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Abstract: People with psychopathology experience high rates of smoking and have more trouble quitting. The Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF; Tellegen & Ben-Porath, 2008/2009) is a valid and reliable instrument for the assessment of psychopathology. In this study, we examined the ability of the MMPI-2-RF to assess psychopathology and to predict smoking cessation outcomes in a sample of 281 smokers seeking psychological treatment to stop smoking at the end of treatment and at 6- and 12-month follow-ups. Results showed that T-scores < 65 on Disaffiliativeness (DSF) scale were associated with a higher likelihood of smoking at the end of treatment, and T-scores \geq 65 on Neurological Complaints (NUC) scale were associated with a higher likelihood of smoking at the 12-month follow-up, after controlling for the effect of age and initial levels of nicotine dependence. The results highlight the usefulness of the MMPI-2-RF in the field of smoking cessation treatment.

THE UTILITY OF THE MMPI-2-RF TO PREDICT THE OUTCOME OF A
SMOKING-CESSATION TREATMENT

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- Psychopathology influences smoking cessation treatment.
- The MMPI-2-RF is a valid and reliable instrument to assess psychopathology.
- The scales of the MMPI-2-RF are used to predict smoking in smokers seeking treatment.
- DSF and NUC scales predict smoking at the end of treatment and after 12 months.

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Abstract

People with psychopathology experience high rates of smoking and have more trouble quitting. The Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF; Tellegen & Ben-Porath, 2008/2009) is a valid and reliable instrument for the assessment of psychopathology. In this study, we examined the ability of the MMPI-2-RF to assess psychopathology and to predict smoking cessation outcomes in a sample of 281 smokers seeking psychological treatment to stop smoking at the end of treatment and at 6- and 12-month follow-ups. Results showed that T -scores < 65 on Disaffiliativeness (DSF) scale were associated with a higher likelihood of smoking at the end of treatment, and T -scores ≥ 65 on Neurological Complaints (NUC) scale were associated with a higher likelihood of smoking at the 12-month follow-up, after controlling for the effect of age and initial levels of nicotine dependence. The results highlight the usefulness of the MMPI-2-RF in the field of smoking cessation treatment.

Key words: MMPI-2-RF, tobacco, smoking cessation, smokers, psychopathology

26 **1. Introduction**

27 Tobacco use is the leading preventable cause of morbidity and mortality in high
28 income countries. Nearly six million people worldwide die each year because of
29 tobacco due to its direct relation with different diseases (e.g., lung cancer,
30 cardiovascular disorders, emphysema, etc.) (United States Department of Health and
31 Human Services [USDHHS], 2014).

32 Evidence indicates that smoking is also related to mental health (Aubin,
33 Rollema, Svenson, & Winterer, 2012; Hall, & Prochaska, 2009; Rüther et al., 2014). In
34 a study conducted by Lasser et al. (2000) adults with and without mental disorders were
35 compared regarding their smoking rates and cessation. The results indicated a dose-
36 response pattern with smoking rates increasing from individuals with no mental
37 disorders to those with past month mental disorders. The same pattern was found when
38 assessing smoking cessation outcomes: abstinence rates were higher in those
39 participants with no mental disorders and they decreased progressively in those with
40 history of mental disorders and those with past month mental disorders.

41 People with mental disorders smoke more cigarettes per day and are more
42 nicotine dependent (Aubin et al., 2012) with rates of smoking prevalence from two to
43 four times higher than in the general population (Rüther et al., 2014). The reasons for
44 this high consumption are still unknown. It has been indicated that they might smoke for
45 stress relief and enjoyment, to ameliorate the effects of mental health problems and
46 medication side effects, to relief boredom or as a tool to facilitate social interactions
47 (Campion, Checinski, Nurse, & McNeill, 2008). As a result of this high consumption,
48 people with mental disorders have serious physical health problems. Moreover, studies
49 suggest that people with mental disorders have more problems quitting smoking,
50 showing lower abstinence rates in comparison with the general population (Hall &

51 Prochaska, 2009). Despite the need for people with mental disorders to stop smoking,
52 few studies have evaluated the efficacy of smoking cessation treatments in patients with
53 mental disorders (Aubin et al., 2012). Among them, the majority has focused in
54 population of smokers with severe mental disorders (e.g., schizophrenia, bipolar
55 disorders). This indicates that more studies are needed for those smokers without a
56 diagnosis of mental disorder but who suffer an important level of distress to influence
57 their smoking and their smoking cessation.

58 One of the difficulties in the study of psychopathology in smokers is the
59 diversity of assessment tools used. Historically, the Minnesota Multiphasic Personality
60 Inventory (MMPI; Hathaway, & McKinley, 1943) has been the most commonly used
61 measure to assess psychopathology. In studies with the MMPI or the MMPI-2, a
62 relationship has been found between tobacco and high scores on the Hypomania (Ma)
63 (Basile et al., 2004; Evans, Borgatta, & Bohrnstedt, 1967; Lipkus, Barefoot, Williams,
64 & Siegler, 1994), Psychopathic Deviate (Pd) (Andrussi, Archer, Pancoast, & Gordon,
65 1989; Evans et al., 1967; Jaffe, & Archer, 1987; Leon, Kolotkin, & Korgeski, 1979;
66 Lipkus et al., 1994), Hypochondriasis (Hs) (Tappan, & Weybrew, 1982), and
67 Depression (D) (Leon et al., 1979) scales. Ames et al. (2005) used various MMPI scales
68 to assess neuroticism, anxiety, depression and pessimism traits to predict tobacco
69 abstinence in 1,877 smokers undergoing treatment to quit smoking. The results showed
70 that high scores on these scales were associated with a lower likelihood of being
71 abstinent six months after treatment completion. In general, these studies employed
72 some items or scales of the questionnaire, but not the entire scale, and they mainly used
73 samples of students, making it difficult to generalize these results to other populations.

74 The MMPI-2-RF (Tellegen, & Ben-Porath, 2008/2009) is the latest version of
75 the MMPI. It is a self-report questionnaire composed of 338 items grouped into scales

76 that are organized hierarchically. Studies have indicated that the scales within the
77 MMPI-2-RF had good convergent and discriminant validity (Ayearst, Sellbom, Trobst,
78 & Bagby, 2013; Tellegen, & Ben-Porath, 2008/2009) and it has been found to be useful
79 for the assessment of psychopathology (Simms, Casillas, Clark, Watson, & Doebbeling,
80 2005; van der Heijden, Egger, & Derksen, 2008). However, to our knowledge, no
81 research is available on the assessment of smokers seeking treatment to quit. Taking
82 into account the high comorbidity of psychopathology and personality problems with
83 smoking and its influence on the process of quitting smoking, using the MMPI-2-RF in
84 the context of smoking cessation interventions would be useful to identify, in a
85 relatively simple way, those smokers with a higher risk for psychopathological
86 problems and treatment failure that may need more attention.

87 Thus, the aim of this study was to analyze the utility of the MMPI-2-RF scales,
88 as indicators of psychopathology, in the prediction of the outcome of a smoking
89 cessation treatment, both at the end of treatment and at the 6 and 12 month follow-ups.

90 **2. Method**

91 **2.1. Participants**

92 Sociodemographic characteristics of participants are presented in Table 1. All
93 participants requested treatment to quit smoking between April 2010 and December
94 2012. Of the 594 people who requested information, 134 just wanted information about
95 the program, 10 were abstinent, 47 were interested in the smoking cessation
96 intervention by mail (which is also offered by our Unit), and 19 were not located.
97 Finally, 99 smokers were eliminated from the study, due to the following exclusion
98 criteria: age under 18 ($n = 4$); smoking fewer than 10 cigarettes a day ($n = 21$); not
99 completing the pretreatment assessment ($n = 36$); diagnosis of a severe mental disorder
100 (bipolar disorder and/or psychotic disorder) ($n = 14$); concurrent dependence on other

101 substances (alcohol, cannabis, cocaine, heroin, etc.) ($n = 6$); smoking rolling tobacco,
102 cigars, or cigarillos ($n = 3$); having participated in the same program or other efficacious
103 psychological or pharmacological treatments to quit smoking in the past year ($n = 7$);
104 suffering from some pathology that implies a high life risk for the person ($n = 3$); and
105 not attending the first group session ($n = 5$). Of the remaining 285, 4 were eliminated
106 from the study because they presented an invalid MMPI-2-RF protocol according to the
107 recommended criteria ($CNS \geq 18$, $TRIN \geq 80$, $VRIN \geq 80$, $F-r \geq 120$, $Fp-r \geq 100$)
108 (Tellegen, & Ben-Porath, 2008/2009). The final sample comprised 281 smokers (60.5%
109 women; $M = 41.80$ years, $SD = 10.78$), with an average pretreatment consumption of
110 21.36 cigarettes per day ($SD = 7.92$).

111 -----Table 1 about here-----

112 2.2. Measures

113 2.2.1. *Questionnaire about the smoking behavior (Becoña, 1994).*

114 Composed of 59 items analyzing sociodemographic variables and various
115 aspects of the smoking history and behavior.

116 2.2.2. *Fagerström Test for Nicotine Dependence (FTND) (Heatherton, Kozlowski, 117 Frecker, & Fagerström, 1991; adaptation to Spanish of Becoña, & Vázquez, 1998).*

118 Composed of six items in which scores ≥ 6 are considered to be indicative of
119 nicotine dependence (Fagerström, & Furberg, 2008). In the current study, the reliability
120 obtained with Cronbach's alpha coefficient was .59, indicating that it has moderate
121 internal consistency, in accordance with previous studies (e.g., John, Meyer, Rumpf, &
122 Hapke, 2004).

123 2.2.3. *MMPI-2-RF (Tellegen, & Ben-Porath, 2008/2009).*

124 A 338-item self-report questionnaire that provides scores on 51 scales. First,
125 there is a group of 9 scales for the assessment of validity. On the other hand a group of

126 five scales, the Personality Psychopathology Five (PSY-5), assess personality,
127 aggressiveness, psychoticism, disinhibition, negative emotionality, and introversion. In
128 addition, two scales measure aesthetic-literary or mechanical-physical interests. Finally,
129 measures of psychopathology are organized hierarchically. The Higher-Order (H-O)
130 scales, which define the highest level, provide an organizational structure, the
131 Restructured Clinical (RC) scales, which are in an intermediate level and analyze
132 clinical features, and at the bottom of the hierarchy, the Specific Problems (SP) scales
133 that provide a more fully developed and detailed assessment. The H-O scales are three
134 scales for the assessment of emotional or internalization dysfunction, thought
135 dysfunction and behavioral or externalizing dysfunction. The RC scales, are a group of
136 9 scales that assess demoralization, somatic complaints, low positive emotions,
137 cynicism, antisocial behavior, ideas of persecution, dysfunctional negative emotions,
138 aberrant experiences, and hypomanic activation. The SP scales are 23 and they are
139 divided in four groups for the assessment of somatic/cognitive problems, internalizing
140 problems, externalizing problems, and interpersonal problems. Reliability and validity
141 of this instrument are good, and extensive data can be consulted in the MMPI-2-RF
142 Technical Manual (Tellegen & Ben-Porath, 2008/2009). T scores of ≥ 65 are considered
143 to be indicative of psychopathology (Tellegen & Ben-Porath, 2008/2009).

144 2.3. Procedure

145 All the participants were assessed with all the above-mentioned questionnaires
146 in a face-to-face interview. All the smokers gave their informed consent for
147 participation, and the study was authorized by the Bioethics Committee.

148 After the assessment, participants started the Smoking Cessation Program
149 (Becoña, 2007). It is a cognitive-behavioral intervention consisting of six sessions (one
150 per week) administered in groups made-up of 4-10 participants assigned according to

151 their availability. It contains the following elements: treatment contract, self-report and
152 graphic representation of cigarette consumption, information about tobacco, stimulus
153 control, activities to avoid the withdrawal syndrome, physiological feedback (CO in
154 expired air) on cigarette consumption, nicotine fading (change of cigarette brands each
155 week progressively decreasing the intake of nicotine and tar), and relapse-prevention
156 strategies.

157 Face to face follow-ups were conducted 6 and 12 months after treatment. In
158 those cases in which participants could not be located, they were considered to be
159 smokers.

160 2.4. Abstinence measures

161 We used the Micro⁺ Smokerlyzer ® (Bedfont Scientific Ltd, Sittingbourne, UK)
162 to measure carbon monoxide (CO) in expired air, to corroborate self-reported abstinence
163 at the end of treatment and at the 6- and 12-month follow-ups (cut-off point of < 10ppm
164 to be considered a non-smoker) (West, Hajek, Stead, & Stapleton, 2005). A participant
165 was considered abstinent when he or she reported not smoking for at least 24 hours at
166 the end of treatment, during the 7 days prior to the date of the 6-month follow-up, and
167 30 days prior to the 12-month follow-up (Velicer, Prochaska, Rossi, & Snow, 1992).

168 2.5. Statistical Analysis

169 To determine sample characteristics, we conducted descriptive statistical
170 analysis. To test the differences between abstainers and smokers at the end of treatment
171 and at the 6- and 12-month follow-ups, we used Pearson's chi-square statistic (Cramer's
172 V effect size was presented when chi-square was significant). We used binary logistic
173 regression analysis with a stepwise procedure to identify the predictive value of
174 psychopathology, assessed with the MMPI-2-RF scales adjusted for sociodemographic

175 characteristics and nicotine dependence, on smoking status (1 = Yes, 0 = No) at the end
176 of treatment and at 6- and 12-month follow-ups.

177 All analyses were performed with the SPSS software version 20. The
178 significance level was set at $\leq .05$.

179 **3. Results**

180 Treatment outcomes are reported in Table 2.

181 -----Table 2 about here-----

182 Bivariate analyses (Table 2) indicated that there were significant differences
183 according to age, nicotine dependence, and several scales of the MMPI-2-RF at the
184 different assessment time points. Sex, educational level, and social class were not
185 significant. With regard to the association between the MMPI-2-RF scales and smoking
186 status, participants with T -scores ≥ 65 on Emotional/ Internalizing Dysfunction (EID),
187 Demoralization (RCd), Ideas of Persecution (RC6), Malaise (MLS), Cognitive
188 Complaints (COG), Self-Doubt (SFD), Inefficacy (NFC), Anxiety (AXY),
189 Disaffiliativeness (DSF), and Psychoticism-Revised (PSYC-r) were more likely to
190 smoke at the end of treatment.

191 Regarding the 6- and 12-month follow-ups, there were a higher percentage of
192 smokers than non-smokers with T -scores ≥ 65 on Somatic Complaints (RC1) and
193 Neurological Complaints (NUC).

194 The results of the binary logistic regression adjusted for age and nicotine
195 dependence, showed that participants with T -scores < 65 on Disaffiliativeness (DSF)
196 (OR = 0.145) had a higher likelihood of smoking at the end of treatment. No scale was
197 significant in the prediction at the 6-month follow-up (Table 3). At the 12-month
198 follow-up, participants with a T -score ≥ 65 on Neurological complaints (NUC) (OR =
199 5.601) had a greater likelihood of smoking.

200 -----Table 3 about here-----

201 **4. Discussion**

202 The aim of the present study was to analyze the utility of the MMPI-2-RF scales,
203 as indicators of psychopathology, to predict the result of a treatment to quit smoking at
204 the end of treatment and at the 6- and 12-month follow-ups.

205 At the end of treatment, there was a relationship between continuing to smoke
206 and *T*-scores ≥ 65 on the scales EID, RCd, RC6, MLS, COG, SFD, NFC, AXY, DSF,
207 and PSYC-r. At the 6- and 12-month follow-ups, smoking was associated with *T*-scores
208 ≥ 65 on the RC1 and NUC scales. Moreover, *T* scores ≥ 65 on DSF predicted being
209 abstinent at the end of treatment, and *T* scores ≥ 65 on NUC predicted smoking at the
210 12-month follow-up.

211 These results differ from those of Ames et al. (2005) who found that high scores
212 on Scale 7 (Psychasthenia, Pt) and on Psychopathology Five-Negative
213 Emotionality/Neuroticism (NEGE), referred to as Dysfunctional Negative Emotions
214 (RC7) and Negative Emotionality/Neuroticism-revised (NEGE-r), respectively, in the
215 most recent version of the MMPI-2-RF, were predictive of a lower likelihood of
216 tobacco abstinence 6 months after receiving smoking cessation treatment. In contrast to
217 our study, these authors only used some of the MMPI scales to assess traits such as
218 anxiety, depression, pessimism, and neuroticism, which could explain the discrepancies
219 with our results.

220 It is difficult to make comparisons with previous studies because many of them
221 used very specific samples like people with a heart transplantation (Basile et al., 2004),
222 submarine crews (Tappan & Weybrew, 1982), or students (Andrucci et al., 1989; Evans
223 et al., 1967; Jaffe, & Archer, 1987; Lipkus et al., 1994). However, the above studies

224 found high levels of psychopathology, as indicated by high scores on the MMPI in
225 treatment seeking smokers (Ames et al., 2005; Cottraux et al., 1986).

226 Regarding the H-O scales, a T -score ≥ 65 on EID scale is related to not quitting
227 at the end of treatment. Van der Heijden et al. (2012) also found high mean scores on
228 this scale in 205 alcohol-dependent patients. These results could be a reflection of the
229 emotional distress of people requesting treatment for substance use (Grant, Stinson et
230 al., 2004), which could negatively affect treatment to quit smoking (Hitsman et al.,
231 2013).

232 Within the group of RC scales, at the end of treatment, the results showed that T -
233 scores ≥ 65 on RCd and RC6 are related to smoking. As noted by Forbey and Ben-
234 Porath (2007), people coming for substance abuse treatment often experience anxiety
235 and distress and, as a result, they obtain high scores on multiple clinical scales,
236 including some unexpected ones like the scale currently known as RC6, which is a
237 measure of ideas of persecution. Van der Heijden, Egger, Rossi, & Derksen (2012) also
238 found high mean scores on the RC6 scale in the sample of alcohol-dependent patients.
239 Although paranoid thoughts have been associated with the presence of psychotic
240 disorders (Purdon, Purser, & Goddard, 2011), they could be the result of ruminative
241 thinking (Brinker, Chin, & Wilkinson, 2014; Wolf et al., 2008), perhaps due to a low
242 mood or an underlying anxiety disorder, both frequent disorders in smokers (Grant,
243 Hasin, et al. 2004).

244 With regard to the 6- and 12-month follow-ups, high scores on the RC1 scale
245 were related to smoking, as Forbey and Ben-Porath (2007) had found in their study with
246 people in treatment for substance abuse. This scale assesses physical health problems.
247 Forbey and Ben-Porath concluded that the high scores were due to the age of the
248 participants of the sample ($M = 44.4$, $SD = 8.34$), which could be applicable to our

249 sample ($M = 41.80$, $SD = 10.78$). It is known that smokers have a poorer physical
250 health-related quality of life compared to never smokers or former smokers (Tian et al.,
251 2016).

252 Within the SP scales, high scores on MLS, COG, SFD, NFC, AXY, and DSF
253 were associated with smoking at the end of treatment, and the NUC scale was related to
254 smoking at the 6- and 12-month follow-ups. These results cannot be compared with
255 previous studies because, so far, no study has used the SP scales to assess smokers or
256 people who use other substances. We found that a T -score < 65 on DSF was associated
257 with a greater likelihood of smoking at the end of treatment, and a T -score ≥ 65 on NUC
258 was associated with a greater likelihood of smoking at the 12-month follow-up.

259 High scores on DSF describe a person who dislikes people or being around them
260 (Tellegen & Ben-Porath, 2008/2009), and this scale has been linked to schizoid
261 personality disorder (Ayearst et al., 2013; Ben-Porath, 2012; Tellegen & Ben-Porath,
262 2008/2009). Piñeiro, Fernández del Río, López-Durán, Martínez, and Becoña (2013)
263 found that people with schizoid personality disorder were more likely to maintain
264 abstinence at the 6- and 12-month follow-ups after smoking cessation treatment. Also,
265 Becoña, Fernández del Río, López-Durán, Piñeiro, and Martínez (2013) found that
266 people with schizoid personality disorder were less likely to be nicotine-dependent
267 smokers in a study with smokers of the general population. They concluded that
268 smokers with schizoid personality disorder are more likely to experiment with tobacco
269 but less likely to be dependent, which increases the likelihood of success when quitting
270 (Fiore et al., 2008). In addition, schizoid personality disorder is characterized by a low
271 need for stimulation (Ekleberry, 2009; Samuel & Widiger, 2008) and for social
272 relations, which would reduce the importance of social pressure to consume tobacco

273 (Piñeiro et al., 2013) and would therefore present fewer problems to stop smoking and
274 remain abstinent.

275 Regarding the NUC scale, T -scores ≥ 65 predicted smoking at the 12-month
276 follow-up. It has been suggested that a high score on this scale does not necessarily
277 imply a neurological impairment (Ben-Porath, 2012; Bolinger, Reese, Suhr, & Larrabee,
278 2014) but rather the presence of somatic and psychological problems (Bolinger et al.,
279 2014). In fact, high scores on this scale in patients with major depressive disorder have
280 been found (Sellbom, Bagby, Kushner, Quilty, & Ayearst, 2012), and a positive
281 correlation with rumination (Brinker et al., 2014), so it is possible that the relationship
282 between high scores on the NUC scale and smoking is due to negative mood rather than
283 to a neurological impairment.

284 Finally, in the PSY-5 scales, we found an association between T -scores ≥ 65 on
285 PSYC-r and tobacco consumption. Ames et al. (2005) used the Negative
286 Emotionality/Neuroticism (NEGE) scale as a measure of neuroticism, finding that high
287 scores on this scale were predictors of tobacco use 6 months after smoking cessation
288 treatment. However, these authors did not use the other PSY-5 scales in their study. In
289 our study, it is likely that the results are consistent with our previous comments about
290 the relationship between persecutory ideas and low affect (Brinker et al., 2014; Wolf et
291 al., 2008). Freeman (2007) estimates that between 10% and 15% of the general
292 population experience paranoid thoughts regularly and, based on reviewed studies, this
293 could be due to negative affect and anxiety. We also now know that there is a
294 relationship between negative affect and anxiety and smoking (Grant, Hasin et al.,
295 2004), which could explain why people with high scores on this scale are more likely to
296 smoke.

297 This study is not without limitations. The ability to generalize the results to
298 smokers from the general population is limited because we used a clinical sample of
299 patients who received an intervention to quit smoking. This type of sample has different
300 characteristics, for example, a greater nicotine dependence (Fagerström et al., 1996).
301 Additionally, the data are based on a self-report questionnaire, although the nine
302 Validity scales allow reducing biases such as social desirability or distortions of recall.
303 In addition, the MMPI-2-RF is a screening tool that does not allow performing
304 diagnoses. Moreover, we could not establish comparisons with other studies on the
305 relationship between psychopathology assessed with this instrument and tobacco use,
306 due to its recent publication. Finally, participants with a severe mental disorder were
307 excluded from the total sample, as they follow a different smoking cessation treatment
308 protocol with more sessions.

309 Despite these limitations, this study adds more knowledge about the MMPI-2-
310 RF and shows its utility in the field of the treatment of tobacco use. In addition, we used
311 a sample of smokers who attended a psychological treatment to quit smoking and who
312 were assessed longitudinally for one year, using biochemical validation of tobacco
313 abstinence (CO).

314 **5. Conclusion**

315 The results of this study indicate that the MMPI-2-RF is a suitable instrument for
316 the assessment of psychopathology and the prediction of the results of a treatment to
317 quit smoking. Therefore, it can be important for the design and improved outcomes of
318 treatments to quit smoking in future studies.

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323 **7. References**

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Table 1. Sociodemographic characteristics of the sample of smokers ($N = 281$).

	Mean	<i>SD</i>
Age	41.80	10.78
	n	%
Age (grouped)		
≤ 40	123	43.8
> 40	158	56.2
Gender		
Male	111	39.5
Female	170	60.5
Marital status		
Single	94	33.5
Married/living with partner	146	52.0
Separated or divorced	33	11.7
Widowed	8	2.8
Educational level		
Elementary	65	23.1
Middle studies	96	34.2
Higher studies	120	42.7
Social class		
Low	66	23.5
Medium	188	66.9
High	27	9.6

Table 2. Comparison of age, nicotine dependence, and MMPI-2-RF scales between smokers and abstainers at the end of treatment and at the 6- and 12- months follow-ups.

	End of treatment						6-month follow-up						12-month follow-up					
	Smokers		Abstainers		χ^2	Cramer's V	Smokers		Abstainers		χ^2	Cramer's V	Smokers		Abstainers		χ^2	Cramer's V
	(n = 106)		(n = 175)				(n = 188)		(n = 93)				(n = 202)		(n = 79)			
	n	%	n	%			n	%	n	%			n	%	n	%		
Age																		
≤ 40	34	27.6	89	72.4	9.46**	0.18**	79	62.4	44	35.8	0.71		85	69.1	38	30.9	0.84	
> 40	72	45.6	86	54.4			109	69.0	49	31.0			117	74.1	41	25.9		
FTND																		
< 6	42	28.2	107	71.8	12.27***	0.21***	86	57.7	63	42.3	12.09**	0.21**	99	66.4	50	33.6	4.65*	0.13*
≥ 6	64	48.5	68	51.5			102	77.3	30	22.7			103	78.0	29	22.0		
MMPI-2-RF (T ≥ 65)																		
EID	24	22.6	23	13.1	4.28*	0.12*	34	18.1	13	14.0	0.75		38	18.8	9	11.4	2.24	
RCd	26	24.5	23	13.1	5.94*	0.15*	37	19.7	12	12.9	1.99		40	19.8	9	11.4	2.79	
RC1	28	26.4	30	17.1	3.47		46	24.5	12	12.9	5.08*	0.13*	48	23.8	10	12.7	4.28*	0.12*
RC6	13	12.3	6	3.4	8.18**	0.17**	15	8.0	4	4.3	1.34		16	7.9	3	3.8	1.53	
MLS	28	26.4	29	16.6	3.96*	0.12*	43	22.9	14	15.1	2.35		44	21.8	13	16.5	0.99	
NUC	21	19.8	21	12.0	3.17		35	18.6	7	7.5	6.02*	0.15*	39	19.3	3	3.8	10.75**	0.20**

COG	27	25.5	23	13.1	6.86**	0.16**	39	20.7	11	11.8	3.38	41	20.3	9	11.4	3.09
SFD	20	18.9	17	9.7	4.83*	0.14*	28	14.9	9	9.7	1.48	29	14.4	8	10.1	0.89
NFC	19	17.9	14	8.0	6.27*	0.15*	26	13.8	7	7.5	2.39	25	12.4	8	10.1	0.28
AXY	21	19.8	17	9.7	5.76*	0.14*	28	14.9	10	10.8	0.91	31	15.3	7	8.9	2.04
DSF	13	12.3	3	1.7	13.68***	0.22***	13	6.9	3	3.2	1.58	14	6.9	2	2.5	2.05
PSYC-r	7	6.6	2	1.1	6.35*	0.15	8	4.3	1	1.1	2.03	9	4.5	0	0.0	3.64

(1) Fisher's exact test was used when the expected values of at least 20% of the cells were less than 5.

EID: Emotional/Internalizing Dysfunction; RDd: Demoralization; RC1: Somatic Complaints; RC6: Ideas of Persecution; MLS: Malaise; NUC: Neurological Complaints; COG: Cognitive Complaints; SFD: Self-Doubt; NFC: Inefficacy; AXY: Anxiety; DSF: Disaffiliativeness; PSYC-r: Psychoticism-Revised.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .00$.

1 Table 3. Variables predicting smoking at the end of treatment and at the 12-month
 2 follow-up.

	AOR	95% CI	p-value
End of treatment			
DSF ($T \geq 65$)	0.15	0.035-0.604	.008
12-month follow-up			
NUC ($T \geq 65$)	5.60	1.476-21-250	.011

3 AOR: Adjusted Odd Ratio for age and initial level of nicotine dependence.

4 DSF: Disaffiliativeness; NUC: Neurological Complaints

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