

## Smoking habit profile and health-related quality of life

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### Abstract

**Background:** Few studies have investigated the relationship between smoking and health-related quality of life (HRQOL), and the results are not consistent. The aim of this study is to explore the association between smoking and HRQOL. **Method:** Cross-sectional study of 714 Spanish adults (44.7% never smokers and 55.3% smokers) without diagnosis of physical or mental disorder. Each participant provided information about different sociodemographic variables and data on HRQOL. Smokers also reported smoking-related information about smoking-related variables. **Results:** Nicotine dependence was not associated with the physical dimension of HRQOL, but in the mental component, nicotine dependent smokers showed worse HRQOL than never smokers ( $p = 0.004$ ) and than non-nicotine dependent smokers ( $p = 0.014$ ). There were no differences between non-nicotine dependent smokers and never smokers. Smoking status (non smokers vs. smokers), number of cigarettes smoked per day, stage of change, quit attempts in the past year or age of smoking onset were not related to HRQOL. **Conclusions:** In subjects without physical or mental diseases, only nicotine dependent smokers showed a significant impairment in the mental component of HRQOL. Therefore, it is important to consider nicotine dependence in the relationship between smoking and HRQOL.

**Keywords:** Quality of life, nicotine dependence, smoking.

### Resumen

**Perfil de tabaquismo y calidad de vida relacionada con la salud.** **Antecedentes:** pocos estudios han investigado la relación entre tabaquismo y calidad de vida relacionada con la salud (CVRS) y los resultados han sido discrepantes. El objetivo de este trabajo es analizar la relación entre consumo de tabaco y CVRS. **Método:** estudio transversal en el que participaron 714 adultos (44,7% no fumadores y 55,3% fumadores) sin diagnóstico de enfermedad física o mental. De cada participante se recogieron datos sociodemográficos y de CVRS, y de los fumadores también se recogió información sobre distintas variables relacionadas con el consumo de tabaco. **Resultados:** la dependencia de la nicotina no se asoció a la dimensión física de CVRS, pero en la dimensión mental los fumadores dependientes mostraron peor CVRS que los no fumadores ( $p = 0.004$ ) y que los fumadores sin dependencia ( $p = 0.014$ ). No se encontraron diferencias en función del número de cigarrillos fumados diariamente, el estadio de cambio, los intentos de abandono o la edad de inicio en el consumo de tabaco. **Conclusiones:** en personas sin diagnóstico de enfermedad física o mental solo los fumadores dependientes de la nicotina muestran deterioro en la dimensión mental de la CVRS. Es importante considerar el grado de dependencia de la nicotina en la relación entre consumo de tabaco y CVRS.

**Palabras clave:** calidad de vida, dependencia de la nicotina, tabaco.

Smoking is a well-known cause of many diseases associated with high mortality, morbidity and disability (United States Department of Health and Human Services, 2004), but only a few studies have investigated how smoking affects other aspects of health such as health-related quality of life (HRQOL). Studies in northern European countries (Laaksonen, Rahkonen, Martikainen, Karvonen, & Lahelma, 2006; Mulder, Tijhuis, Smit, & Kromhout, 2001; Tillmann & Silcock, 1997; Vogl, Wenig, Leidl, & Pokhrel, 2012), USA (McClave, Dube, Strine, & Mokdad, 2009; Mody & Smith, 2006; Strine et al., 2005) and Australia (Wilson, Parsons, & Wakefield, 1999) have revealed that there are statistically significant associations between smoking and HRQOL, particularly for general health and mental dimensions, but similar studies in

Japan have found no differences in HRQOL between smokers and non-smokers (Funahashi et al., 2011). In Spain, studies have shown discordant results. Cayuela, Rodríguez, Domínguez & Otero (2007), and De Miguel-Díez et al. (2010) found that smokers presented a poorer HRQOL than non-smokers, but Bellido-Casado et al. (2004) did not find any differences on the HRQOL between smokers and non-smokers.

Among the discrepancies among studies, different smoking prevalence rates in the studied populations could be involved, because as prevalence decreases, the profile of the smokers differs more of than that of the general population both in psychological and physical characteristics (Fagerström et al., 1996).

The relationship between smoking and poor HRQOL reported in some previous surveys of the general population can be potentially influenced by unrecognized smoking-related physical disorders (Martínez et al., 2004), because some illnesses are more prevalent among smokers than among non-smokers (Center for Disease Control and Prevention, 2007). Moreover, a higher proportion of individuals with mental health disorders smoke compared with the general population without mental disorders (Jorm, 1999;

Lasser et al., 2000), and it is not clear whether the poorer quality of life found in smokers was caused by cigarette smoking per se or whether, on the other hand, it could be attributed to their pre-existing higher psychiatric morbidity (Raciti, Di María, & Polosa, 2005). Although some studies have controlled for the influence of physical smoking-related disorders reported by smokers (Cayuela et al., 2007; Funahashi et al., 2011; Martínez et al., 2004; Mulder et al., 2001), to our knowledge, there have been no studies to date in which mental illness is controlled as a potential confounding factor.

On the other hand, to determine the effect of smoking on HRQOL, it is necessary to consider that the population of smokers is not homogeneous (Wilson, Taylor, & Roberts, 1995) and it is possible that smoking affects HRQOL only in those smokers who present a specific profile of smoking habit. Different smoking-related variables have been associated with smokers' HRQOL. The number of cigarettes smoked is the variable that has received most attention in the literature, with heavy smokers (a person who smokes 25 or more cigarettes per day) (United States Department of Health and Human Services, 1989) showing poorer HRQOL (Mulder et al., 2001; Sarna, Bialous, Cooley, Jun, & Feskanich, 2008; Vogl et al., 2012; Wilson et al., 1999, 2004). The association between nicotine dependence and HRQOL has been examined in two studies (Davila et al., 2011; Schmitz, Kruse, & Kugler, 2003) showing that greater dependence was associated with poorer HRQOL. The influence of other variables referring to smoking has only been examined sporadically. McClave et al. (2009) found that smokers who unsuccessfully attempted to quit in the previous year were more likely to report worse HRQOL than current smokers who made no attempts to quit; early onset of regular smoking was associated with worse HRQOL scores in the study by Bass, Wilson, and Griffith (2004), and in the study by Grau, Font-Mayolas, Gras, Suárez, and Noguera (2007), smokers in contemplation and preparation stages (close to smoking cessation) show a worse HRQOL than smokers in precontemplation stage (with no intent to change). Nevertheless, it is necessary to consider that these smoking-related variables have been associated with a higher prevalence of physical or mental illness. Heavy smokers have more risk of suffering the adverse effects of smoking in their physical health (Doll, Peto, Wheatley, Gray, & Sutherland, 1994), thus trying to quit smoking is positively associated with the presence of physical illness (Schiller & Ni, 2006). On the other hand, nicotine dependence and early age at smoking onset have been associated with a higher prevalence of mental disorders (Castro, Matsuo, & Nunes, 2010; Schmitz et al., 2003). More research is required to determine the specific contribution of the smoking habit profile on the impact of smokers' HRQOL, controlling for the possible confounding effect of physical and mental illness.

The aim of this study is to provide information on the association between smoking and HRQOL according smoking habit profile in an adult Spanish population without physical and psychological morbidity.

## Method

### Participants

We used an initial representative sample of 1,096 adults from 13 cities in Galicia (Spain) stratified by the status of smoker-non-smoker (about 50% each status), gender (male, female) and age

(18-35, 36-54 and 55 or over), who participated in a study designed to determine the differences between smokers and non-smokers in personality patterns. The initial sample was composed by 52.6% non-smokers ( $n = 577$ ) and 47.4% smokers ( $n = 519$ ). Complete details of the selection procedure have been previously published (Becoña et al., in press). All participants responded to interview questions about smoking (whether they had ever smoked tobacco cigarettes, number of cigarettes smoked per day and when they had smoked their last cigarette), and about diagnoses of physical and mental disorders. Data on the existence of disorders were categorized into "without disorder" or "with disorder" (having any current physical or mental disorder diagnosed by a physician).

Subjects included in this study were never smokers (who never smoked before) and current smokers (smoke at least one cigarette per day over the previous 30 days). No current diagnosis of physical or mental disorder was present in the groups.

Of the 1,096 individuals of the initial sample, 234 with a diagnosis of physical disease, 29 with a diagnosis of mental disorder and 18 with comorbidity of physical and mental disorders were excluded from the study. Of the 815 remaining subjects, 86 subjects who were daily smokers but did not smoke at the moment of the study, four occasional smokers (people who had smoked at least 1 cigarette, but not daily, in the last month) and 11 subjects whose data were incomplete were also excluded from the study. The final sample was composed of 714 participants, of whom 55.3% were current daily smokers ( $n = 395$ ) and 44.7% ( $n = 319$ ) were never smokers.

### Instruments

Participants responded to an ad hoc questionnaire, providing information on different sociodemographic variables (age, gender, marital status and educational level).

Data on HRQOL were obtained using the *SF-12v2 Health Survey* (Ware, Kosinski, & Keller, 1996), which consists of 12 questions selected from the SF-36 (Ware & Sherbourne, 1992). The SF-12v2 assesses 8 domains: physical functioning, role limitations due to physical problems, bodily pain, general health perceptions, energy and vitality, social functioning, role limitations due to emotional problems, and mental health. These eight domains can be further summarized into two summary scores: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). PCS and MCS scores are calculated using the standard method with a mean of 50 ( $SD = 10$ ); higher scores indicate better functioning.

Those participants categorized as smokers also responded to questions about the number and brand of cigarettes smoked daily, age at first cigarette and age of onset of smoking regularly, and quit attempts during the previous year. We also considered nicotine dependence level and the degree of motivation to quit smoking. Assessment of nicotine dependence was carried out by the *Fagerström Test for Nicotine Dependence (FTND)* (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). This instrument is made up of six items and scored from 0 to 10. A score of 6 or more indicates nicotine dependence.

The degree of motivation to give up smoking was assessed with the *Stages of Change Questionnaire* (Prochaska, Diclemente, & Norcross, 1992). The precontemplation stage corresponded to smokers who were not thinking of quitting within the next 6 months. The contemplation stage corresponded to those who were

planning to quit within the next 6 months. The preparation stage corresponded to those who were planning to quit in the next 30 days and had had at least one 24-hour quit attempt within the past year.

### Procedure

The variables assessed were collected through anonymous interviews carried out face to face in the home of the participants by psychologists especially trained for this purpose between June 2009 and July 2010. The study was authorized by the Bioethics Committee of the University of Santiago de Compostela (Galicia, Spain).

### Data analysis

PCS and MCS scores were standardized by age and sex using data of general Spanish population of the SF-12v2 (Monteagudo, Hernando, & Palomar, 2011). Standard scores for the two summaries (PCSs and MCSs) were calculated by dividing the difference between a person's score and the mean score by the standard deviation of the general population of the same sex and age (in 10-year intervals). Thus, the score for any participant in the study is expressed as standard deviation units with respect to the estimated means for the Spanish population, expressing the effect size. Negative values denote a poorer HRQOL than the reference population, whereas positive values denote a better HRQOL. According to Kazis, Anderson, and Meenan (1989), an effect size of 0.2 is described as small, an effect size of 0.5 as moderate and an effect size of 0.8 or greater as large.

The relationship between categorical variables was analyzed by means of the Pearson Chi-square test, and between quantitative variables by means of one-way ANOVA. The effect of smoking status according to smoking-related variables on HRQOL was analyzed using a general linear model. To assess whether the means were significantly different (defined as a two-tailed  $p$  value  $<0.05$ ) we used Scheffé as a post hoc test.

SPSS 18.0 for Windows was used for all the analyses, and statistical significance was set at  $p < 0.05$ .

## Results

Sociodemographic characteristics and HRQOL data by smoking status (never smokers vs. smokers) are shown in Table 1. We found no differences between the groups in sociodemographic characteristics or in physical and mental dimensions of HRQOL.

Considering smoking-related variables in the group of smokers, 11.4% smoked 25 cigarettes or more per day ( $M = 15.4$ ,  $SD = 9.1$ ), and according to the FTND, 8.3% of the smokers were nicotine-dependent (score  $\geq 6$ ). A total of 8.6% had begun to smoke regularly before the age of 15. At the time of the interview, 33.2% were at the contemplation stage, and 43.0% had made at least one quit attempt in the previous year.

In the physical dimension of HRQOL, all smokers, regardless of their smoking habit profile, showed higher values than the Spanish reference population with effect sizes between 0.28 in smokers of more than 25 cigarettes a day, and 0.41 in smokers who had made a quit attempt in the past year. In the mental dimension, all smokers presented similar values to the Spanish reference population with a small effect size ( $<0.20$ ), with the exception of smokers who started the consumption of cigarettes before the age

of 15 years and the smokers who were nicotine-dependent, who showed a worse HRQOL than the general population with an effect size near to moderate (see Table 2).

When analyzing the differences in HRQOL between never smokers and smokers according to smoking-related variables,

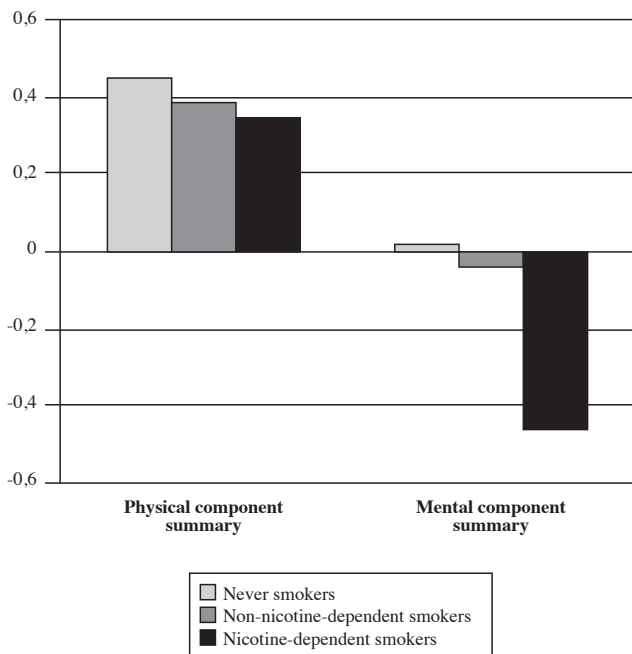
*Table 1*  
Sociodemographic characteristics and standardized scores of physical component summary and mental component summary by smoking status

	Never smokers n = 319	Smokers n = 395
Age		
Mean $\pm$ SD	40.8 $\pm$ 16.5	41.0 $\pm$ 14.9
(range)	(18-90)	(18-82)
Sex		
Men n (%)	154 (48.3)	212 (53.7)
Women n (%)	165 (51.7)	183 (46.3)
Level of education completed		
Elementary school n (%)	132 (41.4)	148 (37.5)
High school n (%)	130 (40.8)	171 (43.3)
College n (%)	57 (17.9)	76 (19.2)
Marital status		
Single/widowed/divorced/separated n (%)	154 (48.3)	178 (45.1)
Married/couple n (%)	165 (51.7)	217 (54.9)
Physical component summary		
Mean $\pm$ SD	0.45 $\pm$ 0.62	0.39 $\pm$ 0.63
(range)	(-4.26 to 2.09)	(-3.27 to 1.79)
Mental component summary		
Mean $\pm$ SD	0.02 $\pm$ 0.71	-0.07 $\pm$ 0.87
(range)	(-3.54 to 1.35)	(-3.47 to 1.50)

*Table 2*  
Standardized scores of physical component summary and mental component summary of smokers according to smoking-related variables

	Physical component summary	Mental component summary
	Mean $\pm$ SD	Mean $\pm$ SD
Number cigarettes day		
< 25 (n = 350)	0.40 $\pm$ 0.64	-0.06 $\pm$ 0.84
$\geq 25$ (n = 45)	0.28 $\pm$ 0.56	-0.15 $\pm$ 1.05
Nicotine dependence (FTND)		
No dependence (n = 362)	0.39 $\pm$ 0.62	-0.04 $\pm$ 0.82
Dependence (n = 33)	0.35 $\pm$ 0.74	-0.46 $\pm$ 1.26
Age at smoking onset		
< 15 years (n = 34)	0.31 $\pm$ 0.76	-0.34 $\pm$ 1.03
$\geq 15$ years (n = 361)	0.39 $\pm$ 0.63	-0.05 $\pm$ 0.85
Stage of change		
Precontemplation (n = 264)	0.39 $\pm$ 0.65	-0.04 $\pm$ 0.83
Contemplation/Preparation (n = 131)	0.38 $\pm$ 0.60	-0.14 $\pm$ 0.93
Quit attempts previous year		
None (n = 225)	0.37 $\pm$ 0.65	-0.02 $\pm$ 0.85
1 or more (n = 170)	0.41 $\pm$ 0.61	-0.15 $\pm$ 0.89

we found no statistically significant differences in PCSs or MCSs according to number of cigarettes smoked per day, stage of change to quite smoking, quit attempts to give up smoking or age of smoking onset. Considering nicotine dependence level, no differences were found in PCSs, but differences were statistically significant in MCSs ( $p = 0.006$ ). Never smokers and non-nicotine-dependent-smokers showed similar scores to the Spanish population of reference but the mean of nicotine-dependent smokers was lower (worse HRQOL) than that of the Spanish population of reference, and the effect size approached moderate (see Figure 1). The scores of nicotine-dependent smokers were statistically different from those of non-nicotine-dependent smokers ( $p = 0.014$ ) and never smokers ( $p = 0.004$ ). We found no differences between non-nicotine-dependent smokers and never smokers.



**Figure 1.** Mean scores for standardized physical component summary and standardized mental component summary for never smokers, non-nicotine-dependent smokers and nicotine-dependent smokers

### Discussion

In this study, we found no differences considering the total sample of current smokers and never smokers in HRQOL when controlling for physical and mental disorders as possible confounding factors. However, when we compare groups of never smokers and smokers attending to the smoking habit profile, the mental dimension of the HRQOL is shown to be more frequently impaired among nicotine-dependent smokers in comparison with never smokers and non-nicotine-dependent smokers.

The lack of significant differences between never smokers and current smokers in this study in HRQOL could be partially due to the control of the physical and mental disorders. Previous research has shown that some chronic physical illnesses or psychiatric disorders are more prevalent in smokers (Center for Disease Control and Prevention, 2007; Jorm, 1999; Lasser et al., 2000). People with physical or mental diseases may have poor quality of life because of the underlying diseases and not because of their

smoking status, and it may be a confounder in the relationship between smoking behavior and quality of life. Although Cayuela et al. (2007) and Martínez et al. (2004) have reported that even without chronic physical illness, smokers may have a worse HRQOL than individuals without this habit, in these studies, the presence of mental illness was not controlled, which, as shown in other studies (Häuser, Holtmann, & Grandt, 2004; Mok, Lok, & Cheung, 2012), may impair both the physical and mental dimensions of the HRQOL.

On the other hand, it should be pointed out that smokers constitute a heterogeneous group according to smoking-related variables, and the differences between smokers and non-smokers could be attributed only to a subgroup of smokers who present a specific tobacco habit profile. In this study, we explored the effects of different smoking-related variables on HRQOL. Number of cigarettes smoked, stage of change, quit attempts or age of smoking onset did not relate to a worse HRQOL, either in the physical or mental dimensions. Our results differ from those obtained in previous research (Bass et al., 2004; Grau et al., 2007; McClave et al., 2009; Mulder et al., 2001; Sarna et al., 2008; Vogl et al., 2012; Wilson et al., 1999, 2004), probably because these smoking-related variables have been associated with a higher prevalence of physical or mental illness and, in this study, the presence of comorbidity as a potential confounding was controlled.

Related to the nicotine dependence level, no differences were found in the physical dimension of the HRQOL. All groups (never smokers, non-nicotine-dependent smokers and nicotine-dependent smokers) showed higher values than the Spanish general population, which could be explained due to the use of a sample of healthy adults. However, nicotine dependence was associated with a worse HRQOL in the mental dimension. Nicotine-dependent smokers reflected an important impact in HRQOL, whereas non-nicotine-dependent smokers showed similar values to never smokers and to the Spanish general population of reference. Our data agree with those of Davila et al. (2011), who found that greater nicotine dependence was associated with poor HRQOL in smokers, and with those of Schmitz et al. (2003) showing that nicotine-dependent smokers reported poorer quality of life than non-smokers and than current non-nicotine-dependent smokers. It is important to consider that, in the study of Davila et al. (2011), data on mental health conditions are not available, and in the study conducted by Schmitz et al. (2003), affective and anxiety disorders were almost twice as common among nicotine-dependent smokers than among non-nicotine-dependent smokers and non-smokers. In our study, even controlling for mental disorders, being nicotine-dependent is associated with a worse mental dimension of the HRQOL. There are various possible explanations for these results. People who have trouble coping with stress, low self-esteem and a predisposition to adopt a poor lifestyle might be more vulnerable to dependence (Zullig, Valois, Huebner, Oeltmann, & Drane, 2001), and these characteristics have also been related to a poor HRQOL (Duvdevany, 2010; Hesselink et al., 2004; Strine et al., 2005). On the other hand, nicotine dependence may also cause a vicious circle. Not being able to quit can be stressful, which can increase emotional distress (Schmitz et al., 2003). The hypothetical explanations for our data are matters for further exploration in future research.

The present findings should be considered in the context of several limitations. First, this study was cross-sectional, and no conclusions about causality can be drawn from our results. Second,

data referring to physical and mental illness were provided by the participants and in the context of an interview, with all the implications this has regarding memory errors, tendency to provide socially acceptable responses or participants not knowing they present a disorder. Finally, it may also be that the SF-12v2 is not sensitive enough to detect minor sub-clinical changes in smokers' health status. Furthermore, we considered only the physical and mental components globally of quality of life, so that it is not possible to detect how a specific HRQOL domain might be affected.

In summary, in this study among subjects without physical and mental disease, only nicotine-dependent smokers show impairment in the mental dimension of HRQOL. It is important to distinguish which smokers are nicotine-dependent to determine the status of HRQOL in a population, as it is possible that nicotine dependence plays an important role in the assessment of HRQOL in populations of smokers. On the other hand, focusing only on smoking or other smoking-related variables such as number of cigarettes smoked per day, stage of change, quit attempts or age of smoking onset may not be enough to identify groups in the population that present a higher affectation of the HRQOL. Future studies should examine in more depth the relationship between nicotine dependence and the

different physical and mental dimensions that form the HRQOL, not only controlling for the presence of physical illness and mental disorders as potential confounding factors, but also considering the effect of the affective state of the present moment in the perception of the quality of life (the "affective fallacy"), taking into account its importance as a predictor of the ratings of life satisfaction, as was noted in previous studies in populations with other addictive behaviors (Martínez-González, Graña-Gómez, & Trujillo-Mendoza, 2010).

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