

# Factors associated with substance use among preclinical medical students in Turkey: a cross-sectional study

## Facteurs associés à la consommation de substances chez les étudiants en médecine au pré-clinique en Turquie : une étude transversale

Mert Karabacak,<sup>1</sup> Ekin Beyza Kose,<sup>2</sup> Zeynep Bahadir,<sup>3</sup> Yagmur Demirel,<sup>4</sup> Elif Busra Mutlu,<sup>5</sup> Zeynep Ozcan<sup>4</sup> Burak Berksu Ozkara<sup>6</sup>

<sup>1</sup>Department of Neurosurgery, Mount Sinai Health System, New York, USA; <sup>2</sup>Faculty of Medicine, Trakya University, Edirne, Turkey; <sup>3</sup>Department of Pediatrics, Weill Cornell Medicine, New York, USA; <sup>4</sup>Cerrahpasa Faculty of Medicine, Istanbul University-Cerrahpasa, Istanbul, Turkey; <sup>5</sup>Faculty of Medicine, Altinbas University, Istanbul, Turkey; <sup>6</sup>Department of Neuroradiology, MD Anderson Cancer Center, Houston, USA

Correspondence to: Burak Berksu Ozkara, MD; Department of Neuroradiology, MD Anderson Cancer Center, 1400 Pressler Street, Houston, 77030 Texas, USA; email: [BBOzkara@mdanderson.org](mailto:BBOzkara@mdanderson.org)

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### Abstract

**Introduction:** Medical students experience high levels of stress due to their rigorous training, which can negatively affect their mental health. This study aimed to investigate substance use habits of medical students at Istanbul University-Cerrahpaşa and the association on their mental health and demographic factors.

**Methods:** This cross-sectional survey study was conducted in March-April 2022 among preclinical medical students (years 1-3 of a 6-year program). A confidential, anonymous online survey consisting of four sections on sociodemographic and educational characteristics, nicotine use and dependence [Fagerström Test for Nicotine Dependence (FTND)], alcohol use [Alcohol Use Disorders Identification Test (AUDIT)], mental health status [12-item General Health Questionnaire (GHQ-12)], was distributed to 1131 students via WhatsApp and Telegram text messages. Mann-Whitney U and Kruskal Wallis tests compared variables' distribution in the questionnaire categories. Spearman's correlation assessed associations between scales. Significance was  $p < 0.05$ .

**Results:** The study included 190 medical students. A total of 26.3% of the participants were smokers, with 8.4% showing moderate to high levels of nicotine dependence. An estimated 45.8% and 8.4% reported low-risk consumption and risky usage of alcohol, respectively. There were statistically significant associations between substance use and demographic factors such as sex, GPA, and religious belief. The study found a statistically significant correlation between FTND scores and GHQ-12 scores, and, between FTND scores and AUDIT scores.

**Conclusion:** The findings of this study will inform the development of interventions to improve the mental health and academic performance of medical students at Istanbul University-Cerrahpaşa. Furthermore, it will raise awareness about the importance of addressing substance use among medical students in Turkey.

### Résumé

**Introduction :** Les étudiants en médecine sont assujettis à des niveaux élevés de stress en raison de leur formation rigoureuse, ce qui peut avoir un impact négatif sur leur santé mentale. Cette étude avait pour but d'étudier les habitudes de consommation de substances des étudiants en médecine de l'Université d'Istanbul-Cerrahpaşa et l'association avec leur santé mentale et les facteurs démographiques.

**Méthodes :** Cette étude transversale a été menée en mars-avril 2022 parmi les étudiants en médecine au pré-clinique (années 1 à 3 d'un programme de 6 ans). Un questionnaire en ligne confidentiel et anonyme comprenant quatre sections sur les caractéristiques sociodémographiques et éducatives, l'usage et la dépendance à la nicotine [Test de Fagerström pour la dépendance à la nicotine (FTND)], la consommation d'alcool [Test d'identification des troubles liés à la consommation d'alcool (AUDIT)], l'état de santé mentale [Questionnaire général sur la santé en 12 points (GHQ-12)], a été distribué à 1131 étudiants au moyen de messages texte WhatsApp et Telegram. Les tests de Mann-Whitney U et de Kruskal Wallis ont comparé la distribution des variables dans les catégories du questionnaire. La corrélation de Spearman a évalué les associations entre les échelles. Le niveau de signification statistique était  $p < 0,05$ .

**Résultats :** L'étude a porté sur 190 étudiants en médecine. Au total, 26,3 % des participants étaient des fumeurs, dont 8,4 % présentaient des niveaux modérés à élevés de dépendance à la nicotine. On estime que 45,8 % et 8,4 % des participants ont déclaré une consommation d'alcool à faible risque et une consommation d'alcool à risque, respectivement. Des associations statistiquement significatives ont été observées entre la consommation de substances et des facteurs démographiques tels que le sexe, la moyenne générale et les croyances religieuses. L'étude a mis en évidence une corrélation statistiquement significative entre les scores FTND et les scores GHQ-12, ainsi qu'entre les scores FTND et les scores AUDIT.

**Conclusion :** Les résultats de cette étude permettront d'élaborer des interventions visant à améliorer la santé mentale et les résultats universitaires des étudiants en médecine de l'université d'Istanbul-Cerrahpaşa. En outre, elle sensibilisera à l'importance de la prise en charge de l'utilisation de substances chez les étudiants en médecine en Turquie.

## Introduction

University students face mental health challenges from heavy course loads, exam stress, and changing lifestyles. This burden is even greater for medical students undergoing rigorous training.<sup>1,2</sup> Getting accepted to medical school is a stressful and competitive process worldwide. Key stressors in medical education such as excessive information, intense competition, and time management difficulties, render students vulnerable to mental illness.<sup>3-5</sup> Consequently, some students may acquire harmful habits like substance misuse.<sup>6</sup>

Substance misuse can impair medical students' academic and professional careers and in turn, negatively impact society.<sup>5,7,8</sup> As future physicians, students serve as models and should exemplify healthy behaviors. Their clinical communications and opinions should remain objective despite personal experiences. While studies exist on medical students' substance use,<sup>9-13</sup> current research in Turkey is limited.<sup>14</sup> Though it was shown that excessive drinking and smoking among medical students was less prevalent than the general population, studies show medical students' substance use risk cannot be ignored.<sup>15,16</sup> This study aims to investigate the substance use habits of medical students at the Faculty of Medicine, Istanbul University-Cerrahpaşa and its association with their mental health and demographic factors.

## Methods

### Ethical approval

This study was reviewed and approved by the institutional review board of the Cerrahpasa Faculty of Medicine (2011-KAEK-55, 30.03.2022-417418). Participation was voluntary and had no influence on students' academic standing. The students were given detailed information that their anonymous and confidential responses would be used for research purposes only. Informed consent was obtained online prior to completing the survey, which did not collect any identifying information.

### Study design, setting, and participants

This cross-sectional survey study was conducted in March and April 2022 at Istanbul University-Cerrahpaşa, Cerrahpaşa. We targeted 1131 medical students in the first three years (of a six-year program) of their medical education (preclinical students) in our study. We hosted an online survey on Survey Monkey ([www.surveymonkey.com](http://www.surveymonkey.com)). Due to not having a comprehensive email database for students, the survey

was distributed to all eligible students via WhatsApp and Telegram text messages. Additionally, two reminder text messages were sent ten days apart.

### Survey

Informed by previous studies investigating substance use disorder in medical students,<sup>6,9-11,17-21</sup> the survey comprised of four sections. Section 1 pertained to the participants' sociodemographic characteristics (as seen in Tables 1, 2 and, 3). Section 2 pertained to the assessment of nicotine use and dependence using the Fagerström Test for Nicotine Dependence (FTND) measure, which is widely used and has demonstrated sound psychometric properties.<sup>22,23</sup> The FTND scores were divided into three categories: 0-3 (indicating a low level of nicotine dependency), 4-6 (indicating a moderate level of nicotine dependency), and 7-10 (indicating a high level of nicotine dependency). Section 3 assessed participant's alcohol usage with the Alcohol Use Disorders Identification Test (AUDIT) questionnaire. The AUDIT has high sensitivity and specificity for identifying hazardous alcohol use and alcohol dependence.<sup>24,25</sup> The scores ranged from 1-7 (indicating low-risk consumption), 8-15 (indicating risky usage) 16-19 (indicating harmful drinking), 20 or more (indicating dependent drinking). Section 4 assessed general mental health using the 12-item General Health Questionnaire (GHQ-12). The GHQ-12 is a validated screening tool for detecting psychological distress in the general population.<sup>26</sup> The GHQ-12 score can be calculated in two ways: 1) calculating the average outcome based on a score of 0-3 of the four possible responses to each question<sup>27</sup>; and 2) use of the 0-0-1-1 scoring of the four possible responses, allowing a maximum score of 12 with a cutoff point more than three.<sup>28</sup> We adopted the second scoring method and any respondent who scored more than three was considered to be a "case" (total score > 3).

### Statistical analysis

We analyzed the differences in distribution of demographic and educational variables among FTND, AUDIT, and GHQ-12 categories and correlations between the scale scores. Medians with interquartile ranges (IQR) were reported for the continuous variables. For categorical variables, frequencies (%) were calculated. For the dependent variable with two categories (GHQ-12), we performed the Mann-Whitney U test. For the dependent variables with three or more categories (FTND, AUDIT), the Kruskal Wallis test was used. The Spearman's rank correlation was conducted to assess the correlations between scale scores. The differences were considered to be statistically

significant at  $p < 0.05$ . The statistical analysis was performed in R 4.1.3.<sup>29</sup>

## Results

This cross-sectional study included 190 medical students, with 107 (56.3%) males and 83 (43.7%) females. The mean age of participants was 19.9 years. The sample comprised of 63 (33.2%) first-year, 81 (42.6%) second-year and 46 (24.2%) third-year medical students, yielding a response rate of 16.8% (190/1131). For tobacco dependence, as assessed by FTND, 140 students (73.7%) were identified as non-smokers, 34 (17.9%) as minimally dependent, 11 (5.8%) as moderately dependent, and 5 (2.6%) as highly dependent. In terms of alcohol consumption as assessed by the AUDIT, 87 students (45.8%) were non-drinkers, another 87 (45.8%) were categorized under low-risk consumption, and 16 (8.4%) demonstrated risky usage. Additionally, the GHQ-12 results revealed that 82 students (44.8%) were non-cases, whereas 101 (55.2%) were designated as cases. The Kruskal Wallis tests illuminated statistically significant differences between the variables of sex, grade point average (GPA), marital/relationship status, and religious belief in the distribution of FTND categories. Kruskal Wallis tests indicated statistically significant differences between age and religious belief variables concerning the distribution of AUDIT categories. Mann-Whitney U tests revealed a statistically significant difference only between the socioeconomic status variable and the GHQ-12 categories. Details and distribution of demographic and educational variables among FTND, AUDIT, and GHQ-12 categories are presented in Table 1 (details and distribution of demographic and educational variables among FTND categories), Table 2 (details and distribution of demographic and educational variables among AUDIT categories) and Table 3 (details and distribution of demographic and educational variables among GHQ-12 categories). Spearman's rank correlation revealed statistically significant correlation between FTND scores and GHQ-12 scores ( $p = 0.027$ ) and, between FTND scores and AUDIT scores ( $p < 0.001$ ). There was no statistically significant correlation between AUDIT and GHQ-12 scores ( $p = 0.472$ ).

## Discussion

Despite medical school curricula including education on the adverse effects of substance use, reports show concerning rates of use and misuse among students.<sup>12,13,18</sup> This cross-sectional survey aimed to explore substance use prevalence and associated factors among preclinical

students at a Turkish medical school. The findings provide an initial understanding of habits in this population prior to clinical years and also align with existing research.<sup>30</sup> Specifically, studies have shown that medical students experience more stress than the general population, likely due to the high-pressure environment defined by lofty expectations, pressing deadlines, and peer competition, which can foster unhealthy coping mechanisms.<sup>31</sup> While medical students' stress is often linked to anxiety and substance use, some studies do not support this association. For instance, research among Polish medical students found no significant correlation between alcohol consumption and stress coping styles.<sup>10</sup> Similarly, a study of Turkish medical students found no significant relationship between anxiety, depression, and habits like drinking or smoking.<sup>14</sup> However, our results showed a significant correlation between FTND and GHQ-12 scores ( $p = 0.027$ ), though no significant correlation emerged between AUDIT and GHQ-12 scores.

Our study findings also identified factors, specifically relationship/marital status and religious belief, were correlated with dependence on both alcohol and nicotine. Such findings are consistent with Akvardar et al. where students cited religion as a reason for abstaining from alcohol.<sup>14</sup> We found male students exhibited higher tobacco and alcohol dependence compared to females, mirroring other evidence of increased substance use among male medical students.<sup>9,11,12</sup> While our cross-sectional study showed no significant differences in prevalence usage across preclinical years, conclusions about trends are limited given the single time point design.

## Implications

The concerning rates of substance use among preclinical students underscore the need for proactive interventions that promote well-being and curb these harmful behaviors. As the data indicate, these habits often predate medical school, highlighting the importance for prevention and early interventions that prioritize student resilience, mental health, and coping. Further, evidence-based initiatives like skills training, mentoring, and self-care should be embedded across the preclinical curriculum to help constructively manage stress.

The identified correlations between substance use and mental health highlight the necessity of improving student access to counseling services. Support systems that confidentially identify and assist struggling students must be strengthened, paired with policies encouraging help-seeking over punitive measures. A multifaceted, student-

centered approach is required institutionally to build a culture that prioritizes wellness. Expanding this work through multi-institutional research could inform targeted, culturally appropriate interventions addressing modifiable risk factors. Proactive efforts to improve student wellbeing and reduce substance misuse will prove crucial for training Turkey's next generation of physicians.

## Limitations

Despite laying important groundwork, this exploratory study has several noted limitations. First, habits prior to enrollment were not assessed, which could have provided useful context and longitudinal follow-up of the same cohort could reveal informative trends over time.

Second, there was a 16.8% response rate coupled with participants being recruited from one institution, which impacts generalizability of the findings. The low response rate suggests a need for enhanced engagement strategies in future work to motivate broader participation through personalized outreach, incentives, and education on the research goals. Finally, the voluntary participation introduces the potential for voluntary response and selection biases. While significant in establishing baseline methodology and data, future efforts should build on this foundation through longitudinal follow-up of cohorts and increased sample sizes and representation across Turkish medical schools. Expanding participation to all training years could provide a comprehensive understanding of substance use patterns among these students nationally.

## Conclusion

This exploratory study found concerning rates of tobacco and alcohol use among preclinical medical students in Turkey. The FTND categorized 140 (73.7%) students as non-smokers, 34 (17.9%) as minimally nicotine dependent, 11 (5.8%) as moderately dependent, and five (2.7%) as highly dependent. The AUDIT designated 87 (45.8%) students as non-drinkers, 87 (45.8%) with low-risk alcohol consumption, and 16 (8.4%) with risky usage. These align with prior Turkish findings, underscoring the need for further research and development of tailored screening and counseling interventions. Awareness campaigns, peer support groups, mentorship programs, stress management training, and educational materials could enlighten students and steer them towards the adoption of healthy lifestyle habits and behaviours that would better position them in their academic and professional success. As future healthcare professionals, it is critical students avoid

jeopardizing their futures through substance misuse. This study provides key insights to inform initiatives prioritizing medical student wellbeing in Turkey.

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## Appendix A. Tables

Table 1. Details and distribution of demographic and educational variables among FTND categories.

		Fagerstrom Test for Nicotine Dependence Category									
	Total (n = 190)	Non-smoker (n = 140)		Minimally dependent (n = 34)		Moderately dependent (n = 11)		Highly dependent (n = 5)			
Variables	n	% or Median (IQR)	n	% or Median (IQR)	n	% or Median (IQR)	n	% or Median (IQR)	n	% or Median (IQR)	p
<b>Age</b>	-	20 (2)	-	20 (1)	-	20 (2)	-	20 (2)	-	20 (1)	0.118
<b>Sex</b>											<b>0.002</b>
Male	107	56.32%	68	48.57%	25	73.53%	9	81.82%	5	100.00%	
Female	83	43.68%	72	51.43%	9	26.47%	2	18.18%	0	0.00%	
<b>Year</b>											0.066
1	63	33.16%	47	33.57%	12	35.29%	4	36.36%	0	0.00%	
2	81	42.63%	63	45.00%	13	38.24%	1	9.09%	4	80.00%	
3	46	24.21%	30	21.43%	9	26.47%	6	54.55%	1	20.00%	
<b>Language of education</b>											0.591
Turkish	149	78.42%	##	78.57%	28	82.35%	7	63.64%	4	80.00%	
English	41	21.58%	30	21.43%	6	17.65%	4	36.36%	1	20.00%	
<b>GPA</b>											<b>0.015</b>
2.0 - 2.5	27	14.21%	21	15.00%	2	5.88%	2	18.18%	2	40.00%	
2.5 - 3.0	64	33.68%	40	28.57%	20	58.82%	3	27.27%	1	20.00%	
3.0 - 3.5	64	33.68%	50	35.71%	10	29.41%	2	18.18%	2	40.00%	
3.5 - 4.0	35	18.42%	29	20.71%	2	5.88%	4	36.36%	0	0.00%	
<b>Marital/relationship status</b>											<b>0.019</b>
Not in a relationship	120	63.16%	94	67.14%	14	41.18%	9	81.82%	3	60.00%	
In a relationship	70	36.84%	46	32.86%	20	58.82%	2	18.18%	2	40.00%	
<b>Socioeconomic status</b>											0.55
Low/Lower-middle	36	18.95%	25	17.86%	8	23.53%	1	9.09%	2	40.00%	
Middle	89	46.84%	64	45.71%	15	44.12%	8	72.73%	2	40.00%	
Upper/Upper-middle	65	34.21%	51	36.43%	11	32.35%	2	18.18%	1	20.00%	
<b>Type of settlement at the birthplace</b>											0.480
Village	7	3.68%	5	3.57%	2	5.88%	0	0.00%	0	0.00%	
Town	44	23.16%	33	23.57%	8	23.53%	3	27.27%	0	0.00%	
City	93	48.95%	64	45.71%	17	50.00%	8	72.73%	4	80.00%	
Metropol	46	24.21%	38	27.14%	7	20.59%	0	0.00%	1	20.00%	
<b>Type of settlement at the place of being</b>											0.470
Village	5	2.63%	4	2.86%	1	2.94%	0	0.00%	0	0.00%	
Town	23	12.11%	19	13.57%	4	11.76%	0	0.00%	0	0.00%	
City	105	55.26%	70	50.00%	22	64.71%	8	72.73%	5	100.00%	
Metropol	57	30.00%	47	33.57%	7	20.59%	3	27.27%	0	0.00%	
<b>Religious belief</b>											<b>0.019</b>
No belief in god	41	21.58%	28	20.00%	8	23.53%	2	18.18%	3	60.00%	
Belief in god but no belonging to a religion	36	18.95%	21	15.00%	10	29.41%	5	45.45%	0	0.00%	
Fulfilling some of the religious obligations	97	51.05%	76	54.29%	16	47.06%	4	36.36%	1	20.00%	
Fulfilling all of the religious obligations	16	8.42%	15	10.71%	0	0.00%	0	0.00%	1	20.00%	
<b>AUDIT Score</b>	-	1 (4)	-	0 (3)	-	4 (5.5)	-	4 (5.5)	-	7 (11)	<b>&lt;0.001</b>
<b>GHQ-12 Score</b>	-	3 (6)	-	2.5 (6)	-	3.5 (4.5)	-	4 (5)	-	6 (3)	0.129

Table 2. Details and distribution of demographic and educational variables among AUDIT categories.

AUDIT Category									
Variables	Total (n = 190)		Non-drinker (n = 87)		Low-risk consumption (n = 87)		Risky usage (n = 16)		p
	n	% or Mean (SD)	n	% or Mean (SD)	n	% or Mean (SD)	n	% or Mean (SD)	
<b>Age</b>	-	20 (2)	-	20 (1)	-	20 (1.5)	-	21 (2.5)	<b>0.007</b>
<b>Sex</b>	0.075								
Male	107	56.32%	42	48.28%	53	60.92%	12	75.00%	
Female	83	43.68%	45	51.72%	34	39.08%	4	25.00%	
<b>Year</b>	0.101								
1	63	33.16%	35	40.23%	21	24.14%	7	43.75%	
2	81	42.63%	33	37.93%	44	50.57%	4	25.00%	
3	46	24.21%	19	21.84%	22	25.29%	5	31.25%	
<b>Language of education</b>	0.411								
Turkish	149	78.42%	72	82.76%	65	74.71%	12	75.00%	
English	41	21.58%	15	17.24%	22	25.29%	4	25.00%	
<b>GPA</b>	0.465								
2.0 - 2.5	27	14.21%	14	16.09%	9	10.34%	4	25.00%	
2.5 - 3.0	64	33.68%	31	35.63%	29	33.33%	4	25.00%	
3.0 - 3.5	64	33.68%	24	27.59%	35	40.23%	5	31.25%	
3.5 - 4.0	35	18.42%	18	20.69%	14	16.09%	3	18.75%	
<b>Marital/relationship status</b>	0.004								
Not in a relationship	120	63.16%	65	74.71%	49	56.32%	6	37.50%	
In a relationship	70	36.84%	22	25.29%	38	43.68%	10	62.50%	
<b>Socioeconomic status</b>	0.33								
Low/Lower-middle	36	18.95%	19	21.84%	15	17.24%	2	12.50%	
Middle	89	46.84%	35	40.23%	43	49.43%	11	68.75%	
Upper/Upper-middle	65	34.21%	33	37.93%	29	33.33%	3	18.75%	
<b>Type of settlement at the birthplace</b>	0.593								
Village	7	3.68%	3	3.45%	4	4.60%	0	0.00%	
Town	44	23.16%	23	26.44%	19	21.84%	2	12.50%	
City	93	48.95%	39	44.83%	42	48.28%	12	75.00%	
Metropol	46	24.21%	22	25.29%	22	25.29%	2	12.50%	
<b>Type of settlement at the place of being</b>	0.423								
Village	5	2.63%	2	2.30%	3	3.45%	0	0.00%	
Town	23	12.11%	12	13.79%	10	11.49%	1	6.25%	
City	105	55.26%	49	56.32%	43	49.43%	13	81.25%	
Metropol	57	30.00%	24	27.59%	31	35.63%	2	12.50%	
<b>Religious belief</b>	<0.001								
No belief in god	41	21.58%	7	8.05%	30	34.48%	4	25.00%	
Belief in god but no belonging to a religion	36	18.95%	7	8.05%	23	26.44%	6	37.50%	
Fulfilling some of the religious obligations	97	51.05%	57	65.52%	34	39.08%	6	37.50%	
Fulfilling all of the religious obligations	16	8.42%	16	18.39%	0	0.00%	0	0.00%	
<b>FTND Score</b>	-	0 (1)	-	0 (0)	-	0 (0)	-	1 (4)	<b>&lt;0.001</b>
<b>GHQ-12 Score</b>	-	3.64 (3.42)	-	2 (6)	-	3 (5.5)	-	4 (3)	0.805



Table 3. Details and distribution of demographic and educational variables among GHQ-12 categories.

Variables	Total (n = 190)		GHQ=12 Category		Non-case (n = 89)		Case (n = 101)		p
	n	% or Median (IQR)	n	% or Median (IQR)	n	% or Median (IQR)	n	% or Median (IQR)	
<b>Age</b>	-	20 (2)	-	20 (2)	-	20 (2)	-	20 (2)	0.737
<b>Sex</b>									0.382
Male	107	56.32%	47	52.81%	60	59.41%			
Female	83	43.68%	42	47.19%	41	40.59%			
<b>Year</b>									0.294
1	63	33.16%	34	38.20%	29	28.71%			
2	81	42.63%	37	41.57%	44	43.56%			
3	46	24.21%	18	20.22%	28	27.72%			
<b>Language of education</b>									0.078
Turkish	149	78.42%	75	84.27%	74	73.27%			
English	41	21.58%	14	15.73%	27	26.73%			
<b>GPA</b>									0.160
2.0 - 2.5	27	14.21%	10	11.24%	17	16.83%			
2.5 - 3.0	64	33.68%	36	40.45%	28	27.72%			
3.0 - 3.5	64	33.68%	25	28.09%	39	38.61%			
3.5 - 4.0	35	18.42%	18	20.22%	17	16.83%			
<b>Marital/relationship status</b>									0.293
Not in a relationship	120	63.16%	60	67.42%	60	59.41%			
In a relationship	70	36.84%	29	32.58%	41	40.59%			
<b>Socioeconomic status</b>									0.012
Low/Lower-middle	36	18.95%	10	11.24%	26	25.74%			
Middle	89	46.84%	41	46.07%	48	47.52%			
Upper/Upper-middle	65	34.21%	38	42.70%	27	26.73%			
<b>Type of settlement at the birthplace</b>									0.828
Village	7	3.68%	3	3.37%	4	3.96%			
Town	44	23.16%	18	20.22%	26	25.74%			
City	93	48.95%	46	51.69%	47	46.53%			
Metropol	46	24.21%	22	24.72%	24	23.76%			
<b>Type of settlement at the place of being</b>									0.613
Village	5	2.63%	2	2.25%	3	2.97%			
Town	23	12.11%	12	13.48%	11	10.89%			
City	105	55.26%	45	50.56%	60	59.41%			
Metropol	57	30.00%	30	33.71%	27	26.73%			
<b>Religious belief</b>									0.325
No belief in god	41	21.58%	15	16.85%	26	25.74%			
Belief in god but no belonging to a religion	36	18.95%	15	16.85%	21	20.79%			
Fulfilling some of the religious obligations	97	51.05%	50	56.18%	47	46.53%			
Fulfilling all of the religious obligations	16	8.42%	9	10.11%	7	6.93%			
<b>FTND Score</b>	-	0 (1)	-	0 (0)	-	1 (1)			0.020
<b>AUDIT Score</b>	-	1 (4)	-	1 (4)	-	1 (4)			0.265