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## Knowledge and Attitude Towards Doping Among University Students in Jordan

Kamal A. Hadidi<sup>1,2</sup>, Suhad M. Khasawneh<sup>2</sup>, Raghad M. Bani Hamad<sup>3</sup>, Hiba Z. Janbek<sup>3</sup>, Amwaj A. Al-Farajat<sup>3</sup>, Rufayda H. Alamaireh<sup>3</sup>, Zena U. Al-ani<sup>3</sup>, Farah E. Alazizi<sup>3</sup>, Akram K. Alhadidi<sup>4</sup>, and Abdulrahman E. Alhanbali<sup>5</sup>

<sup>1</sup> Department of Pathology Microbiology and Forensic Medicine, School of Medicine, the University of Jordan; khadidi@ju.edu.jo.

<sup>2</sup> Jordan Poison Information Center- Jordan University Hospital; suhadkhasawneh@yahoo.com.

<sup>3</sup> Medical Students, School of Medicine, the University of Jordan; rhdjwd1999@gmail.com; hjanbek@childrensnational.org; amwajfarajat99@gmail.com; rufaidahussien1@gmail.com; zenuqba@gmail.com; frh0175786@ju.edu.jo.

<sup>4</sup> MD, The National Center for Diabetes Endocrinology and Genetics, Jordan. akram\_hadidi@hotmail.com.

<sup>5</sup> MD, School of Medicine, the University of Jordan; aehanbali@gmail.com.

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### Article History:

Received: 20 July 2025; Accepted: 31 August 2025; Published: 3 September 2025

### Address for Correspondence:

Kamal A. Hadidi (khadidi@ju.edu.jo).

Suhad M. Khasawneh (suhadkhasawneh@yahoo.com).

### Abstract

**Background:** Unfortunately, researches on knowledge and attitudes toward doping is lacking in Jordan. The aim of this study is to investigate perceived beliefs and awareness of doping among university students in Jordan.

**Methods:** Self-administered questionnaire of students at the University of Jordan. Students were approached randomly at their classrooms over 3 months.

**Results:** There were significant findings between different age groups, family monthly income, grade point average (GPA), ethical beliefs, and peer pressure when comparing whether or not students were willing to try or had previously tried using performance enhancing substances (PESs). Most importantly, this study found that a huge lack of knowledge about possible side effects of PESs.

**Conclusions:** The results emphasize the significance of addressing the moral and ethical issues surrounding doping, as well as the need for further research into the potential elements that may lead to fewer negative perceptions and greater understanding about doping among university students.

### Keywords

knowledge, attitude, doping, university students, Jordan

### Volume 15, 2025

**Publisher:** The Brooklyn Research and Publishing Institute, 442 Lorimer St, Brooklyn, NY 11206, United States.

**DOI:** <https://doi.org/10.30845/ijhss.v15p33>

### Reviewers

Dr. Ibrahim Mohammad Hammad, The University of Jordan, Jordan; Email: ihammad@hotmail.com, i.hammad@ju.edu.jo.

Dr. Lawrence Adhowhoarie Oboma, University of Uyo, Uyo, Nigeria; ORCID iD: <https://orcid.org/0009-0002-0078-6157>; Email: itxlawsobo@gmail.com.

**Citation:** Hadidi et al. (2025). Knowledge and Attitude Towards Doping Among University Students in Jordan. *International Journal of Humanities and Social Science*, 15, 378-389. <https://doi.org/10.30845/ijhss.v15p33>

## 1. Background:

Doping is defined as the presence of prohibited substances or methods to illegally improve the sporting performance and to gain an advantage over competitors (Vlad et al., 2018).

The use of PESs has increased recently, especially among young people participating in sports, due to media attention on the importance of having a muscular body, which encouraged them to use PESs to be in the best possible athletic looking condition (Dandoy & Gereige, 2012). A study on non-sports practicing adolescents revealed that 48% used PESs to improve their performance and 45% to enhance physical appearance (Berning et al., 2008). According to a study conducted on university students in Jordan, almost one-third of the participants began abusing these substances before reaching the age of 15 (Tahtamouni et al., 2008).

The World Anti-Doping Agency (WADA) has categorized prohibited substances into different categories, with anabolic androgenic steroids (AASs) being the most abused (World Anti-Doping Agency (WADA), 2015). A study conducted in Sub Saharan Africa in 2015 showed high prevalence of AAS use (overall lifetime prevalence 3.8%) (Sagoe et al., 2015). Additionally, a 2021 systematic review and meta-analysis of Iranian athletes found that the overall prevalence rate of anabolic-androgenic steroid misuse was 36.2%, with the highest rates among bodybuilding athletes compared to other athletes (Selk-Ghaffari et al., 2021). In Jordan, the prevalence and risk factors of anabolic- androgenic steroids abuse was 4.2% in collegiate students compared to 26% among the athletes (Tahtamouni et al., 2008), and 8.8% among gymnasium clients in Amman, the capital of Jordan, in another study (Wazaify et al., 2014).

Doping can cause serious side effects and health problems (Hartgens & Kuipers, 2004), including cardiovascular complications (Baggish et al., 2017; Hartgens & Kuipers, 2004), kidney diseases (Davani-Davari et al., 2019), reproductive system disorders (Christou et al., 2017), and psychological disorders (Vorona & Nieschlag, 2018). Most doping agents exert serious side effects, especially when used in combination, at high doses, and for extended periods. Despite these risks, individuals still use doping to achieve personal victory or due to pressure from coaches or clubs to win medals. Studies showed that high percentages of PESs users were unaware of the health-related side effects that PESs could cause (Giraldi et al., 2015; Jaafar & Hamat, 2020; Nicholls et al., 2017; Wanjek et al., 2007).

There appears to be a paucity of studies on the knowledge and attitudes towards doping in Jordan. This highlights the need for further research to investigate the extent of knowledge and attitudes towards doping in the country. The aim of this study is to investigate the perceived beliefs and awareness of doping among university students in Jordan, and to have an idea of the extent to which doping is prevalent in the Jordanian population.

## 2. Materials and Methods:

### 2.1 Research Design and Study Participants

The study adopted cross-sectional design and data was collected from 1859 students at the University of Jordan by convenient sampling. The selection criterion included both female and male students who were enrolled in the University of Jordan by the time data collection took place, regardless of specialty and year of study. Students were approached randomly in classrooms and were asked to fill the questionnaire. Researchers also chose classrooms randomly. Data collection was conducted through 3 months starting from December 6<sup>th</sup>, 2022 until February 6<sup>th</sup>, 2023.

### 2.2 Instruments

Data was collected through a self-administered questionnaire developed by researchers and validated first by distributing it to 10 academicians at the University of Jordan; School of Education, School of Sport Science and School of Medicine and also to Jordan Anti-Doping organization (JADO), then a pilot study was conducted on 50 students from the University of Jordan, the invalid items of the questionnaire were dropped. To validate translating the questionnaire from English to Arabic, which is the native language in Jordan, translation-retranslation method was used. The questionnaire had three sections. The first section sought the demographic details of the respondents (e.g., age, gender, place of residence, family monthly income, sports participation, specialty and year and of study). The second section had items on knowledge on doping such as general knowledge on substances that enhance performance, anabolic steroids and stimulants. Other aspects included sources of information on doping and consequences of the use of PESs. The last section of the questionnaire sought information on attitudes towards doping.

## 2.3 Statistical Analysis

Analysis and visualization were done using version 3.9.12 of Python. Versions 1.4.2 and 1.21.5 of Pandas and NumPy were utilized, respectively for various data wrangling processes. Statistical tests were done utilizing version 0.5.3 of Pingouin package for python. Scikit-learn version 1.0.2 was used in addition to the previous mentioned package for building the regression model. Matplotlib and Seaborn (versions: 3.6.0 and 0.11.2, respectively) were used for visualization.

Scores of negative feelings were calculated by adding the individual rating of embarrassment, guilt, anger, and sadness when caught by each participant. Students were given scores out of 14 points regarding their knowledge about doping side effects. Nominal variables were described using frequencies and percentages, while mean  $\pm$  standard deviation was used to describe continuous variables. Score differences between various groups were assessed by T-test and one-way analysis of variance (ANOVA). Welch's ANOVA was used with variables that did not meet the homoscedasticity assumption for regular ANOVA. Tukey's honest significance difference test (HSD) post hoc test was used to compare different groups if one-way ANOVA's results were significant, while Games-Howell test was used if Welch's ANOVA was significant. T-test was used to compare percentage of doping usage between different groups using. Willing to try doping between different categories were compared using Chi-square test. Multiple binary logistic regression model was then applied to variables with interesting findings to predict their effect on willing to use doping agents. Variance inflation factor was used to detect collinearity in variables used in logistic regression with a cutoff point of 5. A p-value of 0.05 was set as a cutoff point for significant findings.

## 3. Results:

### 3.1 Participant Demographics

The sample consisted of 1859 students who were actively enrolled in the University of Jordan at the time of the survey. Of whom, 1209 (65.03%) were females and 650 (34.97%) were males. Most of the applicants were below 23 years of age 1758 (94.57%). The majority of participants were residing in Amman governorate -the capital of Jordan- at the time of the survey 1308 (70.36%). In addition, 1499 (80.63%) people reported living in a major city compared to 360 (19.37%) living in rural villages. Further breakdown of participants' age, collage and governorate of residency can be found in (Table1). Out of the total sample, 799 (42.98%) reported that their family monthly income is less than 500 Jordan Dinars (JD), 681 (36.63%) reported it being between 500 and 1000 JD, while 379 (20.39%) had family income of more than 1000 JD.

Of the total number of participants, 1349 (72.57%) were in their first year of university study, 316 (17.0%) were in their second year and 128 (6.89%) were in their third year. The number of people in their fourth, fifth or sixth years were 56 (3.01%), 7 (0.38%) and 3 (0.16%) respectively. In terms of GPA, 693 (37.28%) students had an excellent GPA, 712 (38.3%) reported having a very good GPA and 331 (17.81%) had a good GPA, while only 123 (6.62%) students reported a GPA lower than that. When asked about how frequently they play sports, 347 (18.67%) students reported that they don't play sports, 1006 (54.12%) answered that they sometimes play sports, 254 (13.66%) practiced sports regularly at home, 152 (8.18%) practiced regularly at a gym and 100 (5.38%) students said they were professional athletes.

### 3.2 Knowledge About Doping

The majority of participants either did not know or were unsure if using any doping agent could increase their performance in sports. In addition, 1113 (59.87%) students did not know if doping is prohibited by law and 358 (19.26%) said it is prohibited while only 338 (20.87%) knew that doping usage outside of professional sports is not prohibited. When asked about the harms of different doping agents, most of participants answered with "I don't know". This was evident also when asked about specific side effects of different agents. For instance, 1691 (90.96%) couldn't associate nipple discharge with doping usage, 1599 (86.01%) didn't recognize skin rash as a possible side effect, 1554 (83.59%) did not know doping could cause testicular atrophy in males, 1447 (77.84%) could not tie excessive hair growth to doping usage and 1486 (79.94%) didn't know that erectile dysfunction is a possible side effect of doping.

The mean side effect knowledge score was 3.75 out of 14 points with a standard deviation (SD) of 3.24. People attending a gym had a mean score of  $4.26 \pm 3.56$  compared to  $3.67 \pm 3.56$  in those who do not ( $p=0.012$ ). Gender and GPA category did not have any significant association with knowledge score in this

sample ( $p=0.56$  and  $0.14$ , respectively). On the other hand, those who never played sports had lower scores compared to those who play regularly at home or at a gym ( $p=0.003$ ).

### 3.3 Attitude Toward Doping

Of the total number of participants, 1725 (92.79%) said they never thought of using any doping agent while 134 (7.21%) students either have used or thought of using them at some point of their lives. Only 19 (1.02%) students reported that they have used at least one of the following compounds without medical indication: androgenic anabolic steroids, B-blockers, erythropoietin, human growth hormones or diuretics. On the other hand, 12 (0.65%) students reported using one of them according to medical prescription while the rest of the sample 1847 (99.35%) denied using any of those medications. No significant associations could be found comparing percentage of doping without indication usage between males and females, between people who go to gyms and those who don't, or between those who live in an urban city and those who live in a village ( $p=0.53$ ,  $0.22$  and  $0.27$ , respectively).

The mean negative feeling score for this study sample is 12.78 out of 20 ( $\pm 6.21$ ). A breakdown of each subcomponent is visualized in figure 1. Attending a fitness club was associated with lower negative feeling scores ( $p=0.008$ ). Professional athletes had significantly lower negative feeling scores (mean  $10.5 \pm 7.15$ ) than those who practice sometimes (mean  $13.17 \pm 6.12$ ,  $p=0.004$ ) and those who play sports regularly at home (mean  $12.84 \pm 6.12$ ,  $p=0.035$ ) (ANOVA's  $p=0.003$ ). People had different responses when asked how ethical is doping in sports, 1251 (67.29%) thought it was completely unethical, 514 (27.65%) thought it could be ethical under certain circumstances, while 94 (5.06%) responded that doping is ethical regardless of situation. There was a significant difference in those three groups when comparing negative feeling scores if caught ( $p<0.001$ ), with significant post hoc results when comparing those who think it's unethical with those who justify in some situations and those who believe it's completely ethical ( $p<0.001$  for both). The mean score for those who thought its unethical was  $13.99 \pm 5.77$ , while for people thinking it could be justified in some situations it was  $10.59 \pm 6.07$ , and for those who justified its use at all circumstances it was  $8.76 \pm 7.49$  (figure 2). Regarding peer pressure, 1519 (81.71%) were sure they would resist it, 114 (6.13%) answered with maybe they will resist it, 41 (2.21%) were not sure if they could resist, and 185 (9.95%) believed they will not resist at all.

Comparing whether students were willing to try - or have already tried - using a doping substance or not yielded some significant findings between different age groups, different family monthly income, GPA, thoughts on ethicality, and stance from peer pressure ( $p=0.003$ ,  $0.009$ ,  $0.001$ ,  $<0.001$  and  $<0.001$ , respectively). On the other hand, no significant association was found by comparing gender, urban residency, sport frequency, or knowing about prohibition; and having the thought of using these agents - or have them used already - ( $p=0.07$ ,  $0.05$ ,  $0.94$ ,  $0.31$ , respectively). Using a logistic regression model, the variables with potential interesting findings were used to predict whether someone is willing to use doping. Completely justifying doping use was found to be a significant predictor of willingness to use doping (Log-odds= 1.21, 95% confidence interval (CI) = [0.62-1.81],  $p<0.001$ ). On the other hand, believing their use is unethical was a significant negative predictor (Log-odds= -0.84, CI= [-1.28]-[-0.41]),  $p<0.001$ ). Being unsure about peer pressure resistance showed significant prediction of willingness to use doping (Log-odds= 2.38, CI= [1.61-3.14],  $p<0.001$ ). In addition, feeling that peer pressure could not be resisted was also significantly a predictor of willingness to use doping (Log-odds= 1.22, CI= [(0.68)-(1.75)],  $p=0.001$ ).

## 4. Discussion:

### 4.1 Participant Demographics

The present study aimed to investigate the knowledge and attitude of university students towards doping. The demographic characteristics of the sample reveal that the majority of participants are females under the age of 23, who come from families with a middle to high monthly income. Most of these individuals are from an urban background, with the majority residing in the capital of Jordan, Amman, making up 70.63% of the sample. About 72.57% of the students are in their first year of study, and nearly 75% of respondents have a very good to excellent GPA. This finding underscores the importance of targeting diverse populations in future studies to better understand the factors influencing doping behavior.

Regarding sports participation, only 18.67% of respondents reported not engaging in any sports- related activities, meaning that almost 80% of this sample practices some form of physical activity. However, professional athletes make up a small proportion of the sample, with only 5.38% falling under this category.

The majority of the participants never thought of using any doping agent. Moreover, 98% of the participants never used doping agents, however 30 participants, comprising 1.67 % reported using, of which only 12 had a medical exemption for their use. The low prevalence of self-reported doping use in this sample is consistent with previous studies, which have found that the prevalence of doping use among college students is generally low ([Constantinou & Aguiyi, 2022](#)). However, it is important to note that participants may be hesitant to admit to using banned substances due to fear of negative consequences. Therefore, it is possible that the actual prevalence of doping use in this population may be higher than reported.

This study revealed no significant association between gender and percentage of doping among university students. In contrary to a previous study conducted on professional athletes where results revealed lower use of prohibited substances in female versus male athletes ([Collomp et al., 2022](#)).

Furthermore, comparing this study to a previous study found that the prevalence of steroid use throughout a predominantly rural area to be similar to that found by previous studies conducted in metropolitan areas; prevalence was not affected by city or school size ([Whitehead et al., 1992](#)).

#### 4.2 Knowledge About Doping

The majority of the sample did not have knowledge about the effect of doping on sports performance or the regulations set on its use by law. In addition, this study demonstrates a concerning lack of knowledge and awareness regarding the harms and side effects of doping agents among university students. This lack of knowledge is reflected in the high proportion of respondent who were unable to identify or associate the common potential side effects of doping agents in both the short and long-term, such as nipple discharge, skin rash, testicular atrophy, excessive hair growth, and erectile dysfunction. The low knowledge scores found in this study are consistent with previous studies that have also shown low levels of knowledge about doping among university students in Egypt ([Bader el Dine, & Attia, 2022](#)) and Iran ([Fayyazi Bordbar et al., 2014](#)). Another study conducted in Jordan that assessed the knowledge of both healthcare providers and non-healthcare providers who were associated with sport related issues found that both groups need to enhance their professional and legal knowledge about doping agents ([Odeh et al., 2022](#)). These findings indicate that there is a widespread lack of knowledge and awareness regarding doping among various populations, including university students, healthcare providers and the public.

However, this study did find that individuals who never played sports had lower knowledge scores compared to those who participated in sports regularly. This is expected, as students who had participated in sport competitions would be more knowledgeable. However, this finding is contrary to another study's findings where there was no significant correlation between college athlete's awareness of PES and competition experience ([Kamenju, 2014](#)).

#### 4.3 Attitude Toward Doping

The results of the present study suggest that a majority of students have a negative attitude towards doping in sports, with 67.29% considering it completely unethical which is promising and aligns with the generally accepted view that doping in sports is cheating and goes against the principles of fair play. This is consistent with previous researches on attitudes towards doping, which have found that a majority of individuals view the use of PESs as a violation of fair play and sportsmanship ([Constantinou & Aguiyi, 2022](#); [Odeh et al., 2022](#); [Rintaugu & Mwangi 2021](#)). However, the fact that a significant minority (27.65%) felt that doping could be ethical under certain circumstances is a cause for concern, which is consistent with findings from other studies ([Naeem et al., 2023](#)).

Moreover, the present study found a significant difference in negative feeling scores if correlated with the three groups with different attitudes towards doping. Those who believed doping was completely unethical reported the highest negative feeling scores, followed by those who believed it could be justified in certain circumstances, and then those who believed it was ethical under all circumstances. This suggests that attitudes towards doping are related to perceptions of the consequences of being caught, which is consistent with previous research that has found that perceptions of the risks and benefits of doping can influence attitudes towards its use ([Barkoukis et al., 2013](#)).

Furthermore, the finding that professional athletes had significantly lower negative feeling scores than those who practice sports sometimes or regularly at home suggests that individuals who are more involved in sports may have a different view of doping in sports and may be more willing to take risks to gain a competitive advantage. However, further research is needed to explore the reasons behind this difference and the potential implications for preventing doping in sport.



In terms of peer pressure, the present study found that the majority of students were confident in their ability to resist pressure to use PESs. This is consistent with previous research that has found that individuals who are more confident in their ability to resist peer pressure are less likely to engage in doping behavior (Ntoumanis et al., 2014). However, the present study also found that a small proportion of students were not sure if they could resist peer pressure or believed they would not be able to resist it at all. These findings suggest that interventions aimed at preventing doping behavior should also focus on improving athletes' confidence and ability to resist peer pressure.

This study clearly illustrates a correlation between prevalence and attitude towards the use of PESs which is inconsistent with a previous study conducted to determine the frequency of AASs consumption in male medical students in Iran (Fayyazi Bordbar et al., 2014) but similar to findings in a much recent study that illustrated a positive correlation between the prevalence and attitude towards AASs among male bodybuilders in Iran (Manoochehri et al., 2021).

In a systematic review identifying factors that predicted doping among young people, the prevalence of doping in different samples ranged from 0.9 to 6% for males, and between 0.2 and 5.3% for females (Nicholls et al., 2017). This study showed no significant difference in willingness between males and females, this may be due to sports and exercise becoming more popular among females in recent years, but further studies should look into it.

Although some studies found a clear relationship between doping prevalence and age (Hoffman et al., 2008; Laure & Binsinger 2007; Wanjek et al., 2007), a longitudinal study (Vandenberg et al., 2007) examined the prevalence of AASs among a sample 5 years apart and reported that the prevalence usage remained stable with advancing in age which goes with findings in this study that showed no difference in willingness to use PESs in different age groups.

Additionally, Moral conviction and ethical standards were negatively associated with doping in a previous study conducted on junior athletes (Madigan et al., 2016), which goes with this study's findings as well.

A previous study revealed that PESs were mainly supplied by either friends or health professionals and that 18% of AASs users took this substance due to pressure from their friends (Laure et al., 2004). In addition, El-Hammadi, and Hunien, reported that 60% of Syrian pharmacy students believed that sports mates and friends were the main cause in encouraging them to take a doping agent (El-Hammadi & Hunien, 2013). Nevertheless, in this study peer pressure is not a positive predictor for doping.

### Study Limitations

The findings of this study contribute to the growing body of research on doping attitudes and knowledge among university students. However, some limitations should be considered. The study included students from only one university, limiting the generalizability of the findings to other populations. In addition, it relied on self-report measures, which may be subject to social desirability bias. Psychological variables that were studied in other publications were not included in this study, such as happiness, self-control, self-esteem, and perfectionist strivings. Additional research studying these variables is important.

### 5. Conclusions:

In conclusion, the main findings that arose from this study is the lack of knowledge and awareness regarding the side effects of doping agents among university students. Another concerning finding is that there was a significant minority who felt that doping could be ethical under certain circumstances.

These findings open the possibility to concentrate on doping prevention efforts such as increased education and awareness actions addressing the harms and the health-related consequences of doping. Preventative measures should be directed toward enhancing the knowledge of PESs, their side effects and advocating for stricter regulations on the acquisition of these substances. These preventive measures could include performing educational campaigns, as well as incorporating anti-doping education into university curriculums. It is important to know that lack of knowledge and awareness about doping among university students could increase the likelihood of using these substances.

Overall, the present study provides valuable insights into the attitudes of students towards doping in sports. The findings highlight the importance of addressing the ethical and moral considerations associated with doping, as well as the need for interventions that promote social support and resilience in the face of peer pressure. Further research is needed to investigate the factors that influence attitudes towards doping, and to develop effective prevention and

intervention strategies to reduce its use in sports and contribute to the wider global efforts to promote clean and fair sports.

**Table 1 Basic demographical data:**

Variable	N[%]
<b>Age</b>	
17-18	1041 [56.0]
19-20	560 [30.1]
21-22	157 [8.5]
> 23	101 [5.4]
<b>Collage</b>	
School of Arts	223 [12.1]
School of Business	199 [10.7]
School of Shari'a	86 [4.6]
School of Educational Sciences	40 [2.2]
School of Law	50 [2.7]
School of Sport Science	76 [4.1]
School of Arts and Design	28 [1.5]
Prince Al Hussein Bin Abdallah II School of International Studies	7 [0.4]
School of Foreign Languages	170 [9.1]
School of Archaeology and Tourism	55 [3.0]
School of Science	135 [7.3]
School of Agriculture	120 [6.5]
School of Engineering	191 [10.3]
King Abdallah II School of Information Technology	85 [4.6]
School of Medicine	136 [7.3]
School of Nursing	56 [3.0]
School of Pharmacy	100 [5.4]
School of Dentistry	60 [3.2]
School of Rehabilitation Sciences	42 [2.3]
<b>Governorate of residency</b>	
Amman	1308 [70.4]
Zarqa	188 [10.0]
Balqa	134 [7.2]
Aqaba	64 [3.4]
Madaba	61 [3.3]
Jerash	35 [1.9]
Mafrq	15 [0.8]
Ajloun	14 [0.8]
Irbid	14 [0.8]

Tafilah	11 [0.6]
Ma'an	9 [0.5]
Karak	6 [0.3]

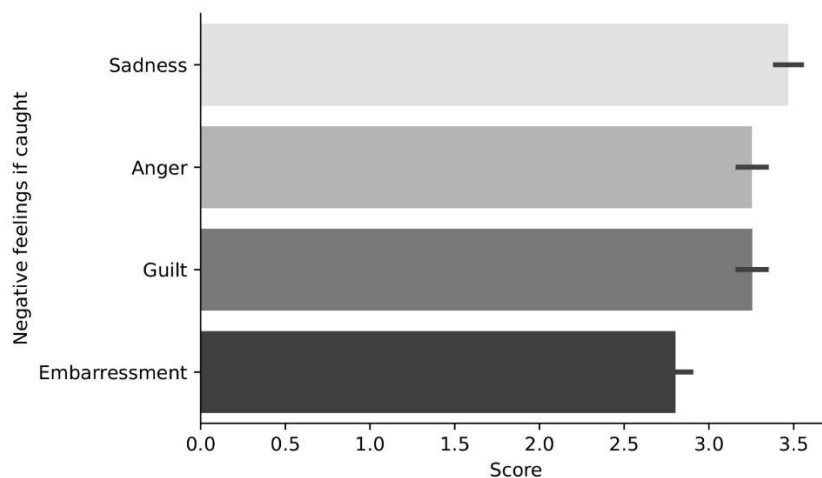


Figure 1: Negative feeling score subsections

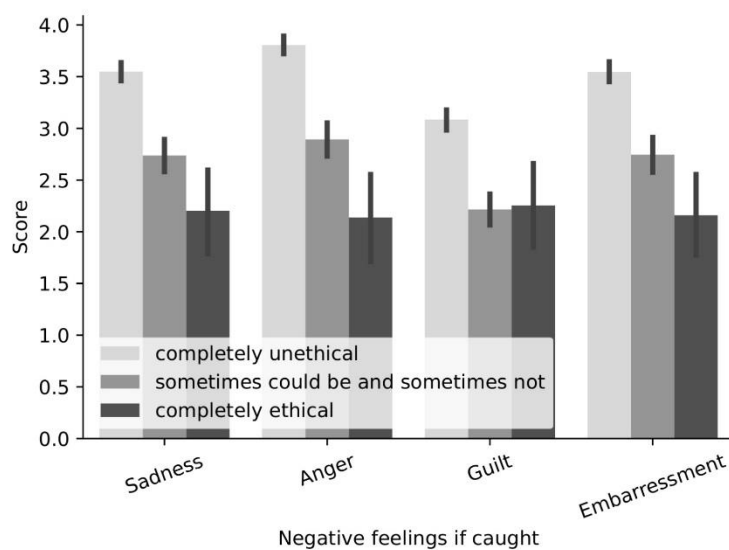


Figure 2: Thoughts on ethicality and negative feelings if caught

**Conflict of Interest:** Authors have no conflict of interest to declare.

**Ethical Approval:** The project was approved by School of Medicine, the University of Jordan Institutional Review Board.

**Funding:** None.



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### Author Biography

#### Kamal A. Hadidi

Kamal A. Hadidi is a Professor of Toxicology (Forensic and Clinical), section of forensic medicine and toxicology-department of pathology microbiology and forensic medicine -School of Medicine-The University of Jordan, Amman-Jordan. Prof. Hadidi received his PhD in Toxicology from the School of Medicine-University of Glasgow-UK. He has published scientific papers in different areas of toxicology; Analysis of chemical toxin and pesticides, forensic fatal poisoning, clinical aspects of poisoning in Jordan, and the new era of toxicology related doping substances and supplements in sport. In his career as professor of toxicology, he teaches toxicology courses for fifty-year medical student, residents in forensic medicine, and Master of analytical toxicology, he also supervises and examines MSc and PhD students. He is the founder and chairman of National Drug and Poison Information Center- department of laboratory medicine and forensic medicine at Jordan University Hospital (JUH). He established the national (Jordan) anti-doping organization and chair its board; he was World Anti-Doping Agency (WADA) foundation board member and Health, medical and research committee member. Within Asia continent sport championships, he is participating in anti-doping testing activity under the umbrella of Olympic Council of Asia (OCA) as medical anti-doping committee member. As a toxicologist he worked with international organizations since 2003 like; the Organization of Prohibition of Chemical War (OPCW) in establishing diagnostic tests for pesticides toxicity as a module of exposure. Also, with WHO-CEHA; participating in regional framework activities related to response to chemical events and preparedness. Member of Expert reviewers of WHO book title: Guideline for Establishing a Poison Control Centre - World Health Organization - published 2020.

**ORCID ID:** <https://orcid.org/0000-0001-5284-1061>

#### Suhad M. Khasawneh

Suhad holds a Master degree in Business Administration (MBA) from The University of Jordan plus a Bachelor's degree in Pharmacy from Jordan university of Science and Technology. She has more than 20 years of experience at Jordan National Poison Information Center. Handled many poisoning cases of different origins, routes of exposure and age groups. Involved in research as well.

Suhad attended many training courses related to Safe and Secure Approaches in Field Environments, risk assessment, Chemical events management, International Health Regulations (IHR) implementation, and was trained at The Central New York poison center, Syracuse one of the best poison centers in the US.

**ORCID ID:** <https://orcid.org/0009-0009-3175-5725>

#### Raghad M. Bani Hamad

Raghad is a general surgery resident at Jordan University Hospital since July 2024. She graduated from the University of Jordan, School of Medicine, in 2023, where she built a strong foundation in medical sciences and clinical practice.

Her professional interests include trauma surgery, minimally invasive procedures, and surgical oncology, areas in which she aims to expand her knowledge and skills. She is particularly drawn to the problem-solving nature of surgery and its potential to make a direct, lasting impact on patients' lives.

**ORCID ID:** <https://orcid.org/0009-0005-3582-221X>

#### Hiba Z. Janbek

Hiba is a pediatric resident physician at Children's National Medical Center in Washington DC. She graduated from the University of Jordan, School of Medicine, in 2023.

**ORCID ID:** <https://orcid.org/0009-0005-3660-7554>

#### Amwaj A. Al-Farajat

Amwaj is an ophthalmology resident at the University of Jordan Hospital. She earned her Doctor of Medicine (MD) degree from the University of Jordan in 2023. Her academic and clinical interests include medical and surgical management of ocular diseases, advancements in glaucoma and retina care, and the role of innovative technologies in improving patient outcomes.

**ORCID iD:** <https://orcid.org/0000-0003-2367-537X>

**Rufayda H. Alamaireh**

Rufayda is a general practitioner at the ministry of health in Amman, Jordan. She graduated from the University of Jordan in 2023. Her professional interests include preventive care and patient education.

**ORCID iD:** <https://orcid.org/0009-0005-1888-315X>

**Zena U. Al-ani**

Zena is a resident physician in Obstetrics and Gynecology at King Hussein Medical Center in Amman, Jordan. She graduated from the University of Jordan in 2024. Her professional interests include advancing women's health through evidence-based medicine, clinical research, and patient-centered care.

**ORCID iD:** <https://orcid.org/0009-0009-6494-3298>

**Farah E. Alazizi**

Farah is an internal medicine resident physician at Albany Medical Center, NY, USA. She graduated from the University of Jordan in 2023. Her professional interests include advocating for her patients and preventive medicine.

**ORCID iD:** <https://orcid.org/0009-0000-7910-2269>

**Akram K. AlHadidi**

Akram is a medical doctor currently working as a general practitioner at the National Center for Diabetes, Endocrinology, and Genetics. He holds ECFMG certification, and is trained as a Sub-Investigator for clinical trials. He is also a certified Doping Control Officer with the Jordan Anti-Doping Organization (JADO), where he volunteers as a physician to support athlete sample collection.

**ORCID iD:** <https://orcid.org/0000-0001-8263-977X>

**Abdulrahman E. Alhanbali**

Abdulrahman is a resident physician at University of Texas Medical Branch, Department of Pediatrics, Galveston, Texas, USA. He earned his Doctor of Medicine (MD) degree from The University of Jordan.

**ORCID iD:** <https://orcid.org/0000-0003-1860-4294>

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