Assessment of Greek Smokers’ Psychological Characteristics and Empathy While Smoking in Enclosed Public Spaces and Near Nonsmokers

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Abstract

Background
Smoking presents a strong association between emotional intelligence and increased anxiety and depression. Empathy is a form of perception where people feel the emotional states of others as their own. The act of smoking expresses indifference to social norms and the health of nonsmokers, which speaks to smokers’ psychology. We conducted this study to identify the impact of smoking in psychology, empathy, and smoking behavior and examine the effect of smokers’ psychological characteristics and empathy toward smoking in enclosed public spaces and in front of nonsmokers.

Methodology
A primary, quantitative, synchronous, correlational, and nonexperimental research was accomplished using validated, reliable questionnaires. We used random sampling to acquire the study population consisting of 453 employees of public dining areas, owners of public dining areas, and medical and nonmedical students at the University of Larissa, Greece. Data were collected via self-completed questionnaires on participant demographic information and smoking habits. We used SPSS Statistics for Windows, version 24.0 (IBM Corp., Armonk, NY) to analyze the data with significance set at 5%. We also used independent samples t-test, Mann-Whitney U test, Spearman’s coefficient, chi-square test, and factorial analysis of variance with significance set at 5%.

Results
We found high levels of empathy in smokers with low psychosomatic symptoms. Smoking significantly affected levels of empathy (p<.001), annoyance when they are in a place where smoking is prohibited, someone else smoking (p<.001), recommendations of someone who smokes in a nonsmoking area to quit (p<.001), and hostility (p<.001). There was a statistically significant effect of double interaction sample category and smoking on empathy (p<.001). Smoking more than 15 cigarettes affected the levels of agreement in the perception that nonsmokers around them are bothered when they smoke (p=.004) and anxiety (p=.002). Perceptions about the annoyance of nonsmokers were negatively correlated with interpersonal sensitivity (p=.003), depression (p<.001), anxiety (p<.001), paranoid ideation (p=.005), psychoticism (p<.001), and Global Severity Index (p=.006). Annoyance, when smoking is prohibited, was positively correlated with empathy (p<.001) while negatively correlated with somatization (p<.012) and hostility (p<.015). Smoking in prohibited places was related to somatization (p=.052), hostility (p<.01), and paranoid ideation (p<.001).

Conclusions
The purpose of this study was to examine the empathy and psychopathological characteristics of smokers in Greece. Smokers presented high levels of hostility and those who smoke more than 15 cigarettes per day indicated higher levels of anxiety than those who smoke less or not at all. Lower levels of empathy appeared in smokers, regardless of occupation. Smokers presented lower levels of annoyance when they are in a place where smoking is prohibited and someone else smokes. Participants with higher somatization, hostility, and lower empathy are less bothered when they are in a place where smoking is prohibited and someone else smokes. These findings could assist the development of communication materials aimed at smokers to help them understand that others nearby do not enjoy their smoking practices, especially in an enclosed area. These findings could also facilitate feasible antismoking laws with an overall goal to reduce smoking in a population.

Categories: Psychology, Pulmonology, Public Health
Keywords: psychopathology, public areas, smoking behavior, empathy, psychosomatic symptoms, smoking
Introduction

Smoking is a significant health risk factor worldwide and is responsible for several serious diseases such as cancer, coronary heart disease, peripheral vascular diseases, chronic obstructive pulmonary disease, stroke, and peptic ulcers. Smoking during pregnancy carries severe consequences for the health of the fetus. Nicotine addiction is a neurobiological addiction and has been officially classified as a medical disease according to the Tenth Review of the Statistical Classification of Diseases and Related Health Problems [1,2].

Secondhand smoke (i.e., passive smoking) causes a significant disease burden with increased mortality rates. Passive smoking occurs in places where smokers and nonsmokers socialize. Smokers’ indifference to social norms and the health of nonsmokers is a critical component of their social and psychological health. Individuals expect to be evaluated negatively when they do not comply with social norms, and social and psychological aspects are critical to people’s behavior when smokers and nonsmokers are in the same place [3].

Studies for the control of the psychological parameters related to smoking previously focused on a smoker’s levels of anxiety and depression. However, a strong correlation exists between coercion, interpersonal sensitivity, depression, anxiety, anger, paranoid ideation, psychosis, and daily cigarette consumption. This correlation explains the psychological parameters contributing to smoking and its severity [4].

International research shows that Greece ranks the highest in smoking rates among Western European countries and Organisation for Economic Co-operation and Development countries [5]. Further, the mortality rates attributed to smoking-related factors are higher in Greece than in the other countries in the European Union [6]. Therefore, we conducted this study to identify the impact of smoking in psychology, empathy, and smoking behavior among smokers in Greece. In addition, we examined the effect of smokers’ psychological characteristics and empathy toward their smoking behavior in enclosed public spaces and in front of nonsmokers.

Materials And Methods

Research design

We conducted this quantitative, primary, synchronous, nonexperimental, and correlative study between and within-subjects at the University of Larissa, Greece, from 2016 to 2020. The study used validated questionnaires completed by study participants that collected demographic information and smoking habits.

Study population

We used random sampling to acquire the study population of 453 employees of public dining areas, owners of public dining areas, and medical and nonmedical students at the University of Larissa, Greece. Data were collected via self-completed questionnaires on participant demographic information and smoking habits. The public dining areas and employees were randomly selected.

Questionnaire

The questionnaire consisted of 120 questions and four sections. The first section collected demographic characteristics using seven closed-ended questions for gender, age, marital status, education, occupational status, monthly income, and sample category. The second section recorded smoking characteristics and behavior. Smoking characteristics were examined with eight closed-ended questions for smoking status (yes/no), the number of cigarettes smoked per day, smoking location (where they live, work, anywhere smoking is prohibited), and the presence of others in a nonsmoking area. Smoking behavior was examined with three Likert-type questions (1 = not at all, 2 = a little, 3 = moderately, 4 = much, 5 = very much) for the perceived levels of the annoyance of nonsmokers when they smoke, when they are in a place where smoking is prohibited, and when someone else smokes, and if they recommend someone who smokes in a nonsmoking area to quit.

The third section covered empathy as measured by the Toronto Empathy Questionnaire (TEQ) [7]. The TEQ includes 16 Likert-type questions (0 = never, 1 = seldom, 2 = sometimes, 3 = often, 4 = always) encompassing a wide range of behaviors related to the theoretical aspects of empathy. The TEQ presents good internal validity and high reliability in its review [7].

The fourth section recorded the psychosomatic symptoms. For this, we used the Symptom Check List 90-R (SCL90-R). The SCL90-R includes 90 Likert-type questions (0 = not at all, 1 = a little, 2 = moderately, 3 = much, 4 = very much) about psychopathology and provides an overview of a patient’s symptoms and their intensity at a specific point in time. The SCL90-R covers the following nine pathologies: somatization, obsessive-compulsive behavior, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism [8].

Reliability
We conducted a reliability analysis (Table 1). Internal reliability was satisfying in all factors as the value of Cronbach’s alpha was more significant than 0.7 [9]. Using principal component analysis with varimax rotation and two components, all questions of the SCL90-R were placed in the first factor explaining 26.36% of the total variance. In contrast, the questions of TEQ were placed in the second factor explaining 7.33% of the total variance, results which indicate concept validity (Table 2) [10].

| Factors       | Questions                                                                 | Cronbach’s alpha |
|---------------|---------------------------------------------------------------------------|------------------|
| TEQ           |                                                                           |                  |
| Empathy       | 1, 2R, 3, 4R, 5-6, 7R, 8-9, 10R, 11, 12R, 13, (14-15)R, 16               | 0.896            |
| SCL90-R       |                                                                           |                  |
| Somatization  | 1, 4, 12, 27, 40, 42, 48, 49, 52, 53, 56, 58                            | 0.868            |
| Obsessive-compulsive | 3, 9, 10, 28, 38, 45, 46, 51, 55, 65                                  | 0.819            |
| Interpersonal sensitivity | 6, 21, 34, 36, 37, 41, 61, 69, 73                                   | 0.814            |
| Depression    | 5, 14, 15, 20, 22, 26, 29, 30, 31, 32, 54, 71, 79                    | 0.869            |
| Anxiety       | 2, 17, 23, 33, 39, 57, 72, 78, 80, 86                                | 0.866            |
| Hostility     | 11, 24, 63, 67, 74, 81                                             | 0.823            |
| Phobic anxiety | 13, 25, 47, 50, 70, 75, 82                                 | 0.809            |
| Paranoid ideation | 8, 18, 43, 68, 76, 83                               | 0.758            |
| Psychoticism  | 7, 16, 35, 62, 77, 84, 85, 87, 88, 90                               | 0.821            |
| Global Severity Index | 1–90                      | 0.972            |

**TABLE 1: Reliability analysis.**

TEQ: Toronto Empathy Questionnaire; SCL90-R: Symptom Check List 90-R; R: reverse item

| Questions | Component (KMO = 0.863) |
|-----------|-------------------------|
|           | 1                       | 2                      |
| SOM_12    | 0.706                   |                         |
| DEP_13    | 0.683                   |                         |
| ANX_3     | 0.667                   |                         |
| SOM_11    | 0.664                   |                         |
| DEP_8     | 0.658                   |                         |
| INT_6     | 0.657                   |                         |
| PAR_3     | 0.657                   |                         |
| ANX_6     | 0.657                   |                         |
| PSY_10    | 0.656                   |                         |
| ANX_2     | 0.654                   |                         |
| DEP_7     | 0.653                   |                         |
| INT_5     | 0.652                   |                         |
| PSY_5     | 0.651                   |                         |
| ANX_8     | 0.649                   |                         |
| ANX_9  | 0.649 |
| DEP_6  | 0.649 |
| ANX_1  | 0.645 |
| PSY_7  | 0.626 |
| SOM_3  | 0.625 |
| DEP_12 | 0.622 |
| PAR_5  | 0.621 |
| DEP_9  | 0.620 |
| HOST_4 | 0.611 |
| OBS_4  | 0.606 |
| OBS_8  | 0.603 |
| DEP_3  | 0.597 |
| ANX_5  | 0.595 |
| DEP_5  | 0.591 |
| OBS_9  | 0.590 |
| OBS_1  | 0.588 |
| ANX_4  | 0.586 |
| PHO_4  | 0.585 |
| INT_2  | 0.578 |
| PHO_1  | 0.569 |
| PSY_6  | 0.567 |
| OBS_6  | 0.566 |
| PHO_6  | 0.563 |
| INT_4  | 0.561 |
| SOM_8  | 0.560 |
| SOM_9  | 0.559 |
| ANX_7  | 0.557 |
| PSY_8  | 0.556 |
| DEP_10 | 0.556 |
| PSY_4  | 0.555 |
| PSY_2  | 0.555 |
| OBS_2  | 0.554 |
| PHO_5  | 0.552 |
| INT_8  | 0.538 |
| SOM_2  | 0.538 |
| HOST_5 | 0.529 |
| PSY_1  | 0.527 |
| PSY_9  | 0.527 |
| OBS_5  | 0.522 |
| ANX_10          | 0.520  |
|-----------------|--------|
| PHO_7           | 0.517  |
| HOST_1          | 0.510  |
| INT_7           | 0.509  |
| PAR_4           | 0.509  |
| SOM_6           | 0.507  |
| DEP_11          | 0.507  |
| SOM_5           | 0.503  |
| INT_3           | 0.503  |
| DEP_1           | 0.499  |
| PHO_2           | 0.492  |
| PHO_3           | 0.488  |
| HOST_6          | 0.488  |
| SOM_7           | 0.488  |
| SOM_10          | 0.476  |
| HOST_2          | 0.473  |
| PAR_2           | 0.472  |
| DEP_2           | 0.469  |
| OBS_7           | 0.466  |
| PAR_6           | 0.461  |
| PAR_1           | 0.458  |
| SOM_4           | 0.451  |
| INT_1           | 0.450  |
| OBS_3           | 0.441  |
| HOST_3          | 0.440  |
| DEP_4           | 0.439  |
| SOM_1           | 0.426  |
| OBS_10          | 0.406  |
| INT_9           | 0.400  |
| PSY_3           | 0.283  |
| TEQ_6           | 0.739  |
| TEQ_16          | 0.737  |
| TEQ_5           | 0.737  |
| TEQ_14          | -0.667 |
| TEQ_12          | -0.658 |
| TEQ_11          | 0.646  |
| TEQ_9           | 0.645  |
| TEQ_13          | 0.611  |
| TEQ_8           | 0.595  |
| TEQ_1           | 0.563  |
TABLE 2: Factor analysis using principal component analysis, varimax rotation, and two components.

| TEQ    | Variance (%) |
|--------|--------------|
| TEQ_7  | -0.562       |
| TEQ_9  | 0.554        |
| TEQ_15 | -0.546       |
| TEQ_4  | -0.488       |
| TEQ_2  | -0.467       |
| TEQ_10 | -0.458       |

TEQ: Toronto Empathy Questionnaire; SOM: somatization; OBS: obsessive-compulsive; INT: interpersonal sensitivity; DEP: depression; ANX: anxiety; HOST: hostility; PHO: phobic anxiety; PAR: paranoid ideation; PSY: psychoticism

Ethics

The University of Larissa, Department of Medicine Ethics Committee (17/5/2021) approved the study. The study was conducted following the Helsinki declaration for ethical principles for medical research involving human subjects. All participants were informed of the purpose of the investigation, assured of the confidentiality of all personal data, and gave their written consent. The questionnaires were completed by the participants in the researcher’s presence and with his help when necessary [11].

Statistical analysis

We used SPSS Statistics for Windows, version 24.0 (IBM Corp., Armonk, NY, USA) to analyze the data. Percentages and frequencies were used for categorical variables, while mean, standard deviation, and range were used for scale variables. Significance was set at 5%. The Shapiro-Wilk test was used to check the normality of variables. Independent samples t-test was used to compare means between two large samples (n≥30) or samples that are typically distributed, otherwise, the nonparametric Mann-Whitney U test was used. The Spearman coefficient was used to examine the correlation between non-normal-scale and ordinal variables. Analysis of variance 4 × 2 was used to examine the interaction of the sample category and smoking to empathy. We used the chi-square test to examine dependencies between categorical variables [12].

Results

Demographic data

In total, 453 people participated in the study. Table 3 presents the demographic characteristics of the study population. There were slightly more male respondents than female respondents (233 males, 51.43%; 220 females, 28.75%). Most participants were aged 18 to 30 years (n=228, 70.2%), unmarried (n=357, 78.81%), with a bachelor's degree (n=312, 68.87%), and working full or part time (n=249, 55.21%) with a monthly income of up to 1,000 euros (n=362, 95%). The population consisted of employees (n=140, 30%), medical students (n=129, 28.48%), owners of dining areas (n=116, 25.61%), and nonmedical students (n=68, 15.01%).

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### TABLE 3: Demographic characteristics of participants.

Table 4 presents the smoking practices of the population. Most survey respondents were nonsmokers (n=288, 63.58%); only 165 respondents indicated they smoke (36.42%). Most smokers reported smoking 6-10 cigarettes per day (n=30, 43.48%) or 11-15 cigarettes per day (n=20, 28.99%). Over half of the respondents who smoke reported smoking where they live (58.18%), work (64.24%), and where smoking is prohibited by law (59.39%). Fewer than half indicated they smoke in front of friends (42.42%).

| Demographics          | Options                        | N (%)          |
|-----------------------|--------------------------------|----------------|
| Gender                | Male                           | 233 (51.43%)   |
|                       | Female                         | 220 (48.57%)   |
| Age (in years)        | 18–25                          | 203 (44.8%)    |
|                       | 26–30                          | 115 (25.4%)    |
|                       | 31–40                          | 109 (24.1%)    |
|                       | 41–66                          | 26 (5.7%)      |
| Marital status        | Single                         | 357 (78.81%)   |
|                       | Married with children          | 77 (17.00%)    |
|                       | Married without children       | 19 (4.19%)     |
| Education             | High school                    | 50 (11.04%)    |
|                       | Vocational training Institute   | 57 (12.58%)    |
|                       | Bachelor                       | 312 (68.87%)   |
|                       | Master                         | 34 (7.51%)     |
|                       | Unemployed                     | 148 (32.82%)   |
| Occupational status   | Occasionally                   | 54 (11.97%)    |
|                       | Part time                      | 59 (13.08%)    |
|                       | Full time                      | 190 (42.13%)   |
|                       | 0–500                          | 185 (48.6%)    |
|                       | 501–1,000                      | 177 (46.5%)    |
|                       | >1,000                         | 19 (5.0%)      |
| Sample category       | Employees                      | 140 (30.91%)   |
|                       | Medical students               | 129 (28.48%)   |
|                       | Owners                         | 116 (25.61%)   |
|                       | Students of other studies       | 68 (15.01%)    |
TABLE 4: Smoking characteristics.

Descriptive statistics
Table 4 presents the descriptive statistics of smoking behaviors. Participants reported that they believe nonsmokers near them are moderately bothered when they smoke (mean=3.22, SD=0.99). Participant smokers were moderately bothered when they were in a place where smoking is prohibited, and when someone else was smoking (mean=3.00, SD=1.37). However, they reported that they seldom request an active smoker to stop smoking in an area where smoking is prohibited (mean=1.76, SD=0.79). As shown in Table 5, smokers showed a high level of empathy (mean=2.69, SD=0.65) but low levels of phobic anxiety, psychoticism, anxiety, somatization, interpersonal sensitivity, and depression.

### Table 5: Descriptive statistics of smoking behaviors.

| Question                                                                 | Mean | SD  | Range |
|--------------------------------------------------------------------------|------|-----|-------|
| How much do you think nonsmokers who are around you are bothered when you smoke? | 3.22 | 0.99 | 1–5   |
| How much does it bother you when you are in a place where smoking is prohibited and someone else smokes? | 3.00 | 1.37 | 1–5   |
| Do you recommend someone who smokes in a nonsmoking area to quit?        | 1.76 | 0.79 | 1–5   |
### TABLE 6: Descriptive statistics of factors.

SD: standard deviation

| Factor               | Mean  | SD    | Range |
|----------------------|-------|-------|-------|
| Empathy              | 2.69  | 0.65  | 0–4   |
| Somatization         | 0.73  | 0.64  | 0–4   |
| Obsessive-compulsive | 1.00  | 0.65  | 0–4   |
| Interpersonal sensitivity | 0.85  | 0.64  | 0–4   |
| Depression           | 0.86  | 0.69  | 0–4   |
| Anxiety              | 0.72  | 0.66  | 0–4   |
| Hostility            | 0.90  | 0.79  | 0–4   |
| Phobic anxiety       | 0.50  | 0.61  | 0–4   |
| Paranoid ideation    | 0.94  | 0.72  | 0–4   |
| Psychoticism         | 0.62  | 0.57  | 0–4   |
| Global Severity Index| 0.79  | 0.55  | 0–4   |

**First Research Question**

Nonsmokers presented high levels of empathy ($t=7.685$, $p<.001$) and annoyance when they were in a place where smoking is prohibited, and when someone else smoked ($t=10.99$, $p<.001$). They also had high levels of requesting someone cease smoking in a nonsmoking area ($t=-5.70$, $p<.001$) and low levels of hostility ($t= -3.686$, $p<.001$; Tables 7-9).
| Factor                                | Nonsmokers, mean (SD) | Smokers, mean (SD) | t-test | df    | P-value |
|---------------------------------------|-----------------------|--------------------|--------|-------|---------|
| Empathy                              | 2.87 (0.47)           | 2.36 (0.77)        | 7.685  | 235.26|         |
| Annoyance when smoking is prohibited  | 3.47 (1.28)           | 2.19 (1.14)        | 10.99  | 374.89|         |
| Recommend to quit smoking             | 1.91 (0.80)           | 1.50 (0.70)        | 5.70   | 451   |         |
| Somatization                         | 0.69 (0.61)           | 0.79 (0.67)        | -1.578 | 316.05| 0.116   |
| Obsessive-compulsive                  | 1.01 (0.67)           | 0.96 (0.61)        | 0.804  | 451   | 0.422   |
| Interpersonal sensitivity             | 0.88 (0.64)           | 0.78 (0.64)        | 1.553  | 451   | 0.121   |
| Depression                            | 0.85 (0.68)           | 0.87 (0.72)        | -0.384 | 451   | 0.702   |
| Anxiety                               | 0.72 (0.68)           | 0.71 (0.61)        | 0.083  | 451   | 0.934   |
| Hostility                             | 0.79 (0.68)           | 1.09 (0.91)        | -3.686 | 270.20|         |
| Phobic anxiety                        | 0.51 (0.62)           | 0.48 (0.60)        | 0.401  | 451   | 0.688   |
| Paranoid ideation                     | 0.92 (0.71)           | 0.99 (0.74)        | -0.993 | 329.66| 0.322   |
| Psychoticism                          | 0.60 (0.58)           | 0.66 (0.55)        | 1.034  | 451   | 0.301   |
| Global Severity Index                 | 0.78 (0.56)           | 0.81 (0.54)        | 0.521  | 348.46| 0.603   |

**TABLE 7:** Independent samples t-test between no smokers and smokers in psychological, empathy factors, and smoking behaviors.

df: degrees of freedom; SD: standard deviation

| Variable                          | df | MS   | Frequency | P-value | η²   |
|-----------------------------------|----|------|-----------|---------|------|
| Sample category                   | 3  | 3.290| 10.525    | .066    |      |
| Smoking                           | 1  | 32.436| 103.752   | .189    |      |
| Sample category* smoking          | 3  | 3.878| 12.404    | .077    |      |
| Error                             | 445| 0.313|           |         |      |
| Total                             | 453|      |           |         |      |

**TABLE 8:** ANOVA 4 (employees, medical students, owners, and students of other studies) × 2 (no smokers, smokers) for empathy.

ANOVA: analysis of variance; MS: mean square; df: degrees of freedom
Age, marital status, and income level were not significantly associated with smoking (Tables 10-13). However, we saw a significant association between smoking status and gender, education level, occupational status, and type of respondent (Tables 14-16). We found that males who finished high school with vocational training were more likely to report smoking, while unemployed respondents and medical students were less likely to smoke.

### TABLE 9: Mean value and 95% confidence intervals for empathy in sample categories for nonsmokers and smokers.

| Category                  | Smoking | Mean     | 95% lower | 95% upper |
|---------------------------|---------|----------|-----------|-----------|
| Employees                 | No      | 2.91     | 2.78      | 3.04      |
|                           | Yes     | 2.71     | 2.57      | 2.85      |
| Medical students          | No      | 2.91     | 2.80      | 3.01      |
|                           | Yes     | 2.38     | 2.14      | 2.61      |
| Owners                    | No      | 2.66     | 2.53      | 2.78      |
|                           | Yes     | 2.18     | 2.01      | 2.35      |
| Students of other studies | No      | 3.15     | 2.95      | 3.34      |
|                           | Yes     | 1.94     | 1.75      | 2.12      |

### TABLE 10: Age and smoking chi-square test.

| Chi-square (3)=5.244, p=0.155 | Age (in years) |
|------------------------------|----------------|
|                              | 18–25 | 26–30 | 31–40 | 41–66 |
| Smoking                      | No    |       |       |       |
| N                            | 138   | 64    | 68    | 18    |
| %                            | 47.9% | 22.2% | 23.6% | 6.3%  |
| Yes                          | N     | 65    | 51    | 41    | 8     |
| %                            | 39.4% | 30.9% | 24.8% | 4.8%  |
| Total                        | N     | 203   | 115   | 109   | 26    |
| %                            | 44.8% | 25.4% | 24.1% | 5.7%  |

### TABLE 11: Marital status and smoking chi-square test.

| Chi-square (2)=1.883, p=0.390 | Single | Married with children | Married without children |
|-------------------------------|--------|-----------------------|-------------------------|
| No                            | N      | 134                   | 54                      | 11                      |
| %                             | 81.2%  | 18.8%                 | 3.8%                    |
| Smoking                       | Yes    | N                     | 223                     | 23                      |
| %                             | 77.4%  | 13.9%                 | 8.7%                    |
| Total                         | N      | 357                   | 77                      | 19                      |
| %                             | 78.8%  | 17.0%                 | 4.2%                    |
| Education          | High school | Vocational training institute | Bachelor | Master |
|--------------------|-------------|-------------------------------|----------|--------|
| Smoking No         | N 20        | 29                            | 212      | 27     |
|                    | % 6.9%      | 10.1%                         | 73.6%    | 9.4%   |
| Smoking Yes        | N 30        | 28                            | 100      | 7      |
|                    | % 18.2%     | 17.0%                         | 60.6%    | 4.2%   |
| Total              | N 50        | 57                            | 312      | 34     |
|                    | % 11.0%     | 12.6%                         | 68.9%    | 7.5%   |

**TABLE 12: Education and smoking chi-square test.**

| Monthly income (in Euros) | 0–500 | 501–1,000 | >1,000 |
|----------------------------|-------|-----------|--------|
| Chi-square (2)=0.977, p=0.614 |       |           |        |
| Smoking No                 | N 106 | 110       | 12     |
|                            | % 46.5% | 48.2% | 5.3%   |
| Smoking Yes                | N 79  | 67        | 7      |
|                            | % 51.6% | 43.8% | 4.6%   |
| Total                      | N 185 | 177       | 19     |
|                            | % 48.6% | 46.5% | 5.0%   |

**TABLE 13: Monthly income and smoking chi-square test.**

| Gender | Male | Female |
|--------|------|--------|
| Chi-square (1)=9.932, p=.002 |       |        |
| Smoking No                  | N 132 | 156    |
|                             | % 45.8% | 54.2% |
| Smoking Yes                 | N 101 | 64     |
|                             | % 61.2% | 38.8% |
| Total                       | N 233 | 220    |
|                             | % 51.4% | 48.6% |

**TABLE 14: Gender and smoking chi-square test.**
| Occupational status | Unemployed | Occasionally | Part time | Full time |
|---------------------|------------|--------------|-----------|-----------|
| Smoking             |            |              |           |           |
| No                  | N          | 106          | 22        | 42        | 118       |
| %                   | 36.8%      | 7.6%         | 14.6%     | 41.0%     |
| Yes                 | N          | 42           | 32        | 17        | 72        |
| %                   | 25.8%      | 19.6%        | 10.4%     | 44.2%     |
| Total               | N          | 148          | 54        | 59        | 190       |
| %                   | 32.8%      | 12.0%        | 13.1%     | 42.1%     |

**TABLE 15: Occupational status and smoking chi-square test.**

| Sample category                        | Employees | Medical students | Owners | Students of other studies |
|----------------------------------------|-----------|------------------|--------|---------------------------|
| Smoking                                |           |                  |        |                           |
| No                                     | N         | 75               | 107    | 74                        | 32            |
| %                                      | 26.0%     | 37.2%            | 25.7%  | 11.1%                     |
| Yes                                    | N         | 65               | 22     | 42                        | 36            |
| %                                      | 39.4%     | 13.3%            | 25.5%  | 21.8%                     |
| Total                                  | N         | 140              | 129    | 116                       | 68            |
| %                                      | 30.9%     | 28.5%            | 25.6%  | 15.0%                     |

**TABLE 16: Sample category and smoking chi-square test.**

Participants who smoked more than 15 cigarettes per day were less likely to think (U=389.5, p=.004) that nonsmokers nearby are bothered when they smoke (mean rank >15 =29.98, mean rank 1-15 =47.60) than those who smoked fewer than 15 cigarettes per day. Participants who smoked more than 15 cigarettes per day also had higher levels of anxiety (U=355, p=.002) than those who smoked fewer than 15 cigarettes per day (mean rank >15 =58.85, mean rank 1-15 =38.85; Table 17).
| Factor                        | 1–15 cigarettes smoked (N=66) | >15 cigarettes smoked (N=20) | Statistic        | P-value |
|-------------------------------|-------------------------------|-------------------------------|------------------|---------|
| Empathy                      | 41.89                         | 48.83                         | U=553.5          | 0.275   |
| Annoyance of nonsmokers      | 47.60                         | 29.98                         | U=389.5          | 0.004   |
| Annoyance when smoking is prohibited | 45.91                         | 35.55                         | U=501            | 0.087   |
| Recommend to quit smoking    | 44.66                         | 39.68                         | U=583.5          | 0.354   |
| Somatization                 | 42.14                         | 47.98                         | U=570.5          | 0.358   |
| Obsessive-compulsive         | 43.89                         | 42.20                         | U=634            | 0.789   |
| Interpersonal sensitivity    | 44.55                         | 40.05                         | U=591            | 0.476   |
| Depression                   | 41.07                         | 51.53                         | U=499.5          | 0.099   |
| Anxiety                      | 38.85                         | 58.85                         | U=353            | 0.002   |
| Hostility                    | 1.15 (1.05)                   | 1.49 (0.71)                   | t (46.89)=1.67   | 0.102   |
| Phobic anxiety               | 43.76                         | 42.65                         | U=643            | 0.859   |
| Paranoid ideation            | 40.89                         | 52.13                         | U=487.5          | 0.074   |
| Psychoticism                 | 42.42                         | 47.05                         | U=589            | 0.465   |
| Global Severity Index        | 41.70                         | 49.45                         | U=541            | 0.223   |

TABLE 17: Mann-Whitney U test and independent samples t-test for psychological, empathy factors, and smoking behaviors regarding the number of cigarettes smoked.

Second Research Question

Smokers’ annoyance of nonsmokers was significantly negatively correlated with depression (p<.001) and hostility (p<.001). Smokers’ annoyance when smoking is prohibited was positively correlated with empathy (p<.001; Table 18). Participants who do not smoke in prohibited places have significantly lower levels of hostility (p<.001) and paranoid ideation (p<.001) than those who smoke where it is prohibited (Table 19).
| Factor              | Statistic | Annoyance of nonsmokers | Annoyance when smoking is prohibited | Recommend to quit smoking |
|---------------------|-----------|-------------------------|-------------------------------------|---------------------------|
| Empathy             | r         | -0.025                  | .150                                | 0.040                     |
|                     | p-value   | 0.747                   | .001                                | 0.399                     |
|                     | N         | 165                     | 452                                 | 453                       |
|                     | r         | -0.125                  | -1.19                               | -0.058                    |
| Somatization        | p-value   | 0.110                   | .012                                | 0.216                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Obsessive-compulsive| r         | -0.080                  | 0.020                               | 0.045                     |
|                     | p-value   | 0.306                   | 0.670                               | 0.337                     |
|                     | N         | 165                     | 452                                 | 453                       |
|                     | r         | -2.227                  | -0.018                              | -0.047                    |
| Interpersonal sensitivity | p-value   | 0.003                   | 0.699                               | 0.323                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Depression          | r         | -2.85                   | 0.008                               | 0.020                     |
|                     | p-value   | 0.860                   | 0.671                               | 0.671                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Anxiety             | r         | -2.29                   | -0.044                              | 0.022                     |
|                     | p-value   | .003                    | 0.349                               | 0.642                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Hostility           | r         | -2.72                   | -.116                               | -0.087                    |
|                     | p-value   | .013                    | .065                                | 0.065                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Phobic anxiety      | r         | 0.025                   | -0.032                              | 0.041                     |
|                     | p-value   | 0.746                   | 0.496                               | 0.385                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Paranoid ideation   | r         | -2.18                   | -0.002                              | -0.084                    |
|                     | p-value   | .005                    | 0.969                               | 0.073                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Psychoticism        | r         | -2.68                   | -0.063                              | -0.026                    |
|                     | p-value   | .001                    | 0.179                               | 0.582                     |
|                     | N         | 165                     | 452                                 | 453                       |
| Global Severity Index | r         | -2.15                   | -0.040                              | -0.010                    |
|                     | p-value   | .006                    | 0.398                               | 0.838                     |
|                     | N         | 165                     | 452                                 | 453                       |

**TABLE 18:** Spearman correlations between psychology and empathy factors with smoking behaviors.
| Factor                  | Do not smoke in prohibited places (N=67), mean (SD) | Smoking in prohibited places (N=98), mean (SD) | t-test | df | P-value |
|------------------------|----------------------------------------------------|------------------------------------------------|--------|----|--------|
| Empathy                | 2.24 (0.80)                                        | 2.45 (0.74)                                      | -      | 163| 0.089  |
| Somatization           | 0.66 (0.68)                                        | 0.89 (0.66)                                      | -      | 163| 0.032  |
| Obsessive-compulsive   | 0.88 (0.64)                                        | 1.02 (0.59)                                      | -      | 163| 0.137  |
| Interpersonal sensitivity| 0.71 (0.60)                                      | 0.83 (0.67)                                      | -      | 163| 0.217  |
| Depression             | 0.88 (0.76)                                        | 0.87 (0.69)                                      | -      | 163| 0.894  |
| Anxiety                | 0.62 (0.62)                                        | 0.78 (0.60)                                      | -      | 163| 0.116  |
| Hostility              | 0.78 (0.82)                                        | 1.31 (0.91)                                      | -      | 163| 0.439  |
| Phobic anxiety         | 0.53 (0.62)                                        | 0.45 (0.58)                                      | 0.776  | 163| 0.493  |
| Paranoid ideation      | 0.76 (0.64)                                        | 1.14 (0.76)                                      | -      | 156.10| 0.001 |
| Psychoticism           | 0.64 (0.55)                                        | 0.67 (0.55)                                      | -      | 163| 0.714  |
| Global Severity Index  | 0.73 (0.53)                                        | 0.86 (0.55)                                      | -      | 163| 0.122  |

**TABLE 19: Independent samples t-test for psychological and empathy factors between smokers and nonsmokers in smoking-prohibited places.**
SD: standard deviation; df: degrees of freedom

**Discussion**

The current study aimed to identify the impact of smoking on psychology, empathy, and smoking behavior. The study also examined the effect of smokers’ psychological characteristics and empathy toward smoking behavior.

Smokers have a strong association between emotional intelligence and increased anxiety and depression [13]. Emotional intelligence demonstrates the ability of an individual to associate with those around them successfully and includes empathy and psychological state. Emotional intelligence is essential for assessing an individual’s mental state, explains aspects of human behavior, and focuses on the processing of situations faced by the individual, applying emotional and social context [13].

The first research question examined the association of smoking with psychological characteristics, empathy, and smoking behaviors. Smokers presented higher levels of hostility than nonsmokers, while participants who smoked more than 15 cigarettes per day indicated higher anxiety levels than those who smoked fewer than 15 cigarettes per day. According to Bernstein et al., aggressive responding is a risk factor for smoking [14]. Traditionally, studies on smoking describe behavior that can more appropriately be called “anxious mood” [15]. Gülseren et al. reported a positive correlation between high levels of nicotine addiction and high anxiety levels [16].

Smokers presented lower levels of empathy than nonsmokers when compared across the entire study population and within each sample category (e.g., employees, students, owners). All study participants stated that they seldom recommend that someone who smokes in a nonsmoking area quit smoking. Participants had low levels of somatization, obsessive-compulsive, interpersonal sensitivity, depression anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Empathy is a complex, multifaceted, dynamic concept that has been described in many ways and carries different meanings to different people. Empathy is a form of perception wherein observers genuinely feel the emotional states of others as their own [17]. A person’s level of empathy is associated with how they perceive another person and how they
This study explored the state of empathy among Greek smokers in public. Smokers presented higher levels of empathy and lower levels of psychosomatic symptoms compared to nonsmokers. Smokers were more likely to be males with high school education and vocational training. These differences may be due to the higher social and economic status of smokers, who might be more able to afford and prioritize smoking cessation interventions.

The current study design has several limitations. Our sample of smokers was insufficient to use parametric tests that require a normally distributed population. Nonparametric tests that are more robust to deviations from normality were performed instead. In addition, this research was not experimental. Samples of smokers and nonsmokers were not similar regarding their demographic and occupational profiles. In particular, smokers were more likely to be males with higher education levels and to work in higher-paying jobs.

Our study has significant limitations. Our sample of smokers was insufficient to use parametric tests that carry higher statistical power. In addition, this research was not experimental. Samples of smokers and nonsmokers were not similar regarding their demographic and occupational profiles. In particular, smokers were more likely to be males with high school education and vocational training. These differences may introduce biased results when evaluating the significance of comparing smokers and nonsmokers.

A future study with an adequate sample size for the statistical tests should be performed. Sampling should be stratified to acquire a representative sample. In a future study, the samples of smokers and nonsmokers should be demographically and occupationally similar to confirm a cause (i.e., smoking) and effect (i.e., consequences of smoking) relationship with fewer confounders than what was allowed in the current study design.

Conclusions
This study explored the state of empathy among Greek smokers in public. Smokers presented higher levels of empathy and lower levels of psychosomatic symptoms compared to nonsmokers. Smokers were more likely to be males with high school education and vocational training. These differences may be due to the higher social and economic status of smokers, who might be more able to afford and prioritize smoking cessation interventions.
hostility than nonsmokers (regardless of occupation), and the level of anxiety was positively correlated with the number of cigarettes smoked per day. Smokers presented lower levels of annoyance when they were in a place where smoking is prohibited and when someone else smokes, as well as lower levels of effort to make a recommendation to someone who smokes in a nonsmoking area to quit. Smokers who smoked in prohibited places had higher levels of somatization, hostility, and paranoid ideation. Our results could assist the development of communication materials aimed at smokers to help them understand that others nearby do not enjoy their smoking practices, especially in an enclosed area. These findings could also facilitate feasible antismoking laws with an overall goal to reduce smoking in a population.

**Additional Information**

**Disclosures**

**Human subjects:** Consent was obtained or waived by all participants in this study. University of Larissa, Department of Medicine issued approval 1897/17.05.2021. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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