



The role of impulsivity in dropout from treatment for cigarette smoking

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Abstract

Impulsivity is a variable that has been associated with drug use. This study analyzes impulsivity from two different paradigms, one considering it as a trait and the other based on its behavioral correlates, such as disinhibition and impulsive decision-making in the treatment prognosis (maintain abstinence, relapse and dropout) of smokers after outpatient treatment. The participants in the study were 113 smokers who requested treatment for nicotine addiction. They were assigned to three groups according to whether or not they remained abstinent one month after beginning treatment; thus, group 1 was abstinent, group 2 had relapsed, and group 3 had dropped out of treatment. The participants filled out the *Semi-structured Interview for Smokers*, the *Fargerström Test for Nicotine Dependence*, the *Temperament and Character Inventory-Revised* (TCI-R) and the *Delay Discounting Task* (DDT). The *Delay Discounting* variable presents lower scores in the dropout group than in the relapse and abstinent groups, with the highest scores in the relapse group. Differences were also found on the *Harm Avoidance* (HA) variable, with lower scores in the dropout group compared to the relapse group. The importance of these results lies in the consideration of the smoker's personality profile in order to prevent both dropout and relapse.

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1. Introduction

Impulsivity is one of the variables most consistently linked to drug addiction [5,10,11,17,23,29,34,35]. Traditionally, impulsivity has been understood as a personality trait that involves quick reward seeking when presented with environmental stimuli, without considering the negative consequences of the behavior [2], and it has been evaluated by various questionnaires (Barrat Impulsiveness Scale [28]; Adjective Checklist [14]; Eysenck Personality Inventory [13]; Sensation Seeking Scale [40] and Cloninger Tridimensional Personality Questionnaire [1,6]). Recently, clinical neuroscience studies have analyzed impulsivity from paradigms that evaluate its behavioral correlates, such as disinhibition and impulsive decision-making [3,22]. Specifically, the delay discounting paradigm has shown that impulsive decisions can be evaluated simply and effectively in diverse addictive behaviors [18]. Delay discounting opera-

tively describes how quickly rewards lose their value as the delay in receiving them increases, and it also explains how the long-term consequences of a behavior lose their ability to control said behavior.

Studies [18,26,33] that explore the relationship between impulsivity and nicotine addiction based on this paradigm have used a delay discounting task (DDT). This task presents different trials where one has to select options with a relative value (an immediate reward versus a delayed one); that is, participants can choose to obtain a large amount of money after a period of time (delay) or a small amount immediately. Results have consistently shown that smokers usually present impulsive tendencies, with this factor being responsible for the inability to stop smoking and for increasing the probability of relapse [27,39].

The purpose of the present study was to analyze impulsivity from two different paradigms, one considering it as a trait, and the other based on its behavioral correlates, such as disinhibition and impulsive decision-making, in the treatment prognosis (maintain abstinence, relapse and dropout) to quit smoking.

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2. Methods

2.1. Participants

The participants in the study were 113 cigarette smokers who requested treatment in the nicotine dishabituation treatment program of the Occupational Medicine Area (Prevention Service) at the University of Granada. The service includes a smoking clinic, managed by two physicians and one psychologist, who provide specialized pharmacological (i.e., varenicline) and counselling (cognitive behavioral therapy + relapse prevention) treatment for smoking cessation between September 2009 and September 2012 (across 2 years). The inclusion criteria consisted of: being 18 years of age or older, having an employment contract with the University of Granada, wanting to voluntarily participate in the treatment, and correctly filling out the pretreatment evaluation measures. The exclusion criteria were: the presence of a serious diagnosed mental disorder (bipolar and/or psychotic disorder, etc.), concurrent dependence on other substances (cocaine, heroin, alcohol, etc.), and regularly taking medications that are incompatible with the pharmacological treatment used in the therapy. Participants were informed about the aims of the study and provided signed informed consent. Ethical approval for this survey was obtained by the Ethics Committee, Research University of Granada, Spain.

The participants were assigned to three different groups depending on whether they remained abstinent one month after the treatment began. Thus, group 1 was abstinent ($n = 69$), group 2 had relapsed ($n = 20$), and group 3 had dropped out of treatment ($n = 24$). The groups were balanced on age, sex, educational level and career, years of addiction to tobacco, number of cigarettes smoked daily, score on the Fagerström Test, and brand of tobacco (see Table 1).

2.2. Procedure

At the beginning of the program, an initial evaluation of the smokers was performed in one session in which the instruments described below were administered. All of the smokers gave their informed consent to participate in the study.

The program combines cognitive-behavioral and pharmacological (varenicline) treatments. The abstinence rates are determined by means of a patient self-report and confirmed by the levels of CO on the CO-oximeter.

2.3. Instruments

2.3.1. Semi-structured interview for smokers [21]

This survey provides information about socio-demographic data, family history, number of years of addiction, brand of cigarettes and level of dependence.

2.3.2. Fagerström Test for Nicotine Dependence [16]

This test is composed of 6 items with two or four response alternatives. Its factorial structure is consistent [8], and there is a Spanish version of the test [4].

Table 1

Baseline demographic variables and variables related to participants' cigarette smoking.

Factor	Groups		
	Abstinence	Relapse	Dropout
Age of the respondents (mean and SD)	45.6 (8.8)	48.7 (6.1)	48.4 (7.9)
Gender (N)			
Male	29	8	8
Female	40	12	16
Education (N)			
Elementary School	15	3	6
Secondary School	1	1	1
Bachelor	14	4	6
Associate Degree	12	1	6
College Degree	15	7	4
Ph.D.	12	4	1
Career (N)			
Janitorial	11	2	4
Administrative and Service Personnel	44	12	17
Teachers	12	5	3
Researchers	2	1	0
Years of tobacco addiction (mean and SD)	27.0 (10.6)	30.6 (7.7)	30.3 (9.5)
Number of daily cigarettes (mean and SD)	18.6 (9.0)	22.0 (8.1)	21.0 (10.6)
Score Test Fagerström (mean and SD)	4.4 (2.5)	5.0 (2.7)	4.5 (2.0)
Cigarette Brand (N)			
Virginia Tobacco	57	17	18
Dark Tobacco	7	2	4
Rolling	5	1	2

2.3.3. Temperament and Character Inventory Revised (TCI-R) [7]

This questionnaire consists of 240 items (5 of them on validity), responded to on a 5-point Likert-type scale, and grouped in 4 temperament dimensions [Novelty Seeking (NS); Harm Avoidance (HA); Dependence on Reward (DR) and Persistence (P)] and 3 character dimensions [Self-directedness (SD); Cooperativeness (C) and Self-transcendence (ST)]. It has been validated in a general Spanish population [15] and has satisfactory psychometric properties [30].

2.3.4. Delay Discounting Task (DDT) [20]

This is a delay discounting task that consists of 27 dichotomous-choice items. Participants have to choose between a smaller more immediate reward and a larger reward with a temporal delay. Previous studies using real rewards have shown a magnitude effect on discount rates, so that people's discount rates typically decrease as the amount of the reward increases.

3. Results

Two Univariate Analyses of Variance (ANOVAs) were performed for a between-groups unifactorial design, using

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