


# Disparities of perceived wellness by smoking and professional status among young individuals in Brasov, Brasov County, Romania

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## Abstract

**Objective:** We aimed to evaluate the association of risk factors such as smoking and professional status (students vs employed) as determinants of disparities in perceived wellness among Romanian individuals.

**Methods:** We conducted a cross-sectional study in which 145 participants were enrolled from December 2017 to February 2018, in Brasov, Brasov County, Transylvania, Romania. We used a simplified Perceived Wellness Survey model to measure the holistic individual perceived wellness status by professional and smoking status. Basic descriptive and multivariate analyses of variance were used to assess and contrast participants' characteristics and wellness score distributions. A factor analysis was used to estimate Kaiser–Meyer–Olkin values and calculate standardized Cronbach's coefficients.

**Results:** The average age of our participants was 27.7 years. Compared with students, more employed participants tended to smoke electronic cigarettes ( $p < 0.0001$ ). The association between professional status and perceived wellness was non-significant. Employed participants were nevertheless more likely to regard themselves as more proactive in dealing with emotional ( $p < 0.0001$ ), environmental ( $p = 0.0042$ ), and spiritual issues ( $p = 0.0039$ ). Perceived physical wellness was statistically different by smoking status ( $p < 0.0001$ ).

**Conclusion:** Among our study participants, there is an association between smoking and perceived wellness. For emotional, environmental, and spiritual domains, employed participants are more likely to regard themselves as more confident. Our study demonstrates the direct application of the Perceived Wellness Survey model in predicting the disparities of perceived wellness among young individuals. It allows health agencies to target disparity interventions among populations with high risk of low perceived wellness.

## Keywords

Perceived wellness disparities, Perceived Wellness Survey, smoking, professional status

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## Introduction

There is an upward trend of low perceived wellness among Romanian students and employed individuals due to increasing exposure to academic and workplace stress.<sup>1,2</sup> A long-term low perceived wellness leads to hypertension as it causes high blood pressure, which facilitates the development of cardiovascular outcomes.<sup>2,3</sup> Students in Romania enrolled in competitive programs such as medicine are at higher risks of developing low perceived wellness.<sup>1,4,5</sup> In addition, medical students who smoke strongly increase the

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likelihood of acquiring low perceived wellness.<sup>1</sup> Moreover, students have a tendency to acquire the smoking habit compared to employed individuals.<sup>1</sup> Both students and employed individuals in Romania not only suffer from low perceived wellness derived consequences such as high blood pressure but are also at a high risk of being exposed to its risk factors (e.g. tobacco consumption).<sup>1,2,6</sup> Therefore, evaluating the effect of risk factors such as smoking status on low perceived wellness by professional status (students vs employed individuals) should indicate the need to control disparities in perceived wellness among Romanian populations with high risks of developing low perceived wellness. The association between professional status and perceived wellness changes is yet to be determined in Romania.

To close these knowledge gaps,<sup>1–3,6,7</sup> we aimed to investigate the association of professional and smoking status on perceived wellness status among Romanian college students. We hypothesized a statistically significant association between professional and smoking status on perceived wellness.

## Material and methods

We used the Perceived Wellness Survey (PWS) model (Adams et al.<sup>7</sup>) to measure the holistic individual perceived wellness. We applied this model in assessing the individual perceived wellness changes by professional status and smoking status in Romania where low perceived wellness is prevalent among students and employed individuals.<sup>1,2,7</sup>

### Design

Our cross-sectional study assessed among residents in Brasov, Brasov County, Transylvania, Romania, the perceived wellness disparities of Romanian young individuals by professional and smoking status. The PWS model allowed us to assess the perceived wellness changes among a population with high risks of developing low perceived wellness. The PWS by Adams et al.<sup>7</sup> constructed six domains of perceived wellness which included psychological, intellectual, emotional, physical, spiritual, and social domains.<sup>7</sup> In our simplified model, we integrated the intellectual and psychological domains derived from Adam's model into the environmental domain. We thus had five domains of perceived wellness: emotional, environmental, physical, spiritual, and social. Each domain had seven questions to measure its perceived wellness. Each question had four gradual scales from "Never" to "Usually" with assigned scores from "1" to "4" accordingly. The final score for each domain was then composed.

### Sample

During December 2017 to February 2018 time period, we recruited 150 participants with ages 18–50 years, who were examined by certified specialists based on standardized

protocols and technician-administered questionnaires. Our study (part of an initial larger project) included the section of the PWS questionnaire related to the relevant data for perceived wellness changes. Participants were excluded if they were missing either professional status or smoking status (five participants), and thus 145 participants were included. To test the power of our sample size, a "post hoc" power calculator was used. Using the average wellness score distribution categorized into four subgroups (students and employed participants), we obtained a power of 88.4%.

### Main exposure with definitions

Professional status and smoking status were considered as main exposures. With regard to professional status, we grouped them into student and employed individuals. In terms of smoking status, we grouped them into non-smokers, conventional smokers, and electronic cigarettes users. Both professional status and smoking status were based on self-report.

### Theorized mechanism buttressing our research hypothesis

In our study, the primary theorized mechanism is the perceived wellness as assessed through our survey (PWS). The PWS is validated in previous studies to measure individual perception.<sup>7–9</sup> Building on the mechanism of PWS, subjective perceptions are valid predictors for future objective wellness. Those perceptions are considered as the crux of cognitive construction and the benchmark of evaluating individual holistic wellness. PWS has demonstrated its significance of better understanding individual health theories.<sup>9–11</sup> According to the theoretical conceptions of perceived wellness by Rothmann and Ekkerd,<sup>10</sup> it is defined as the holistic wellness combining the six domains: emotional, intellectual, physical, psychological, social, and spiritual wellness. After quantifying these six dimensions, the individuals with a higher total score are (1) more physically and mentally healthy, (2) better understanding their own feelings and better expressing emotions in an optimistic way and better dealing with life's challenges, (3) better recognizing the interactions between themselves and their environment (natural and social) and better using available resources and better fostering a safer and healthier environment for others, (4) better making choices to avoid harmful habits and better practice behaviors that support their physical body, (5) having a better sense of purpose and meaning in their life and better acting in line with their beliefs and values, and (6) better building and maintaining a diversity of supportive relationships and better coping effectively with interpersonal conflict. Based on the PWS theory, there were two hypotheses leading our research (1) perceived wellness changes significantly based on professional status (students vs employed individuals) and (2) perceived wellness varies significantly

by smoking status even among young individuals who are not influenced by the smoking habit.

In our simplified model, we incorporated intellectual and psychological domains into environmental domain. The definition of each domain of perceived wellness in our model is presented in Supplementary Appendix Table 1/Figure 1. Each sample question from emotional, environmental, physical, spiritual, and social wellness is: “I find it easy to express my emotions in positive, constructive ways,” “I recognize the impact of my actions on my environment,” “I engage in physical exercise regularly (e.g. 30 min at least 5× a week or 10,000 steps a day),” “I take time to think about what’s important in life—who I am, what I value, where I fit in, and where I am going,” and “I consciously and continually try to work on behaviors or attitudes that have caused problems in my interactions with others.” Each domain is measured by seven questions. The final score of each domain is calculated by adding their respective seven score of each question together. The total number of all 35 content-related questions measured by four gradual scales from “Never” to “Usually” is presented in the Supplementary material.

## Measures

The considered health outcome was low perceived wellness scores in the five domains that included emotional, environmental, physical, spiritual, and social domains as described. All covariate variables were obtained at the baseline visit and were chosen because they are putative risk factors for professional status/smoking status associated with low perceived wellness. These covariates were classified into three categories: demographic, biological, and socio-economic status (SES). With regard to demographic covariates, age and sex were considered as putative confounders of the assessed associations. Body mass index (BMI) was included into the biological covariates. Educational attainment was included into the SES covariates.

## Analyses

Background characteristics of our study sample were assessed with basic descriptive analyses. Categorical variables were presented as frequencies with percentages (%) and continuous variables as mean values with standard deviations (SDs). Chi-square and Fisher’s exact tests were conducted to compare categorical variables; Student’s *t*-test was selected to examine the continuous variables two groups’ comparisons. For the specific wellness items, we used analysis of variance (ANOVA) procedures to find the summarized score difference for the five main questions. Wellness score distribution difference for five wellness sections by different professional status was identified by Tukey’s honest significant difference test. We chose Wilks’ Lambda test to process exact *F* statistics via multivariate analysis of variance (MANOVA). Sex, age, BMI, educational level, professional

status, residence status, marital status, and smoking status were included in the MANOVA model. We considered *p*-values <0.05 as statistically significant. Factor analysis was used to estimate Kaiser–Meyer–Olkin (KMO) value and standardized Cronbach’s coefficient alpha score. We also performed a multi-nominal regression model to examine the relationship between professional status with the perceived wellness status, separately by our questionnaire’s domains. All of our analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC, USA).

## Ethics approval

All participants signed an informed consent, and the questionnaires were answered anonymously. The ethical Committee of the Faculty of Medicine, Transilvania University of Brasov in Romania, reviewed and approved our study design and proposal. All procedures of our current study were performed according to Transilvania University Ethical Commission (approval 2017; no. 7/28.06.2017) guidelines and relative international rules.<sup>12,13</sup>

## Results

### Demographics of the participants

Our study included 32 males (22.1%) and 113 females (77.9%), with mean (SD) age of 27.7 (9.2) years old. There were 75 students (51.7%) and 70 employed participants (48.3%), and thus, the distribution of the professional status was balanced. Our Table 1 presents the demographic characteristics of our participants, by professional status. The age, BMI, and working hours among employed participants were significantly higher than those of students. Students’ families included three or four adults, which are considerably higher than those of employed participants. The distributions by sex, smoking status, marital status, education, and residence status are significantly different among students and employed participants. Our Table 2 presents the same demographic distribution by smoking status. The distribution by age, BMI, professional status, marital status, residence status, the number of adults in the family, and hours in commuting (“on the road”) by smoking status were significantly different.

### Univariate distribution of our covariates

Supplementary Appendix Table 2 presents the five wellness domain questions with average wellness score distributions with stratifications by professional status as well as by smoking status. No differences were detected between students and employed participants. The overall difference for each wellness distribution by the professional status is presented in Supplementary Appendix Figures 2–6. Employed participants always regard themselves as proactive for issues on emotional ( $p < 0.0001$ ), environmental ( $p = 0.0042$ ), and spiritual ( $p = 0.0039$ ) questions. Employed participants were

**Table 1.** Distribution of study participants by employment status.<sup>a</sup>

Characteristics	Total	Students (n = 75)	Employed (n = 70)	p-value <sup>b</sup>
Age (years)	27.7 (9.2)	21.4 (2.5)	34.4 (9.0)	<0.0001
BMI (kg/m <sup>2</sup> )	23.0 (4.7)	22 (4.8)	24.0 (4.4)	0.01
Sex				0.07
Male	32 (22.1%)	12 (16.0%)	20 (28.6%)	
Female	113 (77.9%)	63 (84.0%)	50 (71.4%)	
Smoking status				<0.0001
Never	57 (39.3%)	37 (49.3%)	20 (28.6%)	
Conventional cigarette	55 (37.9%)	33 (44.0%)	22 (31.4%)	
Smokers of electronic cigarettes	33 (22.8%)	5 (6.7%)	28 (40.0%)	
Marital status				<0.0001
Married	33 (23.1%)	1 (1.4%)	32 (46.4%)	
Single	101 (70.6%)	73 (98.6%)	28 (40.6%)	
Divorced	8 (5.6%)	0 (0)	8 (11.6%)	
Others	1 (0.7%)	0 (0)	1 (1.4%)	
Education				<0.0001
High school	76 (55.1%)	60 (84.5%)	16 (23.9%)	
Professional school	8 (5.8%)	1 (1.4%)	7 (10.4%)	
Faculty	42 (30.4%)	10 (14.1%)	32 (47.8%)	
Master	10 (7.2%)	0 (0)	10 (14.9%)	
PhD	2 (1.5%)	0 (0)	2 (3.0%)	
Residence status				<0.0001
Urban	108 (76.1%)	47 (62.7%)	61 (91.0%)	
Rural	34 (23.9%)	28 (37.3%)	6 (9.0%)	
Total person in family	3.3 (2)	3.5 (1.3)	3.1 (2.5)	0.25
Adults	2.4 (1.1)	2.7 (1.1)	2.0 (1.0)	0.0005
Children	0.8 (1.1)	0.8 (1.3)	0.8 (0.8)	0.85
Number of persons with income	2 (0.86)	2.1 (0.8)	1.9 (0.9)	0.38
Hours at home (h)	13.6 (4.9)	13.8 (3.4)	13.2 (6.1)	0.49
Hours at work (h)	8.3 (3.5)	7.1 (3.5)	9.1 (3.2)	0.002
Hours at road from home to work (min)	27.9 (24.8)	30 (24.6)	26.3 (25.1)	0.44

BMI: body mass index.

The bolded values represent the statistically significant comparisons.

<sup>a</sup>Some variables had missing data. Data are presented as mean value (SD) for continuous variables and number (percentage) for categorical variables.

<sup>b</sup>For continuous variables (age, BMI, income, persons in family, and hours at home/work), a t-test was used for the p-value calculation. For categorical variables (sex, marital status, education, residence status), a chi-square test or Fisher's exact test was used for the p-value calculation.

also more likely to regard themselves as more proactive and positive on dealing with emotional, environmental, and spiritual issues. The response scores for the five-domain wellness questions by the three smoking status categories are presented in Supplementary Appendix Figures 7–11. Our Figure 1 shows that the physical wellness status was statistically different among different smoking status categories ( $p < 0.0001$ ).

### The multivariable analyses

Table 3 presents the results for the MANOVA procedure. After adjustment for age and other potential risk factors, the smoking status was significant, while employment status was not. As our factor analysis shows, the Cronbach's alpha for the overall average wellness was 0.90; thus, confirming that our wellness survey had high internal reliability, namely, that the questions for each dimension were consistent.

Cronbach's alpha above 0.70 is considered an acceptable value.<sup>14</sup> As the KMO scores from the factor analysis procedure indicates, the values for each dimension were above 0.70, implying a high external reliability of our questionnaire. Our data were therefore appropriate for factoring.

The multi-nominal regression model for professional status with total emotional wellness scores, assessing the differences for this specific domain between students and employed participants, was statistically significant ( $p = 0.036$ ), consistent with our ANOVA procedure.

### Discussion

To the best of our knowledge, our study is among the first to assess the relationships between professional and smoking status on perceived wellness status. We found that smoking was associated with perceived wellness. The majority of participants who report smoking are college students without

**Table 2.** Distribution of participants by smoking status.<sup>a</sup>

Characteristics	Total	Non-smokers (n=57)	Conventional cigarette smokers (n=55)	Electronic cigarette users (n=33)	p-value <sup>b</sup>
Age (years)	27.7 (9.2)	24.1 (6.3)	26.6 (8.9)	35.7 (9.2)	<0.0001
BMI (kg/m <sup>2</sup> )	23.0 (4.7)	21.8 (3.7)	23.3 (3.8)	24.5 (6.8)	<b>0.024</b>
Sex					0.32
Male	32 (22.1%)	9 (15.8%)	15 (27.3%)	5 (24.2%)	
Female	113 (77.9%)	48 (84.2%)	40 (72.7%)	25 (75.8%)	
Professional status					<0.0001
Student	75 (51.7%)	37 (64.9%)	33 (60%)	5 (15.2%)	
Employed participant	70 (48.3%)	20 (35.1%)	22 (40%)	28 (84.8%)	
Marital status					<0.0001
Married	33 (23.1%)	6 (10.5%)	9 (16.7%)	18 (56.3%)	
Single	101 (70.6%)	49 (86%)	43 (79.6%)	9 (28.1%)	
Divorced	8 (5.6%)	2 (3.5%)	2 (3.7%)	4 (12.5%)	
Others	1 (0.7%)	0 (0%)	0 (0%)	1 (3.1%)	
Education—last one completed					0.23
High school	76 (55.1%)	33 (62.3%)	29 (54.7%)	14 (43.8%)	
Professional school	8 (5.8%)	1 (1.9%)	2 (3.8%)	5 (15.6%)	
Faculty	42 (30.4%)	13 (24.5%)	20 (37.7%)	9 (28.1%)	
Master	10 (7.2%)	5 (9.4%)	2 (3.8%)	3 (9.4%)	
PhD	2 (1.5%)	1 (1.9%)	0 (0%)	1 (3.1%)	
Residence status					<b>0.01</b>
Urban	108 (76.1%)	38 (66.7%)	39 (75%)	31 (93.9%)	
Rural	34 (23.9%)	19 (33.3%)	13 (25%)	2 (6.1%)	
Total persons in family	3.3 (2)	3.4 (1.3)	3.3 (1.4)	3.3 (3.2)	0.93
Adults	2.4 (1.1)	2.5 (1.2)	2.6 (1.1)	1.9 (0.7)	<b>0.008</b>
Children	0.8 (1.1)	0.9 (1.3)	0.7 (0.9)	0.8 (0.8)	0.5
Number of persons with income	2 (0.86)	2.1 (1)	2 (0.8)	1.8 (0.8)	0.39
Hours at home (h)	13.6 (4.9)	14.2 (6.1)	13.7 (4.2)	12.2 (3.6)	0.21
Hours at work (h)	8.3 (3.5)	8.5 (3.9)	7.5 (3.4)	8.9 (2.9)	0.2
Hours at road from home to work (min)	27.9 (24.8)	37.3 (29.5)	22 (18.3)	22.9 (22.1)	<b>0.008</b>

BMI: body mass index.

The bolded values represent the statistically significant comparisons.

<sup>a</sup>Some variables have missing data. Data are presented as mean value (SD) for continuous variables and number (percentage) for categorical variables.

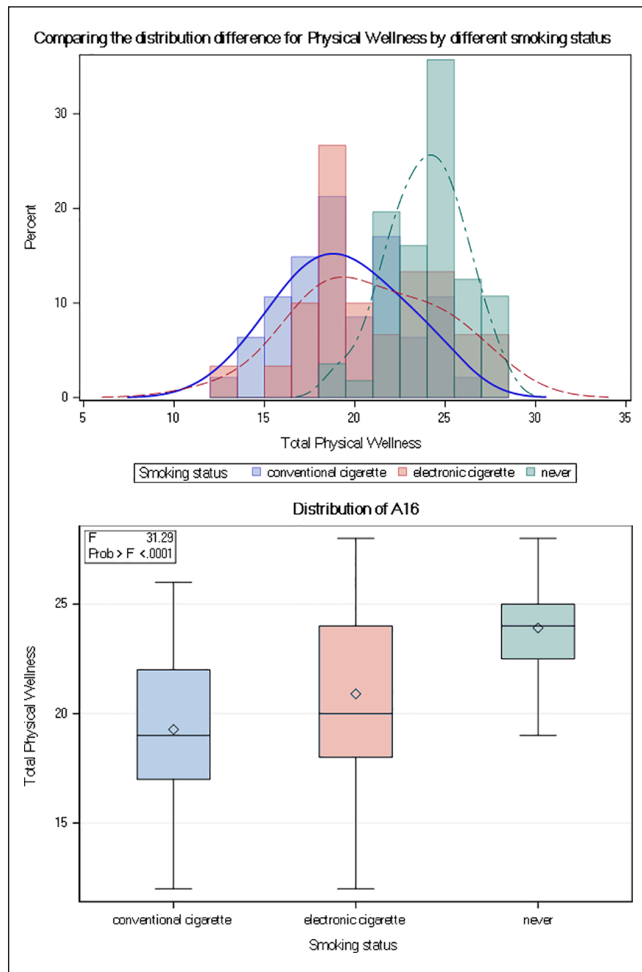
<sup>b</sup>For continuous variables (age, BMI, income, persons in family, and hours at home/work), ANOVA was used for the p-value calculation. For categorical variables (sex, marital status, education, residence status), a chi-square test was used for the p-value calculation.

employment. Our results indicate that college students without employment are more likely to develop low perceived wellness disparity including emotional, environmental, and spiritual issues compared to employed counterparts. Our findings also confirm that young individuals' perceived wellness is important factors in shaping their future career success.<sup>15</sup> Even though interventions that improve perceived wellness have been shown to improve later health outcomes,<sup>16</sup> acknowledging the benefit of maintaining good perceived wellness on the future economic and employed-related opportunities of the young participants themselves needs to be highlighted.

Evidence shows that smoking is prevalent among Romanian college students. Those college students who smoke are more likely to present with emotional, environmental, and spiritual issues.<sup>17</sup> Our findings indicate that college students are a susceptible population to acquire the

smoking habit. Targeting interventions such as enforcing tobacco-free policy on campus among college students is thus paramount.<sup>18</sup> Although direct evidence indicating the longitudinal causal association between smoking and perceived wellness is lacking, it is reasonable to hypothesize that smoking could potentially contribute to perceived wellness disparity, and vice versa, highlighting an important implication of smoking cessations that could decrease perceived wellness disparity among college students.

The non-significant differences between employed participants and students may be due to the relatively young age of our employed participants, and thus the age similarity between the two categories. Research has shown that the disparities of perceived wellness by professional status are partially due to stress.<sup>1,19</sup> The relationship between stress and low perceived wellness has been validated in several previous studies.<sup>19–22</sup> Over-committing stress has a negative



**Figure 1.** Comparison of the distribution of physical wellness by smoking status.

The upper section shows the cumulative physical wellness scores on the x-axis, with ranges from 0 to 35. The distribution percentage of these scores is shown as the height of the columns. The solid blue curve, dashed red curve, and dashed green line show the scores' distribution among conventional cigarette smoker, electronic cigarette smoker, as well as participants who never smoked. The lower section describes the mean, median, 25%–75% range, and the outliers among conventional cigarette smoker, electronic cigarette smoker, as well as participants who never smoked. The  $F$ -score of difference of these two groups was  $F=31.29$ , which is significant ( $p < 0.0001$ ).

impact on not only mental wellness such as migraine but also physical wellness including sleeping quality, somatic issues, muscular, and skeletal issues.<sup>19,23–26</sup> In addition, smoking will facilitate the development of a low perceived wellness and the final outcomes of physical diseases deriving from this low perceived wellness.<sup>27,28</sup> According to previous studies, the best indicator influenced by stress is perceived wellness.<sup>29,30</sup> Therefore, determining the consequences of stress by perceived wellness should provide impactful areas for targeting intervention to control low perceived wellness.

We a priori hypothesized that perceived wellness differs by professional and smoking status among those at-risk of low perceived wellness. The findings of our study support

**Table 3.** Multivariate analysis of variance for the perceived wellness with professional status and smoking status with additional adjustments.<sup>a</sup>

Variable	Value	$F$	df	$p$ -value
Smoking status	0.58	5.28	10	<b>&lt;0.0001</b>
Sex	0.92	1.47	5	0.20
Marital status	0.82	1.14	15	0.32
Age	0.95	0.78	5	0.56
Professional status	0.96	0.72	5	0.61
Education	0.83	0.78	20	0.73
BMI	0.99	0.22	5	0.95
Residence Status	0.99	0.11	5	0.99

BMI: body mass index.

The bolded values represent the statistically significant comparisons.

<sup>a</sup>Wilks' Lambda test was used for exact  $F$  statistics.

Statistically significant differences are  $p < 0.01$ .

this hypothesis as students without employment are more likely to have environmental, emotional, and spiritual issues compared to employed participants, suggesting that students are susceptible to develop low perceived wellness. Previous research supports our finding as the prevalence of stress is increasing among students that leads to perceived wellness disparity.<sup>31</sup> This is concerning and points to a potential risk for stress-related perceived wellness disparity in this unique and vulnerable population. The implication of our finding should provide constructive guidance to the future prevention strategies aimed to improve perceived wellness among students that should take how to decrease stress into account.

Our findings have critical implications for college students and indicate that a multifaceted approach is needed to address the problem and potential risk of smoking. First, recognizing this concern is the important step toward decreasing smoking among Romanian college students. Our findings demonstrate that college students without employment are more prone to smoking than employed counterparts. In addition, smoking may deteriorate their perceived wellness including emotional, environmental, and spiritual domains. It also indicates that college students without employment are vulnerable to get the habit of smoking influenced by their peers and colleagues. The policy makers of the university should therefore be committed to tobacco-free policy in order to build a tobacco-free environment surrounding campus. Second, upon entering the university, students may be asked to adhere to this tobacco-free policy. Third, educating college students to realize the potential risk of smoking on their health especially perceived wellness and its consequences is extremely important.

Our study has several notable strengths. First, we provided to the knowledge base regarding perceived wellness in relation to professional and smoking status. Second, we used a modified validated PWS questionnaire and a reliable perceived wellness model to measure participants' perceptions. Third, we had a diverse sample of employed and non-employed college students. Our study has several limitations that should be acknowledged. As our sample is exclusively

composed of Romanian participants, the generalizability of our findings is limited. We have nevertheless a strong internal validity, despite a limited external validity. Second, the statistical power is relatively limited as we have few respondents in some of the categories queried. Third, because this study is cross-sectional, we cannot test causality in neither the association between perceived wellness changes and professional status nor in the association between perceived wellness and smoking status. Forth, because our questionnaire was modified/shortened from a validated previous questionnaire, the domains queried in our study have not yet been validated.

Despite these shortcomings, the major significance of our study rests in the application of the PWS model in predicting the disparities of perceived wellness among young individuals. It allows government/health agencies to target interventions to early control the disparities of perceived wellness among such populations with a relative high risk of low perceived wellness. Such interventions coupled with smoking cessation and other initiatives to mitigate stress should significantly decrease perceived wellness disparity among college students.

## Conclusion

Our study showed an association between smoking and perceived wellness. College students who are without employment who report smoking are more likely to develop low perceived wellness that includes emotional, environmental, and spiritual components. Our study indicates the need to control disparities in perceived wellness among Romanian college populations that are at high risk. Further research should concentrate on potential factors causing increasing smoking patterns, and how this segment of the population deals with self-reported perceived wellness.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical approval

Ethical approval for this study was obtained from the Ethical Committee of the Faculty of Medicine, Transilvania University of Brasov (no. 7/28.06.2017).

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## Informed consent

Written informed consent was obtained from all subjects before the study.

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## Supplemental material

Supplemental material for this article is available online.

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