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Abstract

Smoking is one of the main preventable causes of death in the world. There are several first-line pharmacological treatments available for smoking cessation. However, they are not very popular amongst smokers. There is evidence that smokers may not value these therapies in accordance with the scientific evidence. This paper provides evidence about the impact of subjective perceptions on the decision to use pharmacological treatments for smoking cessation and on the value that people place on these treatments. We conducted telephone interviews with 2011 members of the Spanish population (785 smokers, 590 ex-smokers and 636 never-smokers). We found that a large proportion of subjects (70% smokers, 67% ex-smokers and 59% never-smokers) did not show a positive willingness to pay for these therapies. The basic reason for refusing to pay anything at all was that they did not believe the therapies were effective. Mean willingness to pay (for those with a positive willingness to pay) was very similar for the three groups (€223/month for smokers, €225/month for ex-smokers and €213/month for never-smokers). We discuss whether social policy can be based on distorted preferences. We argue that Libertarian Paternalism can be used to guide social policy in the area of tobacco addiction.

Keywords: willingness to pay, smoking cessation therapies, biases, libertarian paternalism

Smoking is one of the main preventable causes of death in the world. At present, it is responsible for more than 6 million deaths per year1. The health care costs associated with treatment of smoking-related diseases are substantial, reaching $193 billion in the United States[2], £5.2 billion in the United Kingdom3, and €3.919 billion in Spain[4].

Three first-line pharmacological treatments are available for smoking cessation: nicotine replacement therapy (chewing gum, patches, and nicotine tablets), bupropion, and varenicline. The National Institute for Health and Clinical Excellence[5] (NICE) (National Institute for Health and Clinical Excellence, 2007) and the Canadian Agency for Drugs and Technologies in Health[6] (CADTH) have both acknowledged that all these treatments are effective and cost-effective. More specifically, the CADTH report stresses that "if a drug plan's threshold to pay for an additional quality-adjusted life year (QALY) is at least $4,000 to $10,000 (depending on age and gender), varenicline would be the most cost-effective option". However, there is considerable evidence that some smokers may not value these treatments properly. For example, one survey[7] asked 1076 adults which treatments they thought to be effective for quitting smoking. The percentage of respondents who thought that nicotine replacement therapy was effective (evidence-based) was very similar to the percentage that thought that hypnosis sessions were effective (non–evidence-based). Similarly, in other studies, a majority of smokers stated that nicotine replacement therapy was as damaging for health as smoking itself[8] or that it was not effective[9],[10] .

There is little evidence on the impact of these subjective perceptions on the decision to use pharmacological treatments for smoking cessation and on the value that people place on these treatments. The main objective of this paper is to fill this gap. In this manuscript we report the results of a survey conducted in Spain in order to study how the attitudes and perceptions of smokers influence their decision to consume smoking cessation medication and to measure the monetary value they assign to these medications. The method used to determine the monetary value of smoking cessation medication was contingent valuation. This method measures the value of a product contingent on the description of a hypothetical market in a survey. The value of the product is estimated by asking respondents about their willingness to pay (WTP) for it.

If total WTP is larger than total costs, we say that the medicine passes the cost-benefit test and it should be publicly funded. Although contingent valuation is increasingly used to value several types of health technologies[11] its application in the valuation of smoking cessation therapies has been scant. We know of only 3 studies that have addressed the topic[12,13,14]. Busch et al[12] found that 84% of smokers enrolled in a clinical trial were prepared to pay for a hypothetical treatment that was more effective than the usual one. One limitation of this study is that respondents were volunteers in a trial and this may have led to an overestimate of the social support of these treatments. Halpin, McMenamin & Shade[13] interviewed a group of 400 adult Californians under age 64 with employer-based health insurance. They questioned subjects a) if health insurance companies in California should be required to cover stop-smoking medicines and programs as part of their standard health plans, b) if they would accept a $3 increase in their annual premium to include tobacco dependence treatments in the health plan. The percentage of people responding affirmatively to both questions was 62% and 56% respectively. Those who perceived smoking as an addiction and those who assessed treatments as effective, had a higher probability of responding affirmatively. One limitation of this study is that the percentage of smokers was very small (14%). Also, the paper did not estimate total willingness to pay (WTP). Lastly, Weimer et al[14] (2009) interviewed a group of more than 6,300 smokers by Internet in order to estimate WTP for a hypothetical treatment that was completely effective in eliminating addiction and had no side effects. Although assumptions of complete effectiveness and no adverse effects were useful in their paper, they are not realistic and, therefore, not very suitable for measuring the monetary value of real smoking cessation therapies, which is the objective of this paper. Having this in mind, about 70% of smokers interviewed were willing to pay at least $50 per year in order to get this medicine.

Our study shares some of the characteristics of the studies mentioned above, although it is different in several respects. To some extent, it is similar to[13] but it has some distinctive features. First, smokers are much more represented in our survey. Second, it elicits total WTP and not only whether subjects are willing to pay a certain amount or

not. Third, it includes more attitudinal questions toward smoking cessation therapies and tries to link those attitudes to individual decisions. In short, this study tries to respond to the following questions:

1. Do subjects have a positive attitude to smoking cessation medication? In other words, *do they see it has having a positive (net) marginal benefit?*

2. For those who have a positive opinion of these medications, *how much do they value these medications?* How much are they willing to pay?

In order to answer the above questions, we surveyed a Spanish population. In the next section we describe the methods and procedures used. We then present the results and the discussion closes the paper.

Methods

Survey type, sample, and setting

The survey was a computer-aided telephone survey carried out by a professional survey organization, located in Barcelona, between 11 March and 3 April, 2009. The target population comprised persons aged more than 18 years, living in Spain. Sampling was multistage: primary sampling units were selected according to Autonomous Community and smoking status (40% smokers), and secondary sampling units were selected using age and sex quotas. A total of 2011 interviews were carried out. The margin of error for the unfavourable hypothesis of p=q=50% and a confidence interval of 95.5% was ±2.19% for the whole sample. The mean duration of the interview was 15 minutes.

Structure of the survey

An initial question was asked in order to assign each respondent to one of 3 possible categories: smokers, never-smokers and ex-smokers. Every attempt was made to ensure that the questions were as similar as possible in the 3 types of questionnaires.

The 3 questionnaires followed the same structure and comprised 4 sections. The first section aimed to obtain information such as the smoking habits of smokers, their attitude to smoking, and their motivation for quitting. The second section asked about respondents' knowledge of smoking cessation medication available in Spain and of their use. The 3 drugs considered were nicotine patches, bupropion, and varenicline. Respondents were asked a) if they knew about these medications, b) if they had ever taken them, and c) if they had not taken them, the reason why. Each of these 3 questions was adapted to whether the respondent was a smoker, ex-smoker, or never-smoker. In the case of never-smokers, the question on consumption of smoking cessation medication was aimed at the closest friend or relative who was a smoker ("Do you know if your friend or relative has ever taken any of these medications?"). Questionnaires for smokers and never smokers were almost identical except for the subject (herself/himself or relative/friend). In the case of exsmokers there were more differences between questionnaires since some questions did not apply to exsmokers. The rest of the questions were adapted to their condition of exsmokers (see Table 1). The variables of these 2 parts of the survey were, together with socio-demographic variables, those used to analyse the decision to take or not take medications to quit smoking and the decision about how much to pay for them.

The third section of the survey was the central part, since it focused on the WTP for a medication that increased the likelihood of success in the case of a person attempting to quit. The medication was not referred to by its trade name or active ingredient. More specifically, the respondent was asked about a hypothetical medication that increased the chances of success (rate of cessation after 1 year) when quitting smoking. The respondent was told that of every 100 persons who tried to quit smoking, 9 succeeded, whereas with medication, 23 succeeded during the first year[15]. The possible side effects (nausea and insomnia) were also mentioned, stating that, in most cases, these were mild and did not require the patient to suspend treatment. Similarly, respondents were informed that the treatment could sometimes lead to feelings of sadness and that, if the feelings intensified, the patient should visit the doctor to evaluate whether or not the treatment should be continued. Once

respondents received information on efficacy and side effects, they were asked about their willingness to pay using a sequence of questions. First, respondents were asked whether they would take the medication if it were totally free. If the answer was no, they were asked the reason why. Two closed responses were offered ("I am frightened of the side effects", "I do not think that it is easier to quit smoking with medication"), as was the opportunity to provide an open response (the respondent could give any other reason).

Respondents who said they would be willing to take the medication if it was free were asked what they would do if the medication was not free. They were told that the treatment would be taken for 3 months and were asked if they would pay a specific amount (€X) per month for 3 months. Smokers had to state whether they would be prepared to pay this sum of money to take the treatment. Ex-smokers were asked if they would have paid it if the treatment had been available when they smoked. Lastly, never-smokers were asked if they would advise a friend or relative to pay for and take the treatment. We tried to adapt the question format to their situation. In the case of ex-smokers, we asked them how much they would have paid for these drugs if they had been available when they were smoking. Never-smokers were asked how much they would advise a smoker close to them to pay. Each of the 3 samples (smokers, ex-smokers, never-smokers) was further divided into 3 samples depending on the amount they were asked about in the first question. The initial sum (€X) presented to each of the subsamples was €60, €120, and €240 respectively. These subsamples were created to test the presence or absence of order effects. This initial question led to a series of new dichotomous questions (maximum of 3) that established an interval where WTP was located. The final WTP was estimated using an open-ended question[1]. The amounts suggested to subjects ranged between €30 and €3,000, although it was possible to state willingness to pay more than 3000€ or less than 30€.

[1]For example, if respondents said that they would pay €120/month for the treatment, they were then asked if they would pay €240/month. If their answer was no, they were asked directly about the maximum amount between €120 and €240 they would be willing to pay per month.

The reasons for choosing €60, €120, and €240 as the initial amounts were that the actual cost of one of the smoking cessation medications was approximately €120 per month and we wanted to give prices that were realistic. Furthermore, a pilot study of 200 interviews was performed to verify that these amounts did not generate extreme responses among the population; in other words, they were not amounts that everyone or no-one would pay. We thought that the difference between the lowest amount (€60) and the highest amount (€240) was sufficiently large to generate order effects, if these were present.

The fourth section included some questions about the convenience that smoking cessation therapies were publicly funded. These questions will be analysed in a different paper. The survey finished with socio-demographic questions (age, sex, level of education, income).

The Econometric Framework

In this section, we present the various econometric approaches implemented to answer the preceding questions, namely, whether subjects perceive positive marginal benefits in smoking cessation medicines and how much are they Willing To Pay.

1. As a first approximation to the valuation that respondents make of smoking cessation medication, we analysed their answers to the question of whether or not they would take the medicine if it were provided free of charge. The question posed to never-smokers was slightly different. In particular, never-smokers were asked whether they would recommend the medicine to someone close to them who smokes and ex-smokers were asked if they would have taken the medicine when they were smokers. The medicine was always presented as free of charge. We used Probit models to identify the factors that influence the decision to take or recommend the medicine.

Some notation is useful at this point. Let y_{1i} be an indicator variable that equals 1 if the respondent *i* declares that he/she would take or recommend the medicine. This variable is the result of a rational decision-making process in which respondents

compare the expectations about the gains and costs of the medicine they created from their information sets. Let y_{1i}^{*} be the underlying response variable that measures the expected net gains of taking the medicine. This latent variable is explained by the equation

$$y_{1i}^{*} = \beta x_i + \varepsilon_{1i} \quad (1)$$

where x_i is a vector of individual characteristics, β is a vector of unknown parameters to be estimated and ε_{1i} is a zero mean error term. Respondents take or recommend the medicine if the expected net gain is positive; therefore, the probability of a respondent declaring that he/she would take or recommend the medicine can be written as follows:

$$prob(y_{1i} = 1) = prob(\beta x_i + \varepsilon_{1i} > 0) = F(\beta x_i) \quad (2)$$

Where *F* is the cumulative distribution function of $-\varepsilon_{1i}$. The associated likelihood function has the following expression

$$\log L = \sum_{y_{1i}=1} \log F(\beta x_i) + \sum_{y_{1i}=0} \log\left(1 - F(\beta x_i)\right) \quad (3)$$

2. In a second analysis, we further learned about the valuation that respondents make of the smoking cessation therapy by analysing their willingness to pay for the medicines.

The determinants of respondents' willingness to pay were analysed by means of a Tobit regression model[16] with left censoring at 0. To introduce the model, let y_{2i}^{*} be respondent '*i*'s willingness to pay before non-negativity is imposed. We analyse the determinants of y_{2i}^{*} by means of a standard regression model, such as

$$y_{2i}^{*} = \delta w_i + \varepsilon_{2i} \quad (4)$$

where w_i is a vector of individual characteristics, δ is a vector of unknown parameters to be estimated and ε_{2i} is a zero mean error term. The econometric issue is that we only observe y_{2i}^* when it is positive. That is the reason why we estimate equation (4) using a Tobit model instead of the conventional ordinary least squares estimator. The likelihood function associated with the Tobit model is written as follows

$$\log L = \sum_{i=1}^{N} \left\{ d_i \left(\log \sigma + \log f \left(\frac{y_{2i} - \delta w_i}{\sigma} \right) \right) + (1 - d_i) \log \left(1 - F \left(\frac{\delta w_i}{\sigma} \right) \right) \right\} \quad (5)$$

Where d_i is an indicator variable that equals 1 if y_{2i}^* is positive and 0 otherwise, *f* is the normal density function, and y_{2i}^* is assumed to be normally distributed with mean and variance equal to δw_i and σ^2, respectively. This model takes into account the fact that we only observe the respondent's willingness to pay for the medicine when y_{1i} equals 1 and the respondent's valuation of the medicine is high enough to pay (or to recommend to pay) for it. The Tobit model produces valid population estimates of the determinants of the respondent's willingness to pay for the medicine by correcting for the selection bias that emerges if, as expected, the question of whether or not to pay for the medicine is not randomly answered.

Table 1 shows all the variables used as regressors in the estimations described in this section.

[Insert Table 1 about here]

Results

Socio-demographic characteristics

Table 2 shows the main characteristics of the sample. Given that our main interest was in smokers, we established a quota of 40%, which is greater than the percentage of smokers in the general population (24.1%)[17]. The remainder of the sample was divided equally between ex-smokers and never-smokers. Therefore, even though the sample is

not representative of the general population, in the sense that smokers are over-represented, we have a large enough sample size of the three respondent categories.

[Insert Table 2 about here]

Main findings

1. Decision to take the medication if it is free

Table 3 shows the number (percentage) of respondents who would not take the medication, even if it was free. In the specific case of smokers, this percentage reached 49.4%. Therefore, about 50% of the smokers do not perceive a positive marginal benefit from consuming the drug. In addition, 12.5% who said they would consume the drug if it were free, refuse to pay any money at all when asked how much they would be willing to pay. Consequently, only 30.1% were prepared to pay some positive amount. This is very different from the results previously observed in the literature[12,13,14]. In the case of Busch et al[12] we think that the reason could be that their sample was biased in favour of following these therapies. In the case of Weimer et al[14] one explanation could be that their hypothetical medicine is said to be 100% effective and with no side effects. In the case of Halpinet[13] there does not seem to be a clear explanation of the different results apart from cultural differences.

[Insert Table 3 about here]

Table 4 shows the variables, from all those used in the Probit model aiming to predict the decision to take the medication or not, which have a significant influence in at least one group on the decision to take the medication.[2]

[Insert Table 4 about here]

Two variables had a clear influence on all groups: lack of confidence in the medication and age. Very clearly, those people who do not have confidence in medications are less willing to use these therapies. The relevance of the lack of confidence in medicines was confirmed in follow-up questions: when those who did not want to use medicines, even if it was free of charge, were asked about the main reason for refusing to take it, 58% of smokers replied that they did not think it was useful for quitting (in the case of ex-smokers this percentage increased to 80%; in the case of never-smokers it fell to 50%). The possible side effects were the reason given by 21% of smokers, 14% of ex-smokers, and 30% of never-smokers. The remainder gave different reasons in open replies to the interviewer. We believe this is important since this it shows that the decision to use these medicines is not only influenced by costs. The variables that had a positive influence on all three groups were a doctor's recommendation to quit smoking and having had a positive previous experience with these therapies. For smokers, other variables that increase the likelihood of taking the medication include a strong desire to stop smoking, living alone, a doctor's offer to help and the environment. Previous experience (and obviously negative) in giving up reduced the chances of using medication. For never-smokers, the variables that have a positive influence on the advice that they would give to smokers they are close to, include social class and whether the smoker is a moderate smoker. Finally, in the case of ex-smokers, considering smoking as a vice increased the chances of using these therapies.

2. Willingness to pay

Willingness to pay of those subjects who were prepared to pay a positive amount was very similar for all 3 groups. Thus, smokers stated that they were prepared to pay a

[2]Variables no. 1-3, 5, 7-10, 17-20, 32-34, 36, and 38 from Table 1.

mean of €223.1 per month, ex-smokers said they would have paid €225 per month, and never-smokers said they would advise smokers to pay a mean of €213.4 per month. No clear order effects were observed[3]. Taking into account the different percentage of people that where willing to pay a positive amount, mean willingness to pay was €67.1 (per month for 3 months) for smokers, €61.0 for ex-smokers and €86.8 for never-smokers. Given that this WTP was estimated for a 14% absolute risk reduction, this implies that societal WTP per person that quits smoking ranges between €1300 and €1800. This has to be compared with the net costs of giving medication in order to conduct a full cost-benefit analysis. Table 5 shows those variables with a significant impact on the amount that the subjects were willing to pay[4]. The only variable that has a positive influence on all three groups is having had a positive past experience. In the case of smokers, strong desire to quit and a doctor's offer to help are again relevant. Income is now an important variable. This suggests that for smokers, price can be a relevant variable when deciding whether to take medicines or not. The fact that a variable that should be clearly related with WTP such as income is only relevant in the group of smokers may be related to the hypothetical nature of the question for never-smokers and ex-smokers.

[Insert Table 5 about here]

Conclusions

Our study showed that most of the smokers surveyed would not use smoking cessation therapy if they had to pay something for it. The estimated Probit model for modelling their decision on consumption showed how lack of confidence in these drugs has a negative effect on their decision. This was confirmed in open questions. More than half of those who were not prepared to use smoking cessation pharmacotherapy stated that they did not believe it is easier *for them* to give up smoking with these drugs. Therefore, many smokers doubt the efficacy of using

[3]Those who started at €120 were willing to pay €173, those who started at €60 were willing to pay €184, and those who started at €240 were willing to pay €237 (p=0.164).

[4]Variables no. 2-4, 8-9, 17-19, 36, and 38 from Table 1.

smoking cessation pharmacotherapy, despite available scientific evidence in favour. This finding reveals a clear negative bias with respect to smoking cessation therapy. Backinger et al[18] state that, in the USA, "The National Tobacco Cessation Collaborative (NTCC)'s Consumer Demand Roundtable was created to focus on this priority of building greater demand for tobacco-cessation products and services", owing to "underuse of science-based treatments". Our study shows that this underuse could be because smokers (and society in general) may not believe the drugs are effective. Finally, the results of this study show that mean willingness to pay per quitter ranges between €1300 and €1800. As we have stated, we need to compare this WTP with the cost per quitter, in order to decide if these drugs pass the cost-benefit test.

Implications for public policy

Our results provide an interesting case study for public decision-making. It raises, at least, one question: is it appropriate to use a welfaristic perspective when subjects may have distorted or biased preferences? Let us first clarify what we understand by a welfaristic perspective and by biased preferences. By welfaristic perspective we mean the assumption that societal welfare is approached by the aggregation of individual WTP. If aggregate WTP is greater than the cost of providing the medicines, social welfare increases if subjects consume this product. For this reason they would have to be provided by the NHS. This is a very standard welfaristic perspective.

Let us now clarify what we understand by "distorted or biased preferences". When we speak of bias, we mean that it is a systematic error. Since clinical evidence shows that smoking cessation therapies really help to quit smoking, those who are not willing to pay anything because they do not believe that medicines are effective are making a mistake. This does not mean that all those who do not want to use these drugs are mistaken. For example, those people who are frightened of the side effects act completely rationally when they decide not to take these (or other) drugs, since they consider that costs outweigh benefits. Those who do not consume because they believe that the monetary cost (cost-sharing) outweighs the benefit are also acting

rationally. However, in our survey, most respondents simply do not believe that the drugs are effective in giving up smoking. In our interpretation, this is an error, a bias.

It could be argued that the fact that many smokers thought that *they* did not need medicines to give up smoking does not imply that they do not accept that these drugs can be effective in general (*for others*). It could be the case that subjects know themselves very well and they know whether they need or not the help of smoking cessation therapies. However, some of our data cast serious doubt on this explanation. In our survey, out of 785 smokers only 66 (9.2%) had used some kind of smoking cessation therapy. As for the rest, a total of 490 report being interested in quitting. However, some of them (n=253) claimed that they did not know about the existence of these therapies. If we analyse the reason provided by the rest (those who are interested in quitting and know that these treatments are available) for not using these medicines

We will not speculate too much about the origin of this bias. Obvious candidates could be overconfidence bias[19,20,21] or restraint bias[22]. We just claim that it exists. If this is the case, is it legitimate to take a consumer perspective in order to take a social decision? Is it right simply adding individual willingness to pay in order to decide how much society should invest in smoking cessation therapies?

When individual preferences are distorted we think that the main alternatives are:

1. Consumer sovereignty: the government has to respect people's preferences even if they are wrong.

2. Abandon standard welfare economics if preferences are distorted (as it seems to be in our case). In our case, this may imply, for example, moving to cost-utility analysis.

We think that accepting consumer sovereignty is difficult to defend in this case. When people are spending their own money to buy 'treatments' that are not clearly damaging according to medical science, their own beliefs are what matter. However, when treatments are being financed through taxation, there does seem to be a case

for using 'best scientific judgement' rather than 'personal belief'. If we move to cost-utility analysis, as we have already shown in the introduction, these medicines have a cost per QALY ratio that would be considered reasonable (around $10.000 per QALY) by many standards and they should probably be funded publicly, although some authors[23] suggest that ethical problems could arise when it comes to "paying" (subsidize) people so that they can do things that are in their own interest (e.g., quitting smoking). However, even if it is considered that these medicines are cost-effective and they are funded by the public health system, it may not be enough. The evidence that we present in this paper suggests that many smokers are not going to use them even if they are free. The next question is, what should the government do? Should the government "promote" the use of smoking cessation therapies?

One response is that the government does not have to promote these therapies, based on several reasons. One is, as before, consumer sovereignty. If the government provides official information and funds these medicines but people decide to act on their own beliefs, that should be their privilege as consumers. A second argument against any further involvement of the government rests in the idea that it would increase "medicalization" of everyday life[24] (Szasz, T. S., 2007). Another is that perverse incentives could be generated. For example, those who would quit smoking by their own means, without medication, could quit by using medication, thus increasing health care costs unnecessarily. Another perverse effect could be that many smokers with a limited interest in quitting smoking could consume these medications, thus undoubtedly reducing the success rate. Chapman and McKenzie[25] point out that using smoke cessation therapies "might well disempower smokers and inhibit quit attempts through anticipatory, self-defeating fatalism". That is, if they fail using methods with the highest quit rate, they may not try again since they may think that it is impossible for them to quit. However, even Chapman and McKenzie[25] acknowledge "smoking cessation treatment is one of the most cost-effective interventions in modern medicine". It would be surprising not to promote "one of the most cost-effective interventions in modern medicine". Warner and Mackay[26] suggest that using smoking cessation therapies does not have to be considered as an alternative to

public-health measures. They claim that "not all smokers respond favourably to public-health interventions. Some need individual, often intensive clinical care to achieve abstinence. For this important minority of smokers, treatment is more cost-effective than public-health measures".

It seems clear then that smoking cessation therapies may have some role for some smokers. In spite of that, according to our data, a large portion of these smokers will not use these medicines because they do not believe they are effective. So, again, the question is what should the government do? Should it do something else, apart from funding these treatments? What are the options?

An approach is to make consumers better informed. One way of doing it could be to train physicians to help some smokers to be more realistic and admit that they need help to quit smoking. However, policies based only on providing information often have discouraging results[27]. Another approach, in line with Libertarian Paternalism, would be to try to nudge smokers towards these kinds of therapies. Many defenders of "libertarian paternalism" [28] consider that information policy fails because it is often based on the supposition that subjects are perfectly rational. That is, perfect rationality implies that once the advantages and disadvantages of a specific behaviour are explained, subjects will choose the option that maximizes their benefits. Behavioural economics has shown that this assumption is not correct in many fields. Most people need more than information[28]; hence the idea[29] of providing a nudge in the direction that most benefits subjects.

In our case, the nudge can take the form of positive financial incentives, for example, using low (or zero) copayments. This is in line with the value-based insurance design (VBID) philosophy[30]. According to VBID, cost-sharing should be lower the more cost-effective the treatment. If, as available evidence seems to suggest, smoking cessation therapy is cost-effective, it could be funded by the NHS based on this argument. In fact, Train et al[6], (p. 111-112) asserts that "because cost is a barrier to access to smoking cessation medication, coverage should be considered in treatment strategies" (p.128).

Lastly, there are a number of other smoking cessation policies based on libertarian paternalism that can be promoted from public bodies and which do not require express funding of the medication. Such is the case of the CARES (*Committed Action to Reduce and End Smoking*) experiment[31], in which smokers who wish to quit smoking lodge the money they save each week by not smoking in a current account. After 6 months, they undergo a urinalysis: if the result is negative, the money is returned; if not, the money is donated to charity. The objective of this approach is to take advantage of the well-known loss aversion bias in order to benefit the patient[32] (Tversky & Kahneman, 1991). In general, public funding of these medicines can be linked with incentives to avoid non-motivated smokers to take these medicines.

In summary, our study shows that most smokers do not value smoking cessation therapy, mainly due to the lack of confidence in the help these agents can provide. This is reflected in a low WTP and a low tendency to follow these treatments. The implication for the health system depends on the point of view adopted on the reimbursement of medicines. Under a standard welfarist approach, low WTP estimates make it more unlikely to pass the cost-benefit test and, in consequence, smoke cessation therapies might not be publicly funded. On the contrary, using a non-standard welfarist approach (cost per QALY) they might be funded. Although a widespread use of smoking cessation therapies may have some drawbacks, they have their role in dealing with tobacco addiction. In these cases, the lack of confidence of smokers in these therapies may lead to a suboptimal use of these therapies. We suggest that it may be problematic to correct for this bias with better information exclusively. Policies based on Libertarian Paternalism provide a new and promising approach in order to avoid these biases.

Table 1. Control variables used in the different regressions in this study

No	Variables	Dummy variable that equals 1 if the respondent …. and 0 otherwise*	Exsmokers	Nonsmokers
	Sociodemographic variables			
1	Age	Continuous variable that measures the respondents' age in years.	YES	YES
2	Living alone	Lives alone	YES	YES
3	Social class	Thinks of him/herself as belonging to one of the top 2 levels in a discrete social class scale ranging from 1 to 8	YES	YES
4	Income	The respondent's household income is above €2100 per month	YES	YES
	Smoking behavior variables			
5	Moderate consumer	Smokes (smoked for exsmokers) between 11 and 20 cigarettes per day	YES	YES
6	Heavy consumer	Smokes (smoked for exsmokers) more than 20 cigarettes per day	YES	YES
7	Experience giving up	Stopped smoking for at least 1 month	NO	YES
8	Strong desire to quit	States that he/she has a strong desire to quit smoking	NO	YES
9a	Has no confidence in medications	Totally disagree with the statement "I started to smoke again because I had no medicines to quit smoking"	Ad.	YES
9b	(Adaptation to exsmokers)	Totally disagree with the statement “I quit because I used medicines to quit smoking”	YES	na
10	Environment	Totally agrees with the statement "I started to smoke again because people I usually see are smokers"	NO	YES
11	Willpower	Totally agrees with the statement "You can always quit smoking if you really want"	YES	YES
12a	Not visiting doctor	Totally agrees with the statement "I started to smoke again because I did not ask my doctor for help"	Ad	YES
12b	(Adaptation to exsmokers)	Totally agrees with the statement "I quit because I asked my doctor for help"	YES	na
13a	Relatives' help	Totally agrees with the statement "I started to smoke again because my relatives did not help me"	Ad.	YES
13b	(Adaptation to exsmokers)	Totally disagrees with the statement “I quit because my relatives helped me”	YES	na
14	Anxiety	Totally agrees with the statement "I started to smoke again because of anxiety"	NO	YES
15	Getting fatter	Totally agrees with the statement "I started to smoke again because I was getting fatter"	NO	YES
16	Stress	Totally agrees with the statement "I started to smoke again because of stress"	NO	YES
	Motivation to quit smoking variables*			
17	Family influence	Totally agrees with the statement "I have seriously thought about quitting smoking because someone close to me has asked me to do so"	YES	YES
18	Smoking as a vice	Totally agrees with the statement "I have seriously thought about quitting smoking because it is just a vice"	YES	YES
19	Doctor’s recommendation	Totally agrees with the statement "I have seriously thought about quitting smoking because my doctor has recommended me to do so"	YES	YES
20	Good example to children	Totally agrees with the statement "I have seriously thought about quitting smoking because it is not a good example for my children"	YES	YES
21	Important risk for my health	Totally agrees with the statement "I have seriously thought about quitting smoking because it is an important risk for my health"	YES	YES
22	Makes social relations difficult	Totally agrees with the statement "I have seriously thought about quitting smoking because it makes social relationships difficult"	YES	YES
23	Very expensive	Totally agrees with the statement "I have seriously thought about quitting smoking because it is very expensive"	YES	YES
24	For aesthetic reasons	Totally agrees with the statement "I have seriously thought about quitting smoking for aesthetic reasons (eg, skin, teeth)"	YES	YES
25	Other people's health	Totally agrees with the statement "I have seriously thought about quitting smoking because it affects other people's health"	YES	YES
26	Physical activities	Totally agrees with the statement "I have seriously thought about quitting smoking because it affects me in daily physical activities"	YES	YES

Table 1.- Cont.

No	Variables	Dummy variable that equals 1 if the respondent …. and 0 otherwise*	Exsmokers	Neversmokers
	The consequences of smoking			
27	Living with a smoker	Totally agrees with the statement "Living with a smoker is a serious risk for your health"	YES	YES
28	Heart attack	Totally agrees with the statement "Smoking increases heart attack risk"	YES	YES
29	Lung cancer	Totally agrees with the statement "Smoking increases lung cancer risk"	YES	YES
30	Respiratory diseases	Totally agrees with the statement "Smoking increases respiratory diseases risk"	YES	YES
31	Ten diseases	Totally agrees with the statement "Smoking is related to more than ten different diseases"	YES	YES
32	Visiting doctor because of smoking	Totally agrees with the statement "I have visited my doctor for health problems related to smoking"	NO	YES
33	Being ill because of smoking	Totally agrees with the statement "I am ill because of smoking"	NO	YES
34	Future ill health because of smoking	Totally agrees with the statement "I think that I will have more health problems in the future if I continue smoking"	NO	YES
35	Asked doctor for help	Totally agrees with the statement "I have asked my doctor for help to quit smoking"	NO	YES
36	Doctor offers help	Totally agrees with the statement "My doctor has offered me help to quit smoking"	NO	NO
37	Asked pharmacist for help	Totally agrees with the statement "I have asked my pharmacist for help to quit smoking"	NO	NO
38	Positive experience	Has used medicines to quit smoking and thinks they are useful	YES	YES

In the case of smokers vs never-smokers questionnaires were almost identical. For smokers questions were about themselves and for never smokers about a friend or relative who is a smoker.

In the case of smokers vs exsmokers:

1) Some questions were not asked to exsmokers (7, 8, 13, 14, 15, 16 and 33 to 38)
2) Some questions were exactly the same (11, 27 to 31)
3) Some questions were slightly modified:
   a) 5 and 6 asked about past consumption instead of present consumption.
   b) 17 to 26 (motivation to quit) were almost identical. For exsmokers they read “I quit because…” instead of “I have seriously thought about quitting smoking because…”
4) Some questions (9, 12, 13) had to be adapted for exsmokers.

Table 2. Characteristics of the sample

	N=2011	%
Sex		
Male	885	44.0
Female	1126	56.0
Median age (years)	46.5	
Educational level		
None/education incomplete	258	12.8
Primary education	786	39.1
High school or similar	371	18.4
Pre-university or similar	88	4.4
Higher education	487	24.2
Does not know/Does not answer	21	1.0
Occupational status		
Working	961	47.8
Unemployed	240	11.9
Homemaker	360	17.9
Retired	321	16.0
Student	102	5.1
Other	27	1.3
Smoking status		
Smoker	785	39.0
Exsmoker	590	29.3
Nonsmoker	636	31.6
Number of family members who smoke		
0	835	41.5
1	670	33.3
2	370	18.4
More than 2	124	6.2
Does not know/Does not answer	12	0.6
Income (euros)		
No direct income	4	0.2
Up to 900	131	6.5
901-1500	327	16.3
1501-2100	315	15.7
2101-3000	207	10.3
More than 3000	104	5.2
Does not know/Does not answer	923	45.9

Table 3. Sequence of decisions in questions on consumption of, and willingness to pay for, smoking cessation medication

	(1): Total	(2): Would not take it even when free	(3): Would not take it if it had to be paid for	(4): Would not pay for it or take it: (2)+(3)	(5): Would pay: (1)-(4)
Smoker	785	388	98	486	299
		(49.4)	(12.5)	(61.9)	(30.1)
Ex-smoker	590	379	51	430	160
		(64.2)	(8.6)	(72.9)	(27.1)
Never-smoker	636	264	113	377	259
		(41.5)	(17.7)	(59.3)	(40.7)

Table 4. Model for predicting the decision to take the medication if it was free

	Smokers	Never-smokers	Ex-smokers
Strong desire to quit	0.158***	0.067	NA
Age	–0.003**	–0.004**	–0.004**
Living alone	0.156**	0.081	–0.007
Social class	–0.007	0.217***	–0.007
Moderate consumer	0.039	0.089*	0.030
Does not have confidence in medications	–0.108**	–0.099*	–0.139**
Environment	0.122**	0.034	NA
Experience of giving up	–0.088*	–0.070	0.000
Family influence	0.004	0.116**	–0.010
Smoking as a vice	0.025	0.045	0.098**
Doctor's recommendation	0.144***	0.089*	0.104*
Good example to children	0.078*	0.026	–0.006
Visiting doctor because of smoking	–0.142	0.330***	NA
Being ill because of smoking	0.089	–0.256	NA
Future ill health because of smoking	0.112***	0.077	NA
Doctor's offer to help	0.123*	NA	NA
Positive experience	0.410***	0.204**	0.428***

NA, the question was not asked of this subsample

* p<0.01; **p<0.05 y ***p<0.001

Table 5. Factors explaining willingness to pay

	Smokers	Non smokers	Ex-smokers
Strong desire to quit	111.6**	103.8**	NA
Living alone	117.9	179.2**	–95.3
Social class	–53.1	259.7***	68.2
Income	117.7**	42.6	66.9
Does not have confidence in medicines	–10.0	–37.8	–151.1**
Family influence	36.9	119.1**	–68.6
Smoking as a vice	79.0	18.0	145.9**
Doctor's recommendation	–2.7	95.2*	54.7
Doctor's offer to help	132.0***	NA	NA
Positive experience	571.2***	205.3**	562.8***

NA, the question was not asked of this subsample

* p<0.01; **p<0.05 y ***p<0.001

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