we needed at least two data points in order to calculate cessation, reduction, and relapse. The study was approved by the ethics committee of the Faculty of Psychology of the University of Geneva. The participants were informed of the purpose of the study and had an option to decline to have their data stored on file.

### 2.1. Measurements at each time point

**2.1.1. The cigarette dependence scale (CDS).** The CDS is a 12-item self-report measure of dependence intended for current smokers, which measures craving, cigarettes smoked per day, loss of control, time allocation, neglect of other activities, and persistence of use despite harm, as defined by the DSM-IV (American Psychological Association, 1994) and the ICD-10 (World Health Organization, 1992). Most items are answered on a 5-point Likert scale from *totally disagree* (coded 1) to *fully agree* (coded 5). The CDS has high test retest reliability ( $r \geq 0.83$ ), and high internal consistency ( $\alpha \geq 0.90$ ; Courvoisier and Etter, 2010; Etter et al., 2003; Etter, 2005), even though the internal consistency of CDS-12 is lower among light smokers (Okuyemi et al., 2007).

**2.1.2. Feeling prisoner to cigarettes (“prisoner”).** This CDS item assesses whether participants feel prisoners to cigarettes (psychological dependence) on a 5-point Likert scale from *not at all* (coded 1) to *completely* (coded 5), and is the only CDS item that can be answered by both current and former smokers.

**2.1.3. The State-Trait Anxiety Inventory – State (STAI-S).** The STAI-S (Spielberger et al., 1983) is a 20-item inventory that assesses the temporary or emotional state anxiety in adults. The essential qualities evaluated by the STAI-S-Anxiety scale are feelings of nervousness, tension, apprehension, and worry. Items are answered on a 4-point Likert scale from *not at all* (1) to *completely* (4) with higher scores reflecting greater levels of anxiety. The STAI-S has a high degree of internal consistency ( $\alpha = 0.86$ ; Spielberger, 2005).

**2.1.4. Smoking status.** Smoking status was assessed by a question asking participants if they were (1) daily, (2) occasional or (3) ex-smokers.

**2.1.5. Smoking cessation.** Based on the question above, we compared baseline daily smokers who were still smoking at follow-up ( $n = 717$ ) with baseline smokers who had quit smoking at the 2- or 4-week follow-up ( $n = 249$ ).

**2.1.6. Smoking relapse.** We compared baseline ex-smokers who were still abstinent at the 2- or 4-week follow-up ( $n = 474$ ) with baseline ex-smokers who relapsed to smoking at the 2- or 4-week follow-up ( $n = 73$ ).

**2.1.7. Smoking reduction.** We compared baseline daily smokers who maintained their cigarette consumption at the 2- or 4-week follow-up ( $n = 286$ ) versus baseline daily smokers who reduced cigarettes/day by at least 50% ( $n = 136$ ).

### 2.2. Analysis

We used mixed linear models with an identity link to examine the effect of anxiety on (1) cigarette dependence, and (2) feeling prisoner to cigarettes. Mixed linear models allow the assessment of individual characteristics that vary among individuals over time (e.g., level of dependence). For example, individual differences in baseline dependence may be affected by these varying characteristics across different individuals (*random intercept model*). They also allow estimating differences in change over time in dependence ratings across different individuals (*random slope model*). The usefulness of including a random intercept and random slope was assessed using likelihood ratio tests. Multilevel modeling is also more appropriate for clinical longitudinal data, because it does not require listwise deletion and allows using all available data (i.e., different number of measures for each individual). Residual plots were examined to check for conditional normality and homogeneity of variance.

To examine the effect of both inter-individual differences and intra-individual differences in anxiety, we separated anxiety into a mean level over the three time points (mean anxiety score) and a deviation from that mean level for each individual at each time point (deviation anxiety score) and included these two repeated measure variables as fixed effects predictors (Neuhaus and Kalbfleisch, 1998). Mean level in anxiety would allow us to test the hypothesis that more anxious individuals could be inclined to smoke more (effect of inter-individual differences). Deviation in anxiety would test the hypothesis that an individual who is more anxious at a specific moment could be inclined to smoke more at that moment (effect of intra-individual differences).

The independent repeated measure variables were (1) time and time squared, to estimate a (potentially non linear) trend over time, (2) mean anxiety and deviation anxiety, and (3) smoking status. Time and time squared were centered around their mean to avoid multicollinearity problems. To examine whether the impact of intra-individual anxiety on subjects' trajectories of dependence differ for daily versus occasional smokers, we included the following two-way interactions: time and smoking status (to investigate whether the effect of smoking status on dependence is dependent on time), time and intra- as well as inter-individual anxiety (to investigate whether the effect of anxiety on dependence is dependent on time), smoking status and intra- as well as inter-individual anxiety (to investigate whether the effect of smoking status on dependence is dependent on intra-individual anxiety). To control for age and sex, those variables were added to the model as covariates.

Since the cigarette dependence scale consists of questions that cannot be answered by ex-smokers (e.g., how many cigarettes they smoke a day), we excluded ex-smokers from this analysis. Because feeling prisoner to cigarettes is a CDS item that can be answered by both current and former smokers, the mixed linear model with *prisoner* as the outcome included also ex-smokers in the analysis.

We used generalized linear mixed models with a logit link for the effect of anxiety on (1) smoking cessation, (2) smoking reduction, and (3) smoking relapse. For each outcome, the fixed effects were the same: time difference (0–2 weeks and 0–4 weeks), mean anxiety, and deviation in anxiety. Again age, and sex were added as covariates to be controlled for. We did not include any interactions in these models. Analyses were performed using SPSS v.21.0 (IBM Corp., Armonk, NY, USA).

## 3. Results

### 3.1. Characteristics of participants

A total of 1967 individuals completed the initial survey, 889 completed the second survey (45%) and 637 the third survey (32%; Table 1). Response rates to the 2-week and 4-week surveys were similar in daily, occasional and ex-smokers (data not shown). Two thirds of the participants were female and the mean age at baseline was 39 years (SD: 11.4). Most participants at baseline (69%) were daily smokers and 25% were ex-smokers (mean duration of abstinence: 174 days, SD = 887 days). Participants showed a large range of dependence and anxiety scores (Table 1). Many participants quit

Download English Version:

<https://daneshyari.com/en/article/7506305>

Download Persian Version:

<https://daneshyari.com/article/7506305>

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