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Perception and Usage of Filtered Khaini (Shamma Al-HOT) Among University Students in Taiz City, Yemen: A Cross-Sectional Survey

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ABSTRACT

Objective: This study explores the prevalence of Filter Khaini (Shamma Al-HOT) among university and college students in Taiz, Yemen. It aims to assess the awareness and propose prevention strategies.

Method: A cross-sectional study was conducted among 435 students who were selected at each level by convenience sampling method from different universities in Taiz city, Yemen, in the period from May 7 to May 30, 2022**.** Data were collected via a structured questionnaire and were analyzed using excel program.

Results: The study found that 29.89% of students used stimulants, with Qat (62.30%) being the most consumed, followed by smoking (16.32%) and Shamma Al-HOT (11.49%). Over half (51.49%) of students had prior knowledge of Shamma Al-HOT, but 67.35% were unaware of its ingredients. Peer influence (17.93%) was a key initiation factor. Most students (54.71%) recognized its health risks, while 21.39% lacked awareness. Reported adverse effects included health issues (40%) and psychological effects (30.12%). Cancer (2.98%) and oral infections were noted risks. While 21.15% wished to quit, 15.86% felt addicted. (12.18%) who still disagree to stop taking Shamma AL-HOT. Findings indicated that oversight is present at a rate of (18.58%) to control the spread, while (23.22%) reported a lack of oversight.

Conclusion: The study highlights the urgent need for awareness campaigns, stricter regulations, and accessible treatment centers to combat Shamma Al-HOT use. A multi-sectoral approach involving families, educational institutions, media, and law enforcement is essential for prevention and intervention.

Keywords: Stimulants, Shamma Al-HOT, Smokeless Tobacco (SLT), Addiction, Qat, Students.

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INTRODUCTION

The phenomenon of stimulant abuse is no longer limited to specific segments of society and has become a major obstacle to development and construction efforts, particularly among young people (1). The most prevalent phenomenon in modern societies is the use of stimulants, which have a negative impact on the community (2). While some stimulants have a medical use, such as treating mental and neurological diseases, their misuse has become a significant social problem, affecting individuals and societies worldwide. These substances can lead to serious health complications due to their dosage, type, and chemical composition (3).

The World Health Organization (WHO) South-East Asia region (SEAR) is home to nearly 90% of the world's smokeless tobacco (SLT) users, which amounts to over 250 million out of 300 million global users (4, 5). SLT can be consumed in various ways, including chewing, sucking, snuffing, or applying it to teeth and gums. There is a wide variety of SLT products available in SEAR countries, with betel quid being the most commonly used in Bangladesh, Maldives, Myanmar, Sri Lanka, and Thailand (6, 7). In contrast, khaini, a mixture of tobacco and slaked lime, is prevalent mostly in India and Nepal (8). Many SLT products in this region are harmful, being mutagenic, carcinogenic, cardiotoxic, and containing heavy metals (8). The findings from GYTS conducted at different time periods indicate that the prevalence of SLT is significantly higher among boys than girls in Bhutan (2013) (9), India (2009) (10), Maldives (2011) (11), Myanmar (2011) (12), and Sri Lanka (2011) (13). However, in Bhutan, the prevalence of current SLT use has increased from 9.4% in 2009 to 23.2% in 2013 (14), and from 6.1% in 2007 to 16.2% in 2011 in Nepal (6).

Stimulants are diverse and come in various forms, each with a unique composition that may differ significantly from others. These types of stimulants, such as khat, ketamine, barbiturates, marijuana, cocaine, Tempel, nicotine, heroin, shabow, and shamma AL-(HOT), can be broadly classified into distinct categories, highlighting the complexity and range of substances within this class (15).

In this study we focused on one of the recently emerging stimulants in Yemen, which is the 'Filter Khaini' (also known as Shamma Al-HOT). Lack of sufficient resources and information about this type of stimulant showed the need for more studies to detect the danger and seriousness of their spread. 'Filter Khaini' is defined as a narcotic substance, also known as "Al-Shamma Al-Hindi," and is being marketed to young people in an attractive and modern way. It is a deadly carcinogen that affects the nervous system, kills cells, and causes delirium (16). The substance is widely available in local markets and pharmacies, despite its dangers. Symptoms of use include inability to walk, laziness, joint pain, headache, and increased risk of gum cancer, stomach and intestine cancer, and impaired reproduction. Users are also at risk of developing diseases such as gingivitis and tooth sensitivity (16).

In general, shammah is a smokeless tobacco product often mixed with lime, ash, black pepper, and flavorings. Exposure to shammah has been linked with dental diseases and oral squamous cell carcinoma. There is limited literature on the prevalence of shammah and its role in the pathobiology of oral cancer (17, 18). Smokeless tobacco (ST) products have been consumed in varied amounts, and their consumption leads to the development of oral cancer. Various forms of smokeless tobacco products have been used worldwide, which are known by various names such as “Tombak” in Sudan, “Snus” in Sweden, and “Khaini” in India, with mass marketing of newer forms sold under different brand names (19).

The excessive and increasing use of these stimulants has highlighted the need for further research to understand the scope of the problem, identify risk factors, and develop effective prevention and intervention strategies. This study aims to explore the extent of knowledge and behaviors related to the spread and use of filter Khaini Shamma Al-HOT among university and college students in Taiz City.

METHODOLOGY

Study Design

This study employed a cross-sectional research design to assess awareness, usage patterns, and perceptions of Shamma Al-HOT among university and college students in Taiz City, Yemen. The analytical descriptive approach was adopted to analyze the extent of knowledge and behaviors related to the spread and use of Shamma Al-HOT among students. This design was selected to capture

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a snapshot of the participants' stimulant use and awareness at a specific point in time.

Study Area and Study Duration

The study was conducted in Taiz City, Yemen, covering ten universities and colleges to ensure a representative sample of students from diverse academic institutions (Taiz University—public, University of Science & Technology—private, The National University—private, Al-Saeed University—private, Al-Hikmah University—private, Al-Janad University—private, Applied College of Sciences & Technology—private, Community College—public, Al-Nahdha College—private, and others). The data collection took place over a period of 24 days, from May 7 to May 30, 2022.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- University and college students aged 20–30 years.
- Students who were willing to participate in the survey and provided informed consent.
- Participants from both public and private institutions in Taiz City.

Exclusion Criteria:

- Students below the age of 20 years or above 30 years.
- Individuals who did not fully complete the questionnaire.
- Participants who refused to participate or withdrew from the study.

Sample Size Calculation

The study included 435 students, selected from various universities and colleges in Taiz City. Since the study aimed to describe stimulant use among students, the sample was determined using convenience sampling, ensuring adequate representation from different institutions. (Taiz University—public (n=47), University of Science & Technology—private (n=57), The National University—private (n=45), Al-Saeed University—private (n=57), Al-Hikmah University—private (n=41), Al-Janad University—private (n=50), Applied College of Sciences & Technology—private (n=35), Community College—public (n=51), Al-Nahdha College—private (n=25), and others (n=7)). The final sample comprised 435 fully completed questionnaires, which were deemed sufficient for statistical analysis.

Data Collection Procedure

Data collection was conducted through self-administered structured questionnaires derived from previous studies (20, 21) and distributed to students at their respective universities and colleges. The research team approached participants in person, explained the study objectives, and obtained verbal consent before providing the survey. The participants were given sufficient time to complete the questionnaire, and completed forms were collected immediately to ensure data integrity.

Data Collection Tools

A structured questionnaire was used as the primary data collection tool. The questionnaire was divided into two sections:

1. Demographic Information:
   This section gathered personal details, including:
   - **Age** (categorized as <20 years, 20-30 years)
   - **Gender** (Male/Female)
   - **Residence** (City/Village)
   - **Income Level** (High/Low)
   - **Educational Qualification and Level**
2. Shamma Al-HOT Usage and Awareness:
   A **24-item** questionnaire was developed to assess participants' stimulant use, specifically focusing on Shamma Al-HOT. The questions included:
   - **Use of stimulants during studies** (Yes/No)
   - **Most frequently used stimulant** (Qat, Smoking, Shamma Al-HOT, Shabow, Other)
   - **Prior knowledge of Shamma Al-HOT** (Yes/No)
   - **Awareness of its components** (Yes/No)
   - **Perception of Shamma Al-HOT as a stimulant** (Yes/No)
   - **First exposure to Shamma Al-HOT** (friends, relatives, university, other)
   - **Duration of use** (less than 3 months, 3 months–1 year, 1–5 years, more than 5 years)

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- **Reasons for using Shamma Al-HOT** (family problems, psychological stress, comfort & quality, other)
- **Usage method** (secret/public)
- **Perception of Shamma Al-HOT's prevalence in the community** (High, Moderate, Weak, I don't know)
- **Awareness of health risks and diseases associated with Shamma Al-HOT use** (Yes/No)
- **Perception of addiction to Shamma Al-HOT** (Yes/No)
- **Most commonly experienced side effects** (health problems, psychological effects, economic impact, social impact)
- **Reported diseases associated with use** (cancer, oral infection, depression, other)
- **Perceived oversight by authorities to limit the spread of Shamma Al-HOT** (Agree, Disagree, Neutral, I don't know)
- **Role of health workers in raising awareness about its dangers** (Agree, Disagree, Neutral, I don't know)
- **Role of social media in increasing awareness** (Agree, Disagree, Neutral, I don't know)
- **Desire to stop using Shamma Al-HOT** (Yes/No)
- **Possible methods to quit usage** (avoid bad friends, seek medical help, I don't know)

The questionnaire was pre-tested for validity and reliability before full implementation. The final version ensured clarity, relevance, and ease of comprehension for student participants.

Data Analysis

After data collection, responses were entered into Microsoft Excel for analysis. The dataset was cleaned, and descriptive statistics were performed to summarize the findings. The analysis included:

- **Frequencies and percentages** to describe demographic characteristics.
- **Cross-tabulations** to assess relationships between **stimulant use and awareness levels**.
- **Graphical representations** (e.g., bar charts, pie charts) to visually illustrate key trends in stimulant consumption and awareness.

Ethical Approval

This study was conducted following ethical research principles. Ethical approval was obtained from the University of Science and Technology, Aden, Yemen, number (MEC/AD070). Informed consent was obtained from all participants, ensuring voluntary participation, anonymity, and confidentiality. The participants were assured that their responses would be used solely for research purposes, and they had the right to withdraw from the study at any time without any consequences.

RESULTS

The study included a total of 435 participants, all aged between 20 and 30 years. A significant majority were male (87.95%), while females represented only 12.41% of the sample. All participants resided in urban areas, with no respondents from villages.

Regarding income levels, 57.47% reported a high income, while 41.61% reported a low income. Stimulant use was reported by 29.89% of the respondents, while 46.90% stated they did not use stimulants. Additionally, 23.32% did not provide a response regarding stimulant use.

In terms of university affiliation, the majority of students (76.55%) were from private universities, while only 22.53% were enrolled in public universities. The largest representation was from the University of Science & Technology (13.10%) and Al-Saeed University (13.10%), followed by Al-Janad University (11.49%) and Community College (11.72%). Other institutions had lower percentages, with some falling below 10%.

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Table 1: Demographic Data Among Variables, n= 435

Variable	Categories	Frequency (n)	Percentage (%)
Age (years)	< 20	110	25.28%
	20 - 30	435	100.0%
Gender	Male	383	87.95%
	Female	54	12.41%
Residence	City	435	100%
	Village	-	-
Income Level	High	250	57.47%
	Low	181	41.61%
Stimulant Use	Yes	130	29.89%
	No	204	46.90%
	No response	101	23.32%
Universities Type	Public	98	22.53%
	Private	337	76.55%
Name of Universities	Taiz University-public	47	10.81%
	University of Science & Technology-private	57	13.10%
	The National University-private	45	10.35%
	Al-Saeed University-private	57	13.10%
	Al-Hikmah University-private	41	9.43%
	Al-Janad University-private	50	11.49%
	Applied college of Sciences & Technology-private	35	8.05%
	Community College-public	51	11.72%
	Al-Nahdha college-private	45	10.34%
	others	7	1.61%

Shamma Al-HOT came in the percentage of use among students (11.49%) after Qat, which is the most stimulant used by students (62.30%), and smoking (16.32%), and for other stimulants, their rate was (7.59%). Even though students who have previous knowledge of the Shamma Al-HOT product are over half (51.49%) of them, 67.35% reported that they don't know the components of the Shamma Al-HOT, and only 29.66% have knowledge of the components. Additionally, 79.54% of the students view Shamma AL-HOT as a stimulant. A significant proportion (72.42%) did not respond to the question about when they first started using Shamma Al-HOT, with 17.93% citing the influence of their friends and 3.90% citing their time at university or with relatives. According to the question about when the student started to take Shamma Al-HOT, the study indicated that only 3.68% used the Shamma Al-HOT for more than 5 years, which indicates the recent emergence. The rate for those who use Shamma Al-HOT for three months to a year is 7.31%, which is the same as the percentage for those who use it for one to five years.

Comfort & quality (16.32%) were the most common justifications for using Al-HOT, while family problems (3%) and psychological stress (2.30%) were the least common. Most of them used Shamma Al-HOT in a secret way (18.39%). From the students surveyed perspective, the prevalence of Al-HOT abuse in the community is at a high rate (40%), while others (28.96%) believe that its prevalence is moderate.

The analysis of their awareness regarding Shamma Al-HOT reveals that 54.71% of students are aware of

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the health risks and diseases associated with its use, which indicates an understanding of its dangers. Conversely, 21.39% lack this knowledge, while 23.90% did not respond to the question. Regarding addiction, 15.86% of students reported feeling addicted and unable to stop using Shamma Al-HOT. In contrast, 23.68% stated they do not feel addicted, and 60.46% did not answer. The adverse effects statistics revealed that health effects are the most significant (40%), followed by psychological effects (30.12%), then economic effects (17.70%) and social effects (12.18%). Regarding the types of diseases reported by individuals taking Shamma AL-HOT, the results showed that cancer (2.98%), oral infection (8.50%), depression (9.05%), and other diseases (12.64%) were the most common. Findings indicated that 18.58% believe there is oversight to control the spread, while 23.22% believe there is a lack of oversight. Additionally, 6.90% preferred neutrality, 26.90% answered "I don't know," and 24.14% did not respond at all. The study indicated that health workers play a role in raising awareness, as reflected by 22.76% of respondents acknowledging their contribution. Furthermore, media has a role as a rate (24.37%). Despite those who have a great desire to stop taking Shamma AL-HOT, 21.15% and 20.69% of the participants believe that it is possible to stop taking AL-HOT, and 12.18% still disagree. The study statistics revealed the importance of combating this issue and developing prevention and treatment strategies.

Table 2: Prevalence and Response of Participants to the Survey, n= 435

Survey Question	Response Options	Percentage (%)
Do you use stimulants during your study?	Yes	29.89%
	No	46.90%
Which stimulants do you use most frequently	Qat	62.30%
	Smoking	16.32%
	Shamma AL-HOT	11.49%
	shabow	2.30%
	other	7.59%
Do you have previous knowledge about Shamma AL-HOT?	Yes	51.49%
	No	39.08%
Do you know the components of Shamma AL-HOT?	Yes	29.66%
	No	67.35%
Do you consider Shamma AL-HOT as a type of stimulants?	Yes	79.54%
	No	17.01%
Whom you started taking of Shamma AL-HOT?	Friends	17.93%
	Relatives	3.68%
	University	3.90%
	Mention other places	20.07%
Have you been taking Shamma AL-HOT since?	3 month or less	5.51%
	3 months – a year	7.13%
	1-5 years	7.13%
	More than 5 years	3.68%
What are the most reason for taking Shamma AL-HOT?	Family problems	3%

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	Psychological stress	2.30%
	Comfort & quality	16.32%
	other	4.14%
What is the way do you use Shamma AL-HOT?	Secret	18.39%
	public	11.49%
How would you rate the spreading of Shamma AL-HOT in the community?	High	40%
	Moderate	28.96%
	Weak	3.67%
	I don't know	4.37%
Are you aware of the dangerous & diseases resulting from using Shamma AL-HOT?	Yes	54.71%
	No	21.39%
Do you feel addicted & can't stop using Shamma AL-HOT?	Yes	15.86%
	No	23.68%
What are the most common side effects have the addicted person suffer from?	Health problem	40%
	Economic	17.70%
	Social	12.18%
	psychological	30.12%
which are the most disease have you experienced after taking Shamma AL-HOT?	Cancer	2.98%
	Oral infection	8.50%
	Depression	9.05%
	other	12.64%
There is oversight by the competent authorities to limit the spreading of Shamma AL-HOT?	Agree	18.58%
	Disagree	23.22%
	Neutral	6.90%
	I don’t know	26.90%
There is a role of health workers in educating the community about dangerous use of Shamma AL-HOT?	Agree	22.76%
	Disagree	18.84%
	Neutral	10.35%
	I don't know	24.60%
There is a role for social media in increasing the awareness about dangerous use of Shamma AL-HOT?	Agree	24.37%
	Disagree	18.16%
	Neutral	10.11%
	I don't know	23.22%
Would you like to stop using Shamma AL-HOT?	Yes	21.15%
	No	12.18%
Which way is possible to stop using Shamma AL-HOT?	Avoid bad friend	20.69%
	Going to the doctor	4.60%
	I don’t know	11.03%

DISCUSSION

The study's findings reveal substantial trends in Shamma AL-HOT use, awareness of its harmful consequences, and overall understanding about stimulants. This paper goes beyond previous studies on teenage stimulant usage. The purpose of this essay is to look into the prevalence, trends, and sociocultural factors that influence Shamma AL-HOT use.

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The results of this study shown considerable trends in stimulant use among university and college students. For example, the prevalence of Shamma AL-HOT use is 11.49%, followed by smoking (16.32%) and Qat use (62.30%). This study expands on previous research on teen stimulant use by conducting a thorough evaluation of prevalence, social factors, and health awareness among Taiz City students.

The reasons for the non-response rate of 23.21% regarding stimulant use were unclear; however, it may be attributed to participants' fear or reluctance to disclose sensitive information, which is a common characteristic in conservative societies. This factor should be considered when interpreting our findings, as the non-response may have introduced bias in estimating the true prevalence of stimulant use within the study population. Similarly, we encountered a substantial non-response rate of 72.42% for the question concerning the initiation of Shamma AL-HOT use, and 76.51% non-response about their duration of Shamma AL-HOT use, which represents another important limitation of our study.

A demographic analysis revealed considerable inequalities in stimulant use based on gender, age, and educational achievement. Male students consumed much more Shamma AL-HOT and Qat than their female counterparts, demonstrating the influence of social and cultural norms on stimulant use. Students aged 20 to 24 had the highest incidence of stimulant use, making them more vulnerable to increased academic pressure and social issues. Furthermore, older students (third- and fourth-year university students) reported higher usage rates than first-year students, indicating that prolonged exposure to university environments and peer influence may increase consumption over time.

These findings are consistent with recent studies examining stimulant use trends among young adults, which highlight the significant influence of peer pressure in initiating and maintaining substance use behaviors. In our study, 11.49% of participants reported being encouraged by their friends to continue using Shamma AL-HOT, despite 54.71% acknowledging awareness of its associated health risks. This suggests that social influence, particularly from peers, plays a crucial role in sustaining the use of Shamma AL-HOT. Furthermore, beyond peer pressure, several other factors may contribute to its continued use, including addiction, physical dependence, cultural acceptance, and broader social norms. Psychological factors such as stress, anxiety, and depression may also drive individuals to use Shamma AL-HOT as a coping mechanism in response to emotional or mental health challenges. Nichter (2004) reported a 45% incidence of tobacco smoking among college students in Karnataka, India, highlighting the role of peer influence and academic pressure on stimulant use. Similarly, Patil et al. (YEAR) studied the proteomic and phosphoproteomic profiles of oral keratinocytes exposed to Shamma AL-HOT. Significant changes were seen in proteins involved in extracellular matrix interactions and necroptosis, which may contribute to oral cancer. The demographic trends in our study highlight the importance of targeted awareness campaigns against stimulant use among certain student populations, particularly male students and upper-level university students.

In response to the question, "Which stimulants do you use most frequently?" 11.49% of respondents said "Shamma AL-HOT" when asked, "Would you like to stop using Shamma AL-HOT?" 12.18% replied "no," showing how frequently Shamma used AL-HOT. Numerous studies have indicated that shammah can cause mouth cancer. For example, Patil, Sh., Bhat, M., and the study titled "Proteomic and Phosphoproteomic Profiling of Shammah-Induced Signaling in Oral Keratinocytes" all supported this conclusion. Bioinformatics analysis found substantial changes in proteins related to cellular connections, necroptosis, and peroxisome-mediated fatty acid oxidation. Kinase-substrate enrichment analysis found that shammah-treated cells had significantly increased kinase activity, including ROCK1, RAF1, PRKCE, and HIPK2. These findings provide insight into how shammah affects non-neoplastic cells (22).

Sajid M. and Srivastava S.'s study, "Bacteriome of Moist Smokeless Tobacco Products Consumed in India with emphasis on the Predictive Functional Potential," found that all moist smokeless tobacco products had Good's estimator values greater than 99%, indicating that the majority of bacterial species in the sample were identified. This will provide a fresh knowledge of the oral carcinogenesis produced by smokeless tobacco products (23). In accordance with our findings, Nichter, M. (2004) researched prevailing attitudes towards tobacco products and

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identified use patterns among college students in Karnataka, India. The data demonstrated a prevalence and frequency of tobacco use of 45% among college students (24).

In India, more than 40 different types of smokeless tobacco (SLT) products are commonly used, including pan, paan masala, khaini, sarda, mawa, gutka, mishri, and gudakhu, which are consumed through chewing, snuffing, or applying to the teeth and gums [25–27]. Among these, khaini (a tobacco-lime mixture) is one of the most widely used SLT products, reportedly consumed by more than 10% of the smoking population. A large-scale study conducted by Bharati et al., in 2018, involving 72,250 participants (with a sample of 65,561 individuals aged 45 years and above), investigated the patterns of SLT use in relation to occupation, demographic factors, and childhood adversities across India. Their findings revealed that nearly 38% of adults aged 45 years and above had used either smoked or smokeless tobacco in 2018 — a prevalence approximately 10% higher than that reported by the Global Adult Tobacco Survey of India 2 (GATS-2) conducted in 2016–2017, which recorded a prevalence of 28%. At the population level, the study identified that 20.4% were current users of SLT, a figure consistent with the 21.4% prevalence reported by GATS-2 [27].

In comparison, the current study, which involved 435 participants from various universities in Taiz City, Yemen, found that 11.49% of adult students (aged 20–30 years) were current users of Shamma AL-HOT, a form of smokeless tobacco prevalent in Yemen. This prevalence is notably lower than the rates reported in the Indian population, which may be attributed to differences in age groups studied, cultural practices, and the availability or social acceptance of SLT products in the respective regions.

CONCLUSION

The study concluded that the widespread use of illegal stimulants, particularly among teenagers, poses significant risks to society. Despite modern breakthroughs and technology, a considerable portion of the population continues to succumb to malignant tumors, emphasizing the need for more effective and focused approaches to combating this menace. It emphasizes the need for university students to be aware of illegal drugs and steroids, as well as the risks they pose.

Recommendations

The statistical analysis demonstrated the need to address this issue and develop prevention and therapeutic strategies. The endeavor requires a comprehensive plan that includes individuals, families, educational institutions, universities, the media, civil society, and security and judicial agencies. Raising awareness, tightening sanctions, and expanding treatment centers are critical steps in addressing the issue.

Developing awareness programs targeting adolescents and young adults about the risks of using these substances. There is an urgent need for policy interventions to regulate access to stimulants and restrict their availability to individual, develop prevention policies and providing the financial resources necessary to implement prevention and treatment programs for stimulants use. The research recommends conducting longitudinal studies to track trends in stimulant use over time, to provide a deeper understanding. Moreover, the research recommends analyzing data using advanced statistical techniques such as time-series analysis to identify factors associated with changes in stimulant use.

Conflict of interest

The authors declare that no conflict of interest.

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