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The Effects of Smoking Risk Perceptions on Smoking Behavior of the Turkish Population

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Abstract

This study explores the relationship between risk perception and smoking behavior within the Turkish population, addressing the broader issue of underutilization of preventive healthcare in low- to middle-income countries. By employing a structured survey distributed online, data was collected from 258 respondents on demographic characteristics, smoking habits, and risk perceptions. The analysis utilized a logit model to examine how different dimensions of risk perception influence the probability of smoking. The findings indicate that perceived life expectancy loss due to smoking significantly reduces the likelihood of smoking, while other risk perception measures were not statistically significant. This study highlights the importance of personalized risk messages in public health interventions and underscores the need for targeted strategies to reduce smoking rates, particularly among younger individuals. Limitations include potential biases from convenience and snowball sampling, and the use of self-reported data.

1. **Introduction**

Cigarette smoking has been a crucial and dominant part of human history for many generations now. The use of smoking has been such an important factor that it even infiltrated various societies' cultures. Cigarette consumption, in its history, has faced a lot of different trends. Following the public acceptance of smoking, innovative advertisements significantly boosted cigarette consumption in the 20th century (National Cancer Institute, 2008). However, with more information on its side effects and a steady change in society's view on smoking cigarettes, the latest trend shows that smoking rates have been on a decline for the past couple of decades (Dai et al., 2020). Despite this latest trend of decrease in cigarette consumption, just like an average smoker trying to quit cigarettes, the world is also having a tough time quitting. A significant portion of the world's population continues to smoke, that's why smoking cigarettes is still an important cause of death all around the world. From data in 2020, we know that 1.18 billion people smoke cigarettes regularly, which has led to around 7 million deaths in 2020 (Dai et al., 2020). One might wonder why smoking cigarettes is still a persistent behavior that people partake in to this day despite the common view changing against cigarettes, since from a simplistic and rational point of view the concept of smoking does not make sense. Objectively, its short-term and passing pros

should be drastically outweighed by the long-term and lasting consequences. However, human behavior is not always consistent with objectivity, nor is it that simple. Smoking, to the smoker, has a wide range of pros and cons, which are sometimes hard concepts to fully understand. Therefore, based on this motivation, this research aims to dive deeper into the underlying behavioral components of smoking cigarettes.

One of the significant behavioral components of smoking cigarettes is risk perception. Risk perceptions involve beliefs about the potential for harm or loss, forming a subjective judgment on the nature and severity of a risk. The degree of risk linked to a behavior reflects the likelihood and consequences of harmful effects from that behavior, encompassing evaluations of the probability and severity of an uncertain outcome (Darker, 2013). Smoking cigarettes can easily be described as a choice with risks involved for the smoker. This is the reason why; in order to adequately assess the rationality of smoking behavior, it is necessary and crucial to understand public risk perceptions (Antoñanzas et al. 2000). One study done in America in 2019 shows that most of the studied sample is risk averse in everyday life (Newsroom | Northwestern Mutual - Planning & Progress Study 2019, n.d.). It's safe to assume this study somewhat reflects common behavior in people. However, this general risk-averse behavior fails to explain decisions taken on cigarette consumption, since there are many people who smoke even though the majority of the population seems to be risk averse. This is the reason why a more focused study on risk perceptions specifically related to smoking behavior is needed in place of a general risk assessment study.

This study will investigate the characteristics of smoking risk perceptions for the Turkish population under the broader concept of underusage of preventive healthcare in middle to low-income countries. Since the preventive method to decrease smoking and therefore the number of cases of diseases related to smoking is the decision and action of not smoking, this study is done on smoking behavior itself. One of the reasons for this research to focus on Turkey is the scale and urgency of the problem in the country. Turkey has one of the highest active smoker percentages in Europe (OECD, 2021), and this high usage of cigarettes results in respiratory-related deaths being the third most common reason for deaths in Turkey in 2022 (TurkStat, 2022). Another reason why this research is based in Turkey is because previous research around this topic has mostly been done on high-income and developed countries. However, prior studies lack the potential to be representative of other countries' situations because of differences in culture, demographics, and severity of measures taken against smoking. Therefore, there is a certain literature gap in this study area. So, Turkey being a low-to middle income and

developing country sets this research apart from the rest. Also, this situation brings forward another angle on the topic, with Turkey being a low-middle income country and because of its current state with inflation buying a pack of cigarettes should be harder for the average smoker to buy. One would expect this situation of raised prices to act as an incentive to lower cigarette usage, however, we do not see a significant drop over the years (TurkStat, 2022). This shows that there is a special and strong link between the smoker and cigarettes in Turkey which makes the research on behavioral aspects of cigarette usage interesting and quite urgent.

The aim of this study is to have a better understanding of smoking risk perceptions in the Turkish population. To investigate the relationship between these perceptions that the population holds and their smoking behavior, this study will utilize a survey method since it is the most efficient way to get the desired risk perception assessments of the individuals. With the insights gathered from this study's results, it is possible to influence the probability of making new policies which consider the behavioral backgrounds of smoking. Understanding risk perceptions of smoking has the potential to help design effective risk communication strategies and public health interventions. These applications that could lead to a better educated population in smoking risks become a lot more socially relevant when considering the urgency in Turkey's smoking rates. The research question of this paper will therefore be constructed as follows: **What is the relationship between smoking risk perception and smoking behavior with regards to the Turkish population?**

This paper will analyze the mentioned relationship between risk perception and smoking behavior in Turkey as follows, first a theoretical framework will be laid out in order to further elaborate the concepts and issues at hand. Here a detailed explanation of risk perception will be given, followed by a review of relevant literatures and a portrait of smoking in Turkey will be presented. In the Data section insights and details of the conducted survey will be shared followed by the presentation of collected data, first with an explanation of the data cleaning process then the data itself to show sample characteristics. The Methodology section will introduce the econometric model that is going to be used in this study along with justifications and assumptions of the model, the results will be presented in the following Results section of the paper. Finally, these results will be tied into a conclusion of the paper and further discussed in the Discussion and Limitation sections.

2. Theoretical Framework

2.1. Risk Perception and Preventive Healthcare

Gaining insight on risk perception is a crucial step towards understanding health-related behaviors and decisions like smoking cigarettes. According to Slovic (2000), risk perception involves the subjective judgment that individuals make regarding the severity and probability of a risk, influenced by psychological factors such as fear, trust, and personal experience. The close relationship between personal experience and risk perception is the reason why a perception of risk may differ from person to person. To give an example one might think of two neighbors, one has an outdoor swimming pool, and the other does not. The objective risk of someone slipping near the pool and falling is universal, however the neighbor with the swimming pool probably had instances where they slipped and fell. This personal experience will result in the neighbor with the pool overestimating the risk of slipping and falling in comparison to the neighbor who does not have a pool and has less personal experience to alter their risk perception. Slovic (2000) continues to say that these subjective risk perceptions contribute to decision making progress more than an objective risk assessment. Similarly, Webber, Blais, and Betz (2002) state that risk perception varies among different areas such as health and finance, and that these perceptions are shaped by cognitive assessments and subjective responses to potential hazards. The importance of risk perception in predicting health behavior is further touched upon by Brewer et al. (2007). The authors, through a meta-analysis, demonstrate that altering risk perception can cause significant behavior changes such as smoking. These insights prove the importance of the effect of risk perception on behavior or in this paper's case preventive health behavior, therefore also underlying the importance of understanding the relationship between these topics which this paper aims to achieve.

It was mentioned in the Introduction that the research aimed to be done on the Turkish population about the relationship between smoking risk perceptions and smoking habits was under the broader topic of preventive health care in low to middle income countries. The topic of preventive health care is relevant here since not smoking is a preventive method for smoking related diseases. Another relevant point of the topic is its connection with risk perception. In their paper Lu et al. (2021) reports that the higher risk perception levels caused higher probability of utilizing preventive measures in the context of COVID-19 in the United States. The study from Guo et al. (2021) is another example of a paper where the link between understanding risk perception and preventive health care is mentioned where the authors emphasize the importance of accurate risk perceptions in promoting preventive health behavior

specifically for cardiovascular diseases. As shown by these examples, it is important to have a good understanding of risk perceptions to make better judgments in the field of preventive health care.

2.2. Review of Previous Literature

There are previous studies done that also analyze the concepts of risk perception and smoking behavior. Examples of such papers are Antoñanzas et al. (2000) which studies mentioned topics amongst the Spanish population and Viscusi (1990) which has a research set in the United States. It is beneficial to provide a literature review of these papers by Antoñanzas et al. (2000), and Viscusi (1990) since they are very influential to this paper's research topic and method. The study by Antoñanzas et al. (2000) investigates risk perceptions towards smoking related diseases amongst the Spanish population. By conducting a survey research over the telephone with 2,571 respondents, the researchers aim to assess people's risk perception of smoking towards sicknesses like lung cancer, lung and heart diseases. The final version of the survey used formats like those used in previous studies by Viscusi (1990, 1991, 1992, 1998) this ensured that the findings of this study on the Spanish population was comparable to Viscusi's findings on the American population. The authors give background information on Spanish antismoking campaigns and smoking culture in Spain to justify why research made on the Spanish population will be different to the ones made by Viscusi. The survey also includes risk perception questions about the effects of smoking on having diabetes to understand if the respondent is overestimating the risk of smoking because although lung and heart diseases are known to be correlated with smoking, diabetes is not. So, if the respondent believes that smoking causes a higher risk of diabetes, they have a very high perception of risk. The authors state that the used survey methodology ensures a representative sample across various Spanish regions.

The paper provides a thorough description of sample characteristics for risk perceptions of each investigated disease. Key findings of these characteristics indicate that respondents significantly overestimate the risks of smoking, with current smokers believing that 46 out of 100 would develop lung cancer and estimating relative lung cancer risks at 9.4 compared to non-smokers who estimates it at 13.1. In addition to these, the study shows that respondents with higher levels of education showed more accurate risk perceptions, while younger portion of the population had better risk awareness, as explained in the paper due to the implementation of more aggressive antismoking campaigns in recent years. The paper then continues with a regression analysis, showing that age, gender, and personal habits such as consumption of coffee and alcohol influence risk perceptions. Findings of this analysis are consistent with prior findings as younger population have higher risk assessments, the male population have significantly

lower assessments of risk compared to females, for education as years of schooling increase risk assessment decreases however this is not a contradiction because since the general population overestimates risk, a lower risk assessment means a more accurate one. Finally, for the diabetes component, as expected respondents who believe smoking leads to diabetes have a higher risk assessment. These general findings of the study highlight the necessity for tailored approaches to address specific demographics in risk perception. Overall, the study provides valuable insights for public health policies and smoking cessation strategies in Spain.

In their paper Antoñanzas et al. (2000) repeatedly refers to the studies made by Viscusi (1990, 1991, 1992, 1998) since these studies accomplish a starting point on the research of risk perceptions in smoking and as mentioned before the authors research method follows closely to these studies by Viscusi in order to compare results between the American population and the Spanish population. Here the focus will be on the paper by Viscusi (1990) since this paper investigates risk perception towards smoking, and the type of relationship of this risk perception with smoking behavior. The study utilizes a national survey of 3,119 individuals to assess lung cancer risk perceptions among smokers and non-smokers. Viscusi mentions that only investigating lung cancer risk perceptions may lead to a restricted view, hence Antoñanzas et al. (2000) adds questions on additional diseases linked with smoking. In the paper Viscusi sets this study apart from previous ones made on smoking risk perception by stating that this paper is the first to accomplish an empirical assessment of risk perception with the use of new formatting to the risk related questions in the survey. The survey method used for the research is justified in the sense of representation and robustness, the author believes representation is achieved due to the range of the research and for the robustness the author claims that the results showed similarity with prior surveys with different wording of the risk questionnaire.

To summarize the findings of Viscusi (1990), both smokers and non-smokers have been found to be overestimating the risks of smoking, with non-smokers having a higher degree of overestimation. Viscusi states that this finding is consistent and related with previous literature on psychology and economics of risk perceptions since studies by Fischhoff et al. (1981); Viscusi and Magat (1987) that mention individuals asses higher risks for low-probability events and lower risk for high-portability ones. Another cause for this observed overestimation is said to be the effects of highly publicized events by Viscusi, since previous literature points out that risks from widely publicized accidents tend to be overestimated (Fischhoff et al. 1981). After the mentioning the characteristics of risk perception Viscusi moves on to a logit model regression analysis that investigates the effects of risk perception on smoking

behavior with the use of additional variables such as regional dummies and demographic variables. Results from this analysis show that as the perceived risk of smoking increases, the probability of cigarette consumption decreases.

Comparing these two papers by Antoñanzas et al. (2000) and Viscusi (1990), it is possible to see similarities between them in terms of methodology since Antoñanzas et al. takes inspiration from Viscusi's work and tries to add to it. Survey questions asked follow closely to each other in most cases. However, Antoñanzas et al. adds risk perception questions with regards to other diseases that are scientifically correlated with smoking, allowing for a broader analysis of the topic. Findings on risk perception of smoking are very similar between these papers since both observe an overestimation of risks related to smoking in their respective studied populations. However, the overestimation levels seem to be higher for the American population. Where the paper by Antoñanzas et al. (2000) only focuses on the determinants of risk perception on smoking, Viscusi (1990) continues to research the relationship between these risk perceptions and smoking behavior.

2.3. Smoking Background in Turkey

As stated before, cigarette consumption in Turkey was the highest among other European countries in 2020 (OECD,2021). Gaining knowledge on the characteristics of the smoking population in Turkey and understanding some of the reasons why Turkey has this big of a smoking problem is key to rationalize and comment better on the results of this study. Starting with a recent historical background, while smoking rates have dropped 4.12% worldwide during 1990-1999 smoking in Turkey has increased 52.18% making it the second highest rate in the world (USDA, 1990-1999). This high percentage of smokers start smoking at a very young age, with 20% of smokers starting to smoke between the ages of 11 to 14 and 83% of smokers starting before turning 21 (İkinci, 2013). With comparison to majority of developed western countries smoking rates in Turkey increase with education level (İkinci, 2013). Another difference is that when an increase in social welfare levels happens, smoking rates decrease in developed countries. However, in Turkey this correlation is in reverse as in an increase in social welfare levels also increases cigarette consumption (İkinci, 2013).

The high rate of smoking in Turkey is not only the result of addictive nature of the product but has various more social components that drive it. Public opinion on cigarettes is different in Turkey than in Western countries. One of the reasons for this is that usage of cigarettes and having a Turkish identity has over time got intertwined, making cigarettes a traditional product in Turkey (Dikmen, 2010). In her paper on variables effecting smoking habits in Turkey, Dikmen also mentions that every year 750 thousand

young people start smoking, with the leading reason being envious towards peers. She continues to say that children see the action of smoking as a sign of growing up and they are easily influenced by grown-ups, they look up to also smoking cigarettes. Another difference Turkey has with developed countries is its protocol towards anti-smoking efforts. As an example, when countries like the U.S. Sapin, and United Kingdom had banned tobacco advertisements by 1970, 1989, and 2002; Turkey banned advertisement of tobacco products only in 2013. This may have resulted in the public opinion not being as harsh towards cigarettes, and ads reaching more generations therefore halting the process of decreasing smoking rates nationwide.

2.4. Hypotheses

While answering the central research question of this paper which is to analyze the relationship between risk perception and smoking behavior in the Turkish population, below mentioned hypotheses will be tested. The first hypothesis will be used as a tool to answer the main research question. This hypothesis was created in line with the findings of previous literature on this topic. The second and the third hypotheses are side hypotheses constructed to address the common demographics of the sample. To answer the first hypothesis a logit regression on smoking behavior with risk perception variables as the independent variables alongside demographic control variables. To answer the second and third hypotheses a look into the demographic sample statistics will be ideal. The hypotheses are as follows:

- Higher levels of risk perception reported in the survey will lead to lower probability of cigarette consumption
- The younger population will have higher risk perception levels due to advancements in education and public awareness compared to the older generation in the sample.
- Current smokers will have lower risk perception levels than the rest of the smoking status groups in the sample.

3. Data

To answer the research question and find a relationship between risk perception and smoking habits, this study uses a survey method to attain data. The reason for this choice instead of making use of data available on existing data platforms is mostly the risk perception component of the study. Since people's attitudes towards risk are one of our interested variables, we must ask individually about this. For the context of the survey, it consists of three parts. The first part asks about the characteristics of the

respondents that we want to control for such as age, gender, highest education level attained, monthly income, residency, etc. The second part consists of questions related to smoking. In addition to basic smoking behavior information, this part also asks about other habits and other characteristics related to smoking such as if the person has a relative who smokes or if they have any habits of drinking coffee or alcohol. This inquiry for additional information is inspired by the study of Viscusi et al. (2000). The third and final part of the survey is the questions on risk perception towards smoking, and this study makes use of the existing survey questions of Antoñanzas et al. (2000) since it is beneficial to use a prior and proven literature with credibility in getting information about a complex topic such as risk perception. Also, using similar questions to prior literature allows for obtaining results that are comparable with mentioned previous studies. Table 3.1 summarizes the questions asked in the survey to assess risk perceptions. This survey focuses on smoking risks to the smoker, in fields like lung cancer, lung disease, and heart disease. Additionally, questions about the risks of smoking for diabetes and life expectancy loss are included. A full version of the circulated survey can be found in the Appendix.

Table 3.1. Summary of questions on smoking risks with its translation

Turkish Text	English Translation
15.a Sigara içenlerin akciğer kanserine yakalanma riskinin, sigara içmeyenlere göre daha yüksek olduğuna inaniyor musunuz?	15.a. Do you believe that smokers get more **lung cancer** than nonsmokers?
15.b. Sigara içme alışkanlıklarından dolayı, sigara içen 100 kişiden sizce kaçı akciğer kanseri olur? 0'dan 100'e. Cevabınız "Bilmiyorum" ise 0 ile 100 arasından size en yakın gelen sayıyı belirtiniz.	15.b. Out of 100 smokers, how many do you think will get **lung cancer** due to their smoking habits? From 0 to 100. If your answer is "I don't know" please state which number spontaneously seems more logical from 0 to 100.
İki ikiz erkek kardeş hayal edin. Bu ikizler tüm hayatları boyunca aynı şekilde, aynı şehirde, aynı gelenek ve alışkanlıklara sahip olarak yaşıyorlar. Tek fark, biri 20 yıldır günde bir paket sigara içiyor, diğeri ise hiç sigara içmemiş. Sonraki iki soruyu lütfen bu bilgiye göre cevaplayınız.	*Imagine two twin brothers that have lived their entire lives in the same way, in the same city, with the same customs and habits, except one has smoked a pack of cigarettes for 20 years and the other has never smoked. Please answer the following questions according to this information.*
19. Sigara içmeyen ikiz kardeş sizce kaç yaşına kadar yaşar?	19. Until what age do you think the twin brother who does not smoke will live?
20. Peki sigara içen ikiz kardeş sizce kaç yaşına kadar yaşar?	20. Until what age do you think the twin brother who smokes will live?

Notes. Questions 16.a and 16.b are the same as questions 15.a and 15.b but with the term lung cancer replaced with heart disease. Similarly, questions 18.a and 18.b are the same as questions 15.a and 15.b but with the term lung cancer replaced with lung disease. Questions 19.a and 19.b are the same as questions 15.a and 15.b but with the term lung cancer replaced with diabetes.

The survey was circulated online between the dates of 7th and 19th of June 2024 gaining up to 397 responses before the elimination of unusable data. There are no selected criteria for the dataset, since the distribution is solely the researcher's responsibility the reach of the distribution will be limited. Therefore, for realistic reasons, there won't be a targeted group of people for the study. Because of constraints on time, budget, and resources due to the nature of this research a mix of non-probability sampling techniques such as convenience and snowball sampling was used. Convenience sampling was used since the gathering of responses involved choosing participants who were readily available and willing to take part in the survey. Snowball sampling component of the data collection results from the fact that the large part of their circulation was made possible with respondents forwarding the survey to other respondents, leveraging the networks and social connections of the initial respondents. Due to these techniques used, the study has limitations due to potential biases and the inability to generalize the results to the broader population.

The total amount of received data underwent a cleaning process to ensure no responses were incomplete and all questions were answered in a serious manner. The data cleaning process was as follows, first the incomplete responses were deleted since keeping them in the dataset will result in unreliable and inconsistent findings. The survey involved an attention check question roughly in the middle of other questions to make sure the respondent was still paying attention and answering the questions in a serious manner. The attention check was thought to be needed in fear of respondents' general attention span, and the nature of the risk perception questions which needs a little more critical thinking than demographic questions. Eventually, the second part of the cleaning process was to eliminate those responses which have failed to answer the attention check correctly. Lastly the data was observed for any outliers, which in this research's context would have been responses for risk perception questions that were out of the range [0,100] since the questions clearly state to pick a number from 0 to 100. There were no such responses that exceeded the desired range, so it was concluded that there were no outliers. However, there remained some responses very close to the extreme ends of the range. Due to the fact that it is quite hard for the researcher to judge whether these were serious answers or not, since the answers remained in the range and the respondents passed the attention check these responses were not eliminated. Initially, responses gathered from individuals that did not reside in Turkey but were Turkish citizens were planned to be excluded from the final data set due to potential selection biases that might occur from the differences in settings for these people. However, the choice was made to keep

them in the data set to not lose around 40 responses which would have been around 13% of the sample in hopes to not lose any power for the research.

As a result of this cleaning procedure of data there remains 291 respondents. Another characteristic of the survey questions is that for the demographic variables the respondents had to choose the group they belonged to, resulting in categorical variables. This action was taken with consideration of the survey being an online and un-proctored one. The aim was to make the questions as easy as possible to answer and get Infront of possible limitations such as missing values for the variables due to respondent errors or respondents not wanting to give specific personal details even though the survey was anonymous. With these characteristics of the survey in mind, the data set used for this study had categorical variables: *age, gender, Turkey, city, education, employment, income, coffee, alcohol, smoking, smoking, smoking_age,* and *smoking_rel* alongside variables for risk perception: *lungcancer_1, lungcancer_2, lungdisease_1, lungdisease_2, heartdisease_1, heartdisease_2, diabetes_1, diabetes_2,* and *lifeloss.* See explanations of these variables in Appendix B.

Table 3.2. Sample Characteristics

Variables	Current Smoker	Occasional Smoker	Former Smoker	Never Smoked	Total
			Percentages		
Age					
18-25	17.91	14.43	22.73	0.00	13.95
26-35	14.93	14.43	15.91	4.00	12.79
35-45	16.42	4.12	0.09	2.00	7.75
46-55	25.37	29.90	25.00	20.00	25.97
55 and above	25.37	37.11	27.27	74.00	39.53
Gender					
Male	35.82	31.96	38.64	50.00	37.60
Female	64.18	68.08	61.36	50.00	62.40
Education					
Middle School	1.49	0.00	0.00	1.03	0.78
High School	17.91	20.45	4.00	11.34	13.18
Bachelors	55.22	47.73	50.00	43.30	48.45
Masters	14.93	15.91	26.00	23.71	20.54
Doctorate	10.45	15.91	20.00	20.62	17.05
Employment					
Full time	59.26	52.00	41.38	51.96	51.89
Part time	3.70	2.00	5.17	5.88	4.47
Unemployed	2.47	0.00	0.00	2.94	25.09
Student	25.93	26.00	5.17	11.76	16.84
Retired	8.64	26.00	48.28	27.45	1.72
Coffee					
1-2 cups	61.73	52.00	67.24	56.86	60.85
3 or more	28.40	30.00	18.97	15.69	20.54
Doesn't drink	9.88	18.00	13.79	27.45	18.60
Alcohol					
Daily	0.00	2.00	5.17	0.00	1.37
Weekly	27.16	28.00	32.76	14.71	24.05
Monthly	37.04	46.00	27.59	42.16	38.49
Doesn't drink	35.80	24.00	34.48	43.14	36.08
Smoking Age					
12-14	4.94	8.33	10.34	0.00	7.25
15-17	37.04	22.92	31.03	0.00	31.65
18-20	34.57	37.50	36.21	0.00	34.72
21 and above	23.46	31.25	22.41	0.00	26.42

For this data, 37.6% of the respondents have never smoked, 25.97% are currently smoking, 17.05% are occasional smokers, and 19.38% of them are former smokers. Table 3.2. summarizes the sample's demographic characteristics, previous studies by Viscusi (1990) and Antoñanzas (2000) proved that age is a statistically significant factor for risk believes since people who grew up under different anti-smoke campaigns show different characteristics. As shown in the above tables, around 65% of the sample is above 46 years old and it is shown that when current and occasional smokers have more evenly distributed percentages amongst age groups, former smokers and people who have never smoked tend to be older. Research by Dohmen et al. (2011) is an example of various literature that imply gender could play a role in this study since men and women have different attitudes towards risk. Gender characteristics of this data show that there is a slight abundance of females, where 62.4% of the sample are females. As for the smoking habits, both genders have similar active smoker percentages however it is shown that females tend towards never smoking more than males.

Education was also shown to be correlated with smoking behavior in Turkey as İkinci (2013) states that with education level increasing smoking percentage increases in Turkey. This is also represented in this sample as seen in Table 3.2 majority of active smokers have either a bachelor's degree or above. However, it could be argued that education potentially improves knowledge and understanding of smoking risks since in the data most people with master's degree or above are people who never smoked.

The age that smokers start smoking was not a focus point in the past literature mentioned in this study, however as discussed before İkinci (2013) states that the Turkish smoker population tends to start smoking at a very young age as a result of various social reasons so it is intriguing to take a closer look into the sample on this aspect. Table 3.2. shows that around 40 percent of the current and former smokers started smoking when they were underage with a notable fraction of this percentage starting between the ages of 12 and 14 which can be considered as early teen years.

Table 3.3. Means of Smoking Risk Beliefs of the Survey Sample by Smoking Status

Smoking Risk Beliefs	Smoking Groups				
	Current Smoker	Occasional Smoker	Former Smoker	Never Smoked	Total
Lung cancer risk x100	33.062	40.000	33.483	41.265	36.713
Lung disease risk x100	38.741	48.160	41.362	50.255	45.221
Heart disease risk x100	36.058	44.220	40.690	45.451	42.182
Diabetes risk x100	14.914	23.420	19.000	24.441	20.349
Life Expectancy Loss	9.827	12.380	13.259	13.990	12.409
Observations	81	58	50	102	291

In order to address the third hypothesis , a look into the characteristics of smoking risk perception levels among different smoking statuses is needed. Table 3.3. presents these sample characteristics on smoking risk beliefs. It is noteworthy that for all diseases smokers report a lower risk level than people who have never smoked. Occasional smokers and former smokers construct interesting smoking categories since it is possible that their perceptions have more underlying psychological factors. In this data set for former smokers except for life expectancy loss, reported risk level is significantly lower than occasional smokers and it is closer to current smokers. The inverse is true for occasional smokers' risk levels as it is always closer to never smokers except for life expectancy loss. For the reported level of lost years due to smoking, current smokers have a more optimistic level than any other category and smokers have never been the most pessimistic one. With these insights into the risk perception characteristics among smoking groups, hypothesis three is not rejected.

Table 3.4. Means of Smoking Risk Perception Levels Among Age Groups

	Age Groups					
Smoking Risk Beliefs	18-25	26-35	36-45	46-55	55 and above	Total
Lung cancer risk x100	40.203	39.057	41.174	40.394	31.796	36.713
Lung disease risk x100	45.373	44.971	46.522	46.423	43.243	45.221
Heart disease risk x100	40.220	39.514	42.826	45.577	40.709	42.182
Diabetes risk x100	20.068	24.714	20.348	20.099	19.709	20.349
Life Expectancy Loss	13.881	13.514	9.130	11.338	12.660	12.409
Observations	59	35	23	71	103	291

A similar method can be used as above to answer the second hypothesis proposed on the levels of risk perception among age groups where it was stated that younger age groups will have higher smoking risk perception levels than the older generation due to the cumulative increase in the anti-smoking efforts. Looking at Table 3.4. it is seen that the sample presents a complex picture. If the levels are ranked among the groups, the cumulative ranking suggests that the risk perception levels have this order from highest to lowest, the age group of 36-45, then 46-55, 18-25, 26-35, and 56+. With this insight, the second hypothesis is rejected since the middle-aged groups inhabit higher risk perception levels than the younger generation. However, it is important to note the younger age group of 18-25 and 26-35 have the highest life expectancy loss levels reported. This shows an inconsistency amongst different risk perception indicators.

4. Methodology

4.1. Data Collection

To fit the nature of the researched area, which is risk perception, a survey method was used for data collection since risk perception levels differ within individuals and the only way to attain this desired data is to ask directly the individual. The survey had three parts to its structure, the first part asked the respondent questions regarding demographic background thus getting data for the control variables. The second part of the survey was related to the individual's smoking behavior, as in whether they were a smoker or not, if so how much they smoke, which age they started smoking, and whether the individual had any close family relatives or friends who smoke. With the use of these questions, data was gathered on the dependent variable of the research question at hand which is smoking behavior and additional characteristics which may affect both risk perception and smoking behavior therefore may be used as control variables. The last part of the survey consisted of questions which asked the respondent to assess their perceived risks of smoking in diseases such as lung cancer, lung diseases, heart diseases, and diabetes with the addition of a life expectancy loss question. The responses to these questions built the data on the independent variables of this research which are risk perception levels. After cleaning these data, out of the 390 initial respondents there remained 258 respondents who made the research sample.

4.2. Data Transformation

The data collected from the survey on the demographic profile of the respondents are mostly categorical variables. This resulted from decisions taken to achieve complete responses from the survey by making it easier to answer questions for the respondents. For example, instead of asking the respondents how many years they have studied, the question created a prompt for the respondents to select their highest education level. These categorical variables when run in a regression would result in mini regression for each category, and thus decrease the significance of the model itself. Therefore, a decision to transform these data points into a non-categorical version of themselves was taken. Gender variable transformed into binary variable, which had the value 1 for male and 0 for female. Education levels were assigned values for years studied according to the Turkish education system, with "Middle School" having the value 8, "High School" 12, "Bachelors" 16, "Masters" 18, and "Doctorate" 20.

Then a dummy variable for residence was created; if the respondent resided in Turkey the variable would get 1, otherwise, the variable would get the value 0. Other variables such as employment status, coffee consumption, alcohol consumption, cigarette consumption, age started smoking and having a smoking relative or friend were also turned into dummy variables. For employment status, the dummy

variable has a value of 1 if the respondent selected "Full-time" or "Part-time", and 0 otherwise. The dummy variable for coffee consumption has the value 0 if the respondent "Doesn't drink coffee, 1 otherwise. Same holds true for the dummy variable for alcohol consumption; 0 if the respondent "Doesn't drink alcohol", 1 otherwise. For cigarette consumption the dummy variable has the value 1 for "Smoker" and "Occasional Smoker", and 0 otherwise. If the respondent ever smoked, their age when they started smoking was asked. Here the dummy variable is used to indicate if the person started smoking while being under the age of 18, so if the variable gets assigned the value 1 if they reported "12-14" or "15-17" as the age they started smoking and 0 otherwise. Finally for the dummy variables of having a smoking relative or friend the variable has the value 1 for "Yes", and 0 for "No". The list of these variables and their explanation can be found in Appendix B.

As for the variables indicating the risk perception level of the individual, the survey had collected various data points. These risk perception levels were inquired about four conditions, lung cancer, lung disease, heart disease, and diabetes. Following transformations were made to the data gathered from the survey: a dummy variable was created to indicate if the respondent thought that smoking was a diabetes factor. The variable had the value 1 if they reported that they did think so, and 0 otherwise. After running multiple variations of the model, a route to combine risk perception levels into one cumulative risk perception variable was taken since this single variable had a more significant level than any other variables when they were regressed by themselves. So, a cumulative risk perception variable was created by taking the average of data points reported under risk perception for lung cancer, lung disease, and heart disease. Life expectancy loss variable was created by simply subtracting the age reported by respondent of the twin who smoked in the proposed hypothetical scenario of the survey, from the twin who did not smoke.

4.3. Econometric Model

To test the null hypothesis, "*Higher levels of risk perception reported in the survey will lead to lower probability of cigarette consumption*" several econometric models were tested to be the best fit model for the data at hand. First a Linear Probability Model (LPM) was run due to its simplicity in estimating and interpreting. The main feature of an LPM is that it uses Ordinary Least Squares (OLS) regression to estimate the probability of the dependent variable being 1. However, the LPM has certain assumptions and limitations which created an impulse to find a better fitting model to this research. The biggest drawbacks of the model in the context of this research were its assumptions of linearity, homoscedasticity, and its limitation on predicted probabilities. Due to these caveats a more developed

model would be preferred. The decision on which model to use should have complemented the binary nature of the outcome variable investigated in this research, which can have values 1 for smoker and 0 for non-smoker. To analyze a binary outcome the choices were between implementing a logit model or a probit model. After analyzing the data, it was found that the independent variables did not follow normal distribution which is a violation of the probit model's assumptions. That is why the preferred choice on the model of the research was made in favor of a logit model.

Therefore, a logit model will be used to further analyze the relationship between risk perception and smoking behavior in the context of the Turkish population. The dependent variable will be the probability of an individual being a smoker, coded as a binary outcome (1 = smoker, 0 = non-smoker). The independent variable will be the level of risk perception created by taking the averages of the different risk measures asked in the survey. (e.g., perceived likelihood of developing smoking-related diseases). Control variables such as age, gender, residency in Turkey, education level, employment status, and habits outside of smoking will be used in hopes to eliminate selection bias as effectively as possible with this dataset. The logit model can be specified as follows:

$$\Pr(Y_i = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki})}}$$

Where:

- Y_i is the dependent variable representing the smoking status of individual i.
- β_0 is the intercept term.
- $\beta_1, \beta_2, \ldots, \beta_k$ are the coefficients for the independent variables $X_{1i}, X_{2i}, \ldots, X_{ki}$.
- $X_{1i}, X_{2i}, \ldots, X_{ki}$ are the independent variables, which include various measures of risk perception and demographic control variables.
- e is the base of the natural logarithm.

The logit model does not share most of the assumptions made by linear regression and other general linear models that are based on ordinary least squares algorithms, regarding those of linearity, normality, homoscedasticity, and measurement level. For example, the logistic model does not require a linear relationship between the dependent and the independent variables as mentioned previously. In addition to that, error terms do not need to be normally distributed, and homoscedasticity is not required. However, the logistic model has several key assumptions itself. First, the logistic model requires the

dependent variable to be binary. Since this was the leading reason why this model was chosen for this research, this assumption is met. Second, the observations need to be independent of each other, meaning that no repeated or matched data should be used. Since a survey method was applied to gather data points, each individual therefore each observation is independent of each other. Other assumptions will be further discussed in the discussion section of this paper. It is important to note the potential threats to the causality of the research. One of them being omitted variable bias, since this study investigates a complex relationship, it is possible to not be able to capture all the effective aspects therefore causing an omitted variable bias. Another possible threat is the limitation on the survey distribution and the relatively small amount of final respondents. This can decrease the power of the research, thus becoming a possible threat to the causality of the paper.

The regression will be run on the statistical software of STATA. The logit regression analysis will be conducted to estimate the relationship between risk perception and smoking behavior. The results will include estimated coefficients, standard errors, z-values, and p-values for the independent variable. In the following section, significant variables will be interpreted to understand their impact on the probability of smoking cigarettes.

5. Results

Table 5. Logit regression outputs for the relationship between risk perception and smoking habits

Variable	(1)
Age	
18-25	1.645***
	(0.514)
26-35	0.858
	(0.452)
36-45	1.470**
	(0.568)
46-55	0.385
	(0.366)
Gender	0.075
	(0.289)
Education	-0.090
	(0.067)
Employment	0.409
	(0.320)
Turkey	0.188
	(0.453)
Coffee	0.545
	(0.372)
Alcohol	0.076
	(0.307)
Risk perception	-0.005
	(0.363)
Life expectancy loss	-0.051***
	(0.016)
Believes diabetes is a risk factor	-0.345
	(0.267)
Constant	0.617
	(1.340)
Observations	291
R^2	0.14

Notes. The regression model has been estimated using the Logit method. The dependent variable is the smoking status of the respondent. Column (1) shows the results with age, gender, education, employment, wether the respondent lives in Turkey, coffee and alcohol habits as the control variables, and risk perception, life expectancy loss, and belief in diabetes as a risk factor as the independent variables. Indication of the significance levels are: *** Significant at the 0.1 percent level (p<0.001), ** Significant at the 1 percent level (p<0.01). * Significant at the 5 percent level (p<0.05)

The logit regression results on the relationship between risk perception and smoking behavior are presented above in Table 5. It is important to note that at the first glance, it is visible that most of the

variables used in this model are not statistically significant even at the 10% confidence level. Possible reasons that have caused this many insignificant results will be discussed in the next chapter under Discussion and Limitations.

The independent variables used in this model to represent risk perception levels of the individual were the variables risk perception, life loss and diabetes. While risk perception represented the individual's cumulative belief on the likelihood of contracting various diseases with the use of cigarettes, life loss reported the life expectancy loss the respondent thought a smoker lost compared to a non-smoker, and finally the variable diabetes was a dummy variable showing whether the respondent believed that smoking causes diabetes or not. Looking at the results of the model, only the variable life loss is statistically significant, while risk perception and diabetes variables are shown to be statistically insignificant. Previous research by Viscusi (1990) have shown significant negative relationship between risk perception levels and smoking behavior, the findings of this research is similar as a 1-year increase in reported life expectancy loss leads to 0.051 decrease in the log-odds of smoking behavior. Meaning a unit increase in the life loss variable, the odds of smoking decrease about 5%. Even though they are not statistically significant, risk perception and diabetes variables also have negative coefficients as expected. Meaning that there is a negative relationship between these variables and smoking probability, so if the person shows a higher level of risk perception towards smoking their probability of smoking decreases. For the case of the null hypothesis "Higher levels of risk perception reported in the survey will lead to lower probability of cigarette consumption", the null hypothesis cannot be rejected due to the fact that two out of three variables that construct risk perception levels are found to be statistically insignificant.

Age factor was found to be significant in determining risk perception by Antoñanzas (2000) as well as determining smoking possibility by Viscusi (1990), that was the reason why this research found it logical to include this variable as a control as well. Due to the conducted survey's nature, the variable was categorical, and as seen in Table 5, these categories were the age groups 18-25 to 46-55, where the omitted age group was the respondents aged 56 and above. For the results of the model, only the coefficients of age groups 18-25 and 36-45 were statistically significant at the levels of 5% and 10% respectively. The coefficients of these groups represent the log-odds of smoking behavior relative to the reference group. With a positive coefficient of 1.645, the age group 18-25 have approximately 5.18 times higher odds of smoking compared to those aged 56 and above, holding all other variables constant. The case for the age group 36-45 is that it has a positive coefficient with the value 1.470 meaning individuals aged 36-45 have approximately 4.35 times higher odds of smoking compared to those aged 56 and above.

These findings suggest that younger individuals, particularly those aged 18-25 and 36-45, are more likely to engage in smoking behavior compared to those aged 56 and above. The age constraint has been used to capture differences in perspectives held towards smoking cigarettes across age groups due to the transformation of anti-smoke campaign over the years just as previous studies such as Antoñanzas (2000) and Viscusi (1990) did. In these studies, the younger generation were more accurately informed on the risks of smoking and showed a lower cigarette usage level. This is, however, not the case for this study as mentioned above.

Other control variables that were used as a tool to try eliminating selection bias such as education level, gender, employment status, residency in Turkey, or other habit variables concerning coffee and alcohol consumption were not found to be statistically significant in this research. This can be seen in Table 5 as no other control variables than the age variables have a p-value under 0.05 which is the conventional alpha level. This indicates a lack of strong evidence to suggest that these factors have a meaningful association with smoking behavior in the studied sample. These overall results of the model indicates that in the context of this research and specific model, only one aspect of risk perception, and age are the primary significant predictors of smoking behavior, while the effects of other variables do not appear to be significant. This was not what was aimed at in this study, so the reasons for this failure to capture significant relationships between various variables and smoking behavior will be further discussed in the following section.

6. Conclusion, Discussion and Limitations

6.1. Conclusion

This study aimed to investigate the relationship between risk perception and smoking behavior in Turkey, which was thought to be under the broader context of underusage of preventive healthcare in middle to low-income countries. To be more specific, the research investigated the relationship of these subjects by trying to understand how various dimensions of perceived risk, such as the likelihood of developing smoking-related diseases and the perceived loss of life expectancy due to smoking, influence an individual's decision to smoke. A survey was structured both in the context of the population of interest and past research in this topic. The survey was circulated online and gathered around 291 usable responses using convenience and snowball sampling methods. The survey gathered detailed information on demographic characteristics, smoking habits, and risk perceptions.

To analyze the data gathered from the mentioned survey, a logit model was employed, with the dependent variable being the probability of an individual being a smoker. Independent variables included measures of risk perception and a series of demographic variables such as age, gender, education level, and income were used as control variables. The results of the conducted logit analysis showed that the perceived life expectancy loss due to smoking was a significant predictor of smoking behavior. Meaning that, individuals who believed that smoking would significantly reduce the life expectancy of the smoker were less likely to smoke. In contrast, other measures of risk perception, such as the perceived likelihood of developing lung cancer, lung disease, or heart disease, did not show a significant impact on smoking behavior. These findings suggest that personalized and tangible aspects of risk perception, such as life expectancy loss, are more influential in shaping smoking behavior than general health risks for the context of the studied sample. This insight may be crucial for designing effective public health interventions in Turkey aimed at reducing smoking rates, where it is clear that the usage of cigarettes is still a big problem.

The hypotheses created to test while investigating the research question regarding the relationship of risk perception and smoking behavior served two purposes. The first hypothesis was used as a tool to address the main research question, whereas the second hypothesis was regarding common demographic variables. In the case of the first hypothesis, where the study believed a higher level of risk perception would result in a decrease in the probability of smoking in Turkey, it was neither accepted nor rejected due to the statistically insignificant results.

For the second hypothesis regarding the age demographics, where it was stated that the younger generation would likely overestimate smoking risks compared to the older generation due to the advancement in education on smoking risks and actions taken by the government in the recent past to reduce smoking, it was rejected since looking at the cumulative ranking of risk perception levels among age groups it was found that it was not the younger generation who had the highest levels. However, with the after knowledge on the significance of risk perception indicators where only the life expectancy loss perception was the only one significant it should be noted that the younger generation had the highest level of risk perception in this indicator. Third hypothesis regarding risk perception levels among groups that hold different smoking habits, where it was stated that the current smokers will have higher levels of risk perception levels than other groups was not rejected since it was the case in the demographic of this sample. However, it should be noted that the findings over these hypotheses cannot be generalize to the broader Turkish populations since the external validity of the study is found to be low.

6.2. Discussion and Limitations

The results of this study show the role of risk perception factors in smoking behavior probabilities. According to this study, the only significant factor being the relationship between perceived life expectancy loss and smoking behavior underlines the need of communicating the personalized consequences of smoking to the public. This finding is close to those of previous studies conducted on the topic of smoking risks such as the two articles mentioned throughout this paper, Antoñanzas (2000) and Viscusi (1990). The lack of significance for other risk perception measures, such as the perceived likelihood of developing specific diseases, suggests that individuals may not fully internalize these risks or may not perceive them as immediate threats. Another explanation for the risk perception variable being insignificant is also mentioned in the paper by Antoñanzas (2000) as the possibility of background risks of smoking not being well-understood in the sample thus resulting in a less accurate index of smoking risks due to this misunderstanding. It may also be the case that the expected life loss questions being more straightforward and quite common to ask in the context of smoking risk, however asking the respondent the likelihood of catching a disease due to smoking may come across to the respondent as too medical and statistical thus resulting in biased answers. The logit regression performed also revealed that younger individuals are more likely to smoke compared to older age groups. This finding underlines the need for targeted interventions aimed at preventing smoking initiation among the younger population. Additionally, the significant impact of age on smoking behavior suggests that interventions should be tailored to different age groups to address their specific needs and motivations.

As mentioned before, several limitations faced throughout this study must be acknowledged. Some limitations were faced in the early stages of the study, specifically in the survey part. First, the use of convenience and snowball sampling methods while collecting responses to the survey limits the generalizability and therefore the external validity of the findings. Since Turkey has a very diverse demographic with different lifestyles, believes, etc. Its most probable that the sample collected from the survey, which may belong to similar groups of people, may not represent the broader Turkish population that was aimed to be studied. Another point to note in this context is the use and the significance of control variables applied in the regression. Since most of these control variables were insignificant it is possible to say that selection bias was not eliminated again leading into externally invalid results. That is why future research should aim to use more representative sampling methods to enhance the generalizability of the results, and use. The second limitation faced when conducting the survey is the sample size collected. Even though as an independent research with no funding, achieving around 350

responses is beyond the expectations set in the beginning of the study it still showed to be a low number of responses to achieve statistical significance.

Another notable limitation arises in the collected data of risk perception of the respondents. Before, the reasons for the insignificance of the risk perception variable were mentioned. Even though the method of collecting this information was inspired by previous studies which achieved significancy, it could be noted that there were differences in the techniques used while conducting the survey. In the study of Antoñanzas (2000) the survey was conducted through telephone which allowed for communication between the surveyor and the respondent. However, in this study the survey was distributed online. Even though the survey was designed to address as many possible questions as possible there may have been areas where the respondent needed guidance. For further research in this area of risk perception more attention could be paid to these data which are open to be influenced by biases to create more robust data collection techniques. A final limitation to discuss is the probability of reverse causality in the topic at hand. It might be the case that smoking behavior also has causal effects on smoking risk perceptions therefore potentially causing insignificant results in this study. Further research done on this topic could try to improve the representativeness of the sample, targeting a certain demographic instead of trying to study a general population, or even trying a different methodical approach and performing an information intervention and studying the effects of that.

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Appendices

Appendix A

Survey Introduction and Consent

Dear Participant,

Thank you for taking the time to participate in our survey. This research is being conducted for a student's thesis in Erasmus University to understand smoking behavior in Turkey. Your responses will provide valuable insights that contribute to our understanding of this important topic.

Purpose of the Survey:

The purpose of this survey is to gather insight on smoking habits in Turkey and to assess people's views on the risks of smoking.

Estimated Time to Complete the Survey:

The survey will take approximately **5-10 minutes** to complete. We appreciate your time and effort in contributing to this research.

Anonymity and Confidentiality:

Your responses will be kept anonymous, and no identifying information will be linked to your responses. The data collected will be used solely for academic purposes. We will take all necessary measures to ensure that your information remains confidential.

Consent to Participate:

By clicking "Next" and proceeding with the survey, you indicate that you have read and understood the information provided above, and you consent to participate in this study.

If you have any questions about the survey or your participation, please contact
kivncblgn23@gmail.com

Thank you for your participation.

Sincerely,

Kivanc Bilgin

Erasmus University

Survey Questions:

1. Which age group do you belong to?

    a. Less than 18

    b. 18-25

    c. 26-35

    d. 36-45

    e. 46-55

    f. 55+

2. Please state your gender?

    a. Male

    b. Female

    c. Other

3. Do you live in Turkey?

    a. Yes

    b. No

4. What is the city of your residence?

5. What is your highest level of education?

    a. Middle school

    b. Highschool

    c. Bachelors

    d. Masters

    e. Doctorate

6. What is your current employment status?

    a. Employed full-time

    b. Employed part-time

    c. Unemployed

    d. Student

    e. Retired

7. Which income group do you belong to (shown to the respondent if they live in Turkey)?

    a. Student

    b. 0 - 17,999 TL

    c. 18,000 – 35,999 TL

d. 36,000 – 53,999 TL

e. 54,000 – 71,999 TL

f. 72,000 – 89,999 TL

g. 90,000 – 107,999 TL

h. 107,000 TL and above

8. Which income group do you belong to (shown to the respondent if they live outside Turkey)?

a. Student

b. 0 - 999 EUR

c. 1,000 – 2,499 EUR

d. 2,500 – 3,999 EUR

e. 4,000 – 5,499 EUR

f. 5,500 – 6,999 EUR

g. 7,000 – 8,499 EUR

h. 8,500 – 9,999 EUR

i. 10.000 EUR and above

9. On average how often do you consume coffee daily?

a. 1-2 cups a day

b. 3 or more cups a day

c. Don't drink coffee

10. How often do you consume alcohol?

a. Daily

b. Couple of times in a week

c. Monthly

d. Don't drink

11. Which category do you belong to?

a. Smoker

b. Smokes in special occasions

c. Ex-smoker

d. Never smoked

12. If you were ever an active smoker, at what age did you start smoking?

a. 12-14

b. 15-17

  c. 18-20

  d. 21 or older

13. Do you have any relatives in your close family that smoke?

14. Do you have any friends in your close circle that smoke?

15.

  a. Do you believe that smokers are more prone to get **lung cancer** than nonsmokers? yes

  b. Out of 100 smokers, how many do you think will get **lung cancer** due to their smoking habit? From 0 to 100. If answer ''don't know' which number spontaneously seems more logical? From 0 to 100.

16.

  a. Do you believe that smokers are more prone to get **heart disease** than nonsmokers? yes

  b. Out of 100 smokers, how many do you think will get **heart disease** due to their smoking habit? From 0 to 100. If answer ''don't know" which number spontaneously seems more logical? From 0 to 100.

17. **Attention check:** To make sure you are paying attention please select "strongly disagree" for this question

18.

  a. Do you believe that smokers are more prone to get **lung disease (for example: bronchitis, emphysema)** than nonsmokers? no

  b. Out of 100 smokers, how many do you think will get **lung disease (for example: bronchitis, emphysema)** due to their smoking habit? From 0 to 100. If answer ''don't know' which number spontaneously seems more logical? From 0 to 100.

19.

  a. Do you believe that smokers are more prone to get **diabetes** than nonsmokers? no

  b. Out of 100 smokers, how many do you think will get **diabetes** due to their smoking habit? From 0 to 100. If answer ''don't know" which number spontaneously seems more logical? From 0 to 100.

20. Imagine two twin brothers that have lived their entire lives in the same way, in the same city, with the same customs and habits, except one has smoked a pack of cigarettes a day for 20 years and the other has never smoked.

  a. Until what age do you think the twin brother who does not smoke will live? 85

  b. Until what age do you think the twin brother who smokes will live? 70

21. In your opinion, which option below is your main source of information about smoking risks?

    a. Genral culture

    b. Social media

    c. News

    d. Public service announcements

    e. Doctors

Notes. Questions 15, 16, 18, 19, and 20 were taken exactly from the paper by Antoñanzas (2000) to ensure comparability and robustness.

Appendix B

List of variables used with their explanation:

age: reported age of the respondent

gender: reported gender of the respondent

Turkey: dummy variable on whether the respondent resides in Turkey or not

city: reported city that the respondent resides in

education: reported highest earned education level of the respondent

employment: reported employment status of the respondent

*income*_TL: reported income level of the respondent in TL

*inco*me_EUR: reported income level of the respondent in EUR

coffee: reported coffee drinking level of the respondent

alcohol: reported alcohol consumption level of the respondent

smoke: reported smoking status of the respondent

smoke_age: reported age when the respondent started smoking if they ever smoker

smoke_rel: dummy variable of whether the respondent has a relative who smokes

smoke_friend: dummy variable of whether the respondent has a friend who smokes

lungcancer_1: dummy variable of whether the respondent thinks smoking causes lung cancer

lungcancer_2: reported number to question 15 in Appendix A

heartdisease_1: dummy variable of whether the respondent thinks smoking causes heart disease

heartdisease_2: reported number to question 16 in Appendix A

lungdisease_1: dummy variable of whether the respondent thinks smoking causes lung disease

lungsidease_2: reported number to question 18 in Appendix A

diabetes_1: dummy variable of whether the respondent thinks smoking causes diabetes

diabetes_2: reported number to question 19 in Appendix A

twin_non: reported life expectancy of the twin who does not smoke

twin_smoke: reported life expectancy of the twin who does smoke

infosource: reported main information source on risks of smoking

lifeloss: created variable which is the difference between variables twin_non and twin_smoke

riskperception: created variable which is the avarage of variables lungcancer_2, heartdisease_2, and lungdisease_2