



# Assessing the Impact of Drug Education Programs on Generation Z Tertiary Students' Knowledge

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## Authors' contributions

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## ABSTRACT

**Aims:** The Drug Education Program aims to impart knowledge about the dangers of drug abuse, especially among Generation Z tertiary students. Understanding the intricacies of drug abuse is imperative for personal well-being and catalyses the dissemination of critical information within the community. Despite the widespread existence of educational programs, there is an existing research gap regarding their effectiveness in improving the knowledge level of Generation Z tertiary students. Consequently, this study aims to assess the level of knowledge on drug abuse among Generation Z tertiary students.

**Methodology:** This cross-sectional study involving 296 participants explores the knowledge levels of Generation Z tertiary students across seven drug categories. Participants engaged in student development programs were randomly selected, and a specially designed questionnaire was utilized for data collection through Google Forms. Descriptive data, presented as percentages, revealed gender-based disparities in knowledge and lack of knowledge about various drugs.

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**Results:** The analysis indicates that males generally possess a greater understanding of stimulants (30.16%) compared to females (15.9%), with marginal gender disparities in depressants (17.9% for males and 19.24% for females). Males exhibit slightly higher knowledge (17.64%) than females (14.34%) for hallucinogens, while knowledge levels about opium are comparable between males (35.55%) and females (33.52%). Moreover, males surpass females in understanding cannabis (27.3% to 19.46%), inhalants (33.88% to 29.82%), and kratom (15.3% to 9%).

**Conclusion:** These findings highlight the overarching strategy recommends that educators adapt teaching methods by integrating real-life scenarios, grasping Generation Z's characteristics, and leveraging technology to establish an effective and resonant learning environment for this generation.

*Keywords: Drug; education; programs; knowledge; tertiary; students; generation Z.*

## 1. INTRODUCTION

The term "drug abuse" pertains to the inappropriate or excessive use of substances, resulting in adverse effects on an individual's physical and mental well-being. This includes the misuse of prescription medications, illegal drugs, or other substances, surpassing recommended dosages and leading to addiction, impaired judgment, and a spectrum of social and legal issues. Drug abuse affects individuals from various backgrounds, age groups, and socio-economic statuses, cutting across all walks of life. People turn to drugs for various reasons [1]. Firstly, seeking pleasure is a common motivation. Secondly, individuals may resort to drugs to cope with negative emotions, particularly those grappling with social anxiety, stress, or depression. Additionally, some people use drugs to enhance their performance [2], strive to improve academics [3], work focus, or enhance abilities in sports [4]. Lastly, curiosity and social pressure [1], particularly among teenagers, can act as catalysts for drug use.

Drug abuse is influenced by multiple factors, with specific demographics, particularly young adults and college students, exhibiting a higher prevalence [5]. Individuals dealing with mental health issues may turn to substance abuse as a coping mechanism [6], while stressful life events or trauma contribute to the initiation or continuation of drug abuse [7]. Genetic predisposition, peer pressure, and environmental elements, such as easy drug access, low socioeconomic status, and a history of previous substance abuse, also contribute to the complexity of drug abuse [8-10]. Collectively, these diverse factors underscore the varied circumstances contributing to drug abuse across different populations.

A study by Caldeira et al. [11] found that nearly half of the 946 college students they followed from freshman to junior year met the criteria for at least one substance use disorder during that period. Cocaine use stands out as a significant challenge, as shown by the 2016 Monitoring the Future study, where 4.0% of full-time college students reported using cocaine in the past year, with 1.4% reporting use in the past month [12]. Additionally, more than 20% of the 1,253 college students surveyed were exposed to cocaine use opportunities in the past year [13]. While cannabis use has seen a significant increase, with 20% of full-time college students admitting to marijuana use in the past month, according to the 2016 National Survey on Drug Use and Health [14], these increases raise concerns about immediate effects on memory, learning, and overall academic and health outcomes. The popularity of Methylenedioxymethamphetamine (MDMA), Lysergic acid diethylamide (LSD), and other psychedelic substances is increasing, as evidenced by the doubling of annual MDMA prevalence from 2004 to 2016 [12]. Furthermore, opioid abuse is of particular concern, as young people aged 18 to 25, including college students, report the highest prevalence of opioid use in the past year [15]. Meanwhile, research on 16,252 tertiary students in Malaysia indicated a low prevalence of drug abuse, with only 0.51% (according to ASEAN Senior Officials on Drug Matters [ASOD] protocol standards) testing positive in urine tests [16]. Among the substances detected, Tetrahydrocannabinol (THC) and Methylethyltryptamine (MET) were the most commonly used drugs. The study's findings further revealed a lack of awareness among tertiary students regarding the effects of drug abuse. Notably, codeine emerged as the most encountered type of drug, with only 5% of students reporting having friends involved in drug abuse. Regular substance use is associated with poor academic outcomes, including lower grade

point averages (GPAs), fewer study hours, increased absenteeism, and higher rates of unemployment after graduation [17,18].

Despite the study's indication of a low involvement rate among tertiary students [16], ongoing efforts to improve knowledge and understanding of drug abuse persist through educational programs. The drug education program for tertiary students concentrates on recognising and addressing their unique challenges, with the main objective being to promote responsible decision-making regarding substance use while creating a supportive campus environment. Specific goals encompass disseminating accurate information about drugs, emphasizing harm reduction, and encouraging responsible decision-making, considering academic, social, and health implications. Additionally, the program educates students about local drug laws, introduces on-campus resources for support, and integrates strategies for handling peer pressure and stress.

Drug education programs for tertiary students, implemented at the college or university level, adopt a multifaceted approach to tackle the distinct challenges young adults face in higher education. These programs encompass various elements, including orientation programs, course integration, workshops, and seminars, all emphasizing prevention, responsible decision-making, and overall wellness. They extend to mental health, stress management, and healthy lifestyles, with residential life programs and counselling services playing crucial roles in addressing substance abuse. The integration of online platforms, active student participation in initiatives, and collaboration with local organisations further enhance program effectiveness, ensuring a safe environment and promoting responsible decision-making and health promotion in the interconnected lives of students.

Tertiary students' responses to drug education programs are influenced by factors such as program approach, content relevance, and campus culture. Active engagement is observed when programs utilize interactive formats like workshops and multimedia presentations. The success of drug education programs can be determined through diverse measurable outcomes and qualitative assessments, with indicators including enhanced knowledge about the risks and effects of drugs, measured through pre- and post-assessments or surveys. As a

result, those valuing the information often gain new knowledge about substance abuse risks. Additionally, increased awareness of substance abuse prevalence and available resources is a potential outcome. The exploration of the knowledge level concerning drug abuse among Generation Z tertiary students is a subject that has been minimally addressed, with the singular exception of the investigation carried out by Hussin et al. [16]. Nevertheless, the study by Hussin et al. [16] predominantly focuses on the prevalence of drug abuse within the categories of undergraduate, postgraduate, and foreign students. It is essential to highlight that the majority of research endeavours in this domain do not explicitly centre on students belonging to Generation Z. Generation Z, is deeply immersed in technology, having grown up in the digital era. Their dependence on technology is a result of continuous exposure since childhood, fostering the development of adept skills in its use. Technology has significantly transformed the learning process for this generation, emphasizing not just information acquisition but also skills like arranging, remaking, and interpreting vast information.

Generation Z tertiary students employ diverse channels to gain knowledge on drug abuse, utilizing their digital native status and varied learning preferences. Online resources, including educational websites and academic journals, play a significant role in acquiring insights into drug abuse. Meanwhile, social media platforms like Facebook, Instagram, WhatsApp, WeChat, Twitter, and YouTube contribute to shaping their perspectives and disseminating educational content, awareness campaigns, and discussions on drug abuse prevention. Apart from this, tertiary institutions organise workshops, seminars, and guest lectures focused on drug abuse awareness, providing direct engagement with experts. Along with this, peer education programs foster a relatable and open learning environment, allowing Generation Z students to educate each other on drug abuse. Participating in community outreach and volunteer work enhances understanding through practical experience. Additionally, Generation Z benefits from educational apps that focus on health and wellness, providing interactive features for self-education on drug abuse prevention and delivered directly to smartphones. Tertiary institutions, offering health services, conduct awareness campaigns and provide support. Joining health-focused student organizations further exposes Generation Z to information on

drug abuse. Moreover, media literacy programs play a crucial role in aiding Generation Z students, helping them critically evaluate information and ensuring reliance on accurate sources in their pursuit of knowledge on drug abuse.

The shift in learning methods among Generation Z, marked by a departure from traditional information acquisition to more interactive and dynamic processes, underscores the importance of researching drug abuse knowledge within this demographic. This evolution in learning approaches suggests that drug abuse education should align with the preferences and engagement styles of Generation Z. This adaptation presents an opportunity to enhance the effectiveness of drug abuse education by aligning it with the evolving learning preferences of Generation Z.

Despite the prevalence of educational programs, there is a gap in the research regarding their effectiveness in enhancing the knowledge level of Generation Z tertiary students. Consequently, this study aims to assess the level of knowledge on drug abuse among Generation Z tertiary students. Researching their knowledge of drug abuse allows for the creation of interventions aligned with their unique learning styles, ensuring that the information is not only received but comprehended, applied, and critically analysed. Apart from that, by adapting educational approaches to Generation Z's distinctive learning methods, researchers can enhance the effectiveness of initiatives aimed at addressing drug abuse issues within this demographic.

## 2. METHODOLOGY

This study employed a cross-sectional design involving 296 tertiary students from Generation Z. The sample was randomly and voluntarily selected, specifically targeting those engaged in drug abuse education programs. Students willingly participated in the study, completing a specially designed questionnaire to evaluate knowledge levels regarding seven categories of drugs across genders. The questionnaire employed a dichotomous scale (1 = YES; 2 = NO; 3 = UNSURE), where "YES" indicated awareness, "NO" denoted a lack of knowledge, and "UNSURE" represented uncertainty. Responses marked as NO or UNSURE were scored as 0, while YES responses received a score of 1. Administered as part of the student development program, the questionnaire typically

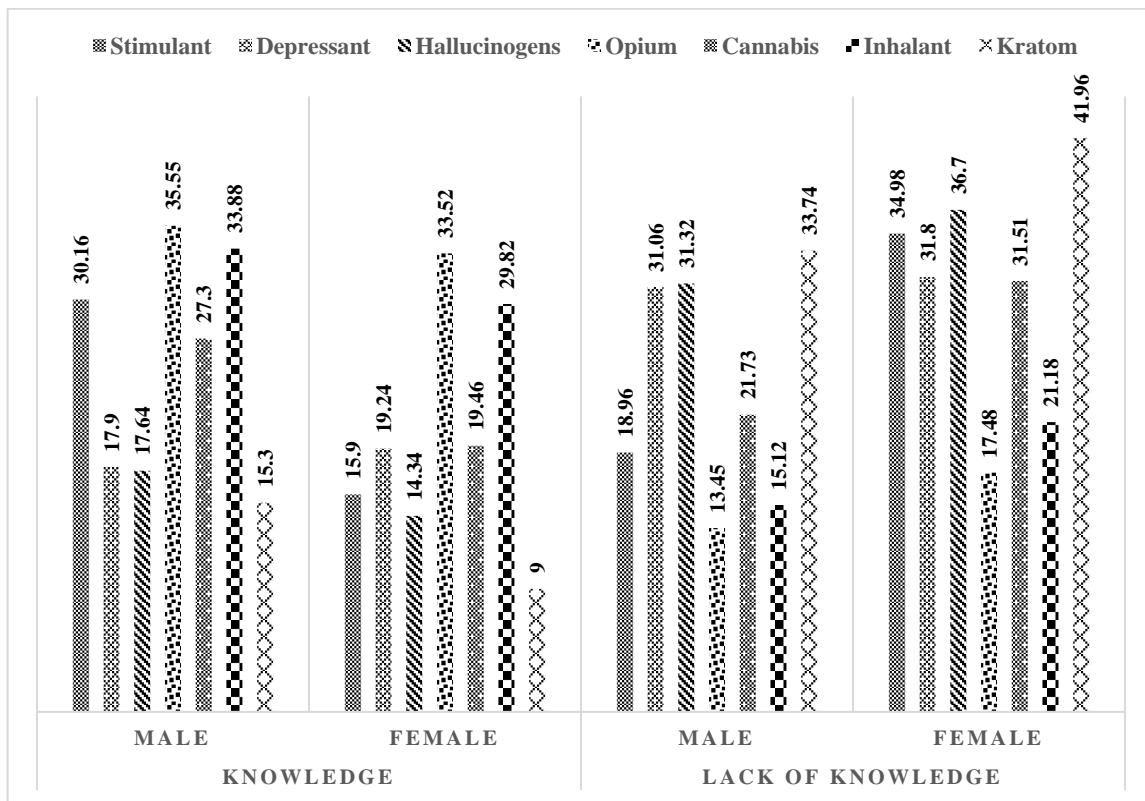
required approximately 15 minutes to complete. A panel of two experts evaluated the content validity of the questionnaire, assessing terminology, clarity, and representativeness. Data collection utilized Google Forms, a web-based platform ensuring versatility and accessibility across various devices [19]. Google Forms prioritizes data security through encryption for both transmission and storage, ensuring a secure and cost-effective data collection method [20]. Statistical Package for Social Sciences (SPSS) for Windows software version 26.0 was used to analyse the data. Descriptive data using percentages were mostly presented.

## 3. RESULTS

The analysis reveals that 296 individuals, comprising 145 males and 151 females, partook in this study, with an average age of 21.7 years. Regarding family income, 7.09% (n=21) were classified within the Top 20% (T20) category, 32.77% (n=97) fell under the Middle 40% (M40), while the majority, constituting 60.13% (178), belonged to the Bottom 40% (B40). The racial breakdown demonstrated 65.5% (n=194) of Malay participants, 22.3% (n=66) Chinese participants, 6.8% (n=6.8) Indian participants, and 5.4% (n=16) categorized as other races. Admission to higher institutions displayed 30.4% (n=90) based on STPM, 56.1% (n=166) through matriculation, 8.4% (n=25) via diploma qualifications, and 5.6% (n=15) through other credentials.

Following this, the analysis examines the participants' knowledge levels across seven categories of drugs namely stimulant, depressant, hallucinogen, opium, cannabis, inhalant, and kratom as shown in Fig. 1.

This comprehensive analysis examines the knowledge and attitudes toward various substances among males and females, providing percentages that reflect the prevalence of different perspectives on stimulants, depressants, hallucinogens, opium, cannabis, inhalants, and kratom within each gender. Notably, males generally exhibit a higher understanding of stimulants (30.16%) compared to females (15.9%), while females demonstrate a greater lack of knowledge about stimulants (34.98%) in contrast to males (18.96%). The gender disparity in knowledge of depressants is marginal, with males at 17.9% and females at 19.24%, yet both genders share a similar lack of



**Fig. 1. Knowledge of seven categories of drugs among males and female tertiary students**

knowledge about depressants, with males at 31.06% and females at 31.8%. Concerning hallucinogens, males show slightly higher knowledge (17.64%) than females (14.34%), while females display a greater lack of knowledge (36.7%) compared to males (31.32%). Knowledge levels about opium are comparable between males (35.55%) and females (33.52%), with an equal lack of knowledge (13.45%) in both genders. Additionally, males surpass females in understanding cannabis (27.3% to 19.46%), while females have a higher lack of knowledge regarding cannabis (31.51% to 21.73%). Regarding inhalants, males exhibit slightly higher knowledge of opium (33.88%) compared to females (29.82%), and males also show a lower lack of knowledge about inhalants (15.12%) compared to females (21.18%). Lastly, males (15.3%) demonstrate greater knowledge of kratom than females (9%), while females have a higher lack of knowledge about kratom (41.96%) compared to 33.74% males. Overall, these findings reveal gender-based variations in substance-related knowledge, highlighting areas where targeted educational efforts may be beneficial.

#### 4. DISCUSSION

The recent transformative shift in education is attributed to the emergence of Generation Z (Gen Z), born between the mid-1990s and early 2010s. This generation is also known by various names such as Generation I, Generation Next, New Silent Generation, Homelander Generation, Vista Generation, Internet Generation, iGeneration, Generation Now, Computer Generation, Generation M (Millennium or Multi-Task), Millennials, Google Generation, Generation Q (Quiet), Net Gen, or Net Natives (Generation Z - The iGeneration) (21). Unlike previous generations, Generation Z individuals, have grown up in a world where technology is omnipresent. This has significantly altered their approach to information engagement, learning methods, and interactions within educational settings. Due to their upbringing in a fast-paced digital environment, Generation Z tends to exhibit shorter attention spans, influencing the presentation of educational content [21]. In essence, the influence of Generation Z has redirected education toward a more technology-driven, personalized, and globally oriented-landscape. While the Z generation excels in

leveraging technology for efficient information retrieval, they are not immune to involvement in drug abuse. Simultaneously, there is a concurrent increase in drug misuse. According to a report from the National Institute on Drug Abuse [22], in 2021, rates of marijuana and hallucinogen use among young adults reached the highest levels since 1988. Between 2011 and 2021, marijuana use in young adults rose by 13.2%, and hallucinogen use increased by 4.7% during the same period. Common hallucinogens used by young adults include LSD, MDMA, mescaline, peyote, "shrooms" or psilocybin, and Phencyclidine (PCP) [22]. Additionally, a study conducted by Hussin et al. [16] revealed that some tertiary students are still engaged in drug abuse due to a lack of knowledge. Understanding the prevalence of drug abuse among tertiary students is crucial for fostering the health, well-being, and success of individuals within the academic community, with broader implications for societal health. Therefore, the study aims to assess the level of knowledge regarding drug abuse among Generation Z tertiary students, encompassing both male and female participants.

The overall findings of this study reveal that the knowledge level among tertiary students remains relatively low; however, this does not necessarily indicate a complete absence of direct knowledge among these students. Instead, the deficiency in knowledge is likely attributed to the continued use of traditional information delivery techniques in educational programs. These techniques, which predate modern technologies, include methods such as lectures, printed materials, face-to-face instruction, demonstrations, discussions, experiential learning, visual aids, and role-playing. The persistence of these traditional approaches may contribute to the observed limitations in the knowledge levels of tertiary students. Moreover, the lack of interest among Generation Z tertiary students in drug education programs is influenced by factors such as their heavy reliance on digital technology. Generation Z has been reported as the most open-minded, inclusive generation, and the most technologically savvy [23,24]. Growing up in an era of information abundance, Generation Z may perceive drug education programs as redundant, feeling that they already have access to relevant information online. This is due to Generation Z having qualities such as good problem-solving and practical skills, a high level of proficiency in the use of digital tools, and a success-oriented attitude. They also have good abstraction skills,

are better at dividing their attention, and more tolerant of increasing environmental stimuli, and can keep up with rapid technological change. All these factors can make them appear smarter than previous generations [25]. If the program content doesn't align with their experiences or interests, it is seen as irrelevant, fostering disinterest. By knowing the characteristics of this generation, educators can use them to design appropriate learning models and strategies [26]. The characteristics that emerge and characterize this generation are caused by social change, technological penetration, and the complexity of social problems [27].

Additionally, educators or presenters from older generations (Baby Boomers and Generation X) may encounter challenges relating to the unique experiences of Generation Z. This challenge is further complicated by divergent communication styles and preferences, potentially resulting in a disconnect. The limited tech-savviness of these educators or presenters poses a hurdle in adapting to the modern technologies preferred by Generation Z, hindering effective engagement. Moreover, incorporating multimedia and interactive tools presents a challenge, restricting the effectiveness of educational experiences for Generation Z students accustomed to engaging learning methods. Recognizing and understanding the characteristics of students provide opportunities for teachers, especially in developing themselves, embracing change, and using the information as a basis for creating learning models and strategies [28]. According to Hollins [29], the most crucial aspect of teaching and learning is how well teachers know their students. Therefore, educators or presenters need to understand students as individuals, as members of social and cultural groups, as learners with certain characteristics, and as learners at a specific point in their academic, emotional, psychological, and social development.

Gen Z, like Millennials, is deeply intertwined with technology. To raise knowledge about drug abuse among Generation Z tertiary students, it's vital to meet their unique needs by incorporating digital and interactive platforms into education. Technologies such as virtual reality, 3D printing, AI, holograms, portable devices, virtual labs, and blockchain significantly impact Gen Z education. Utilizing different types of technology in the education program creates learners who are actively engaged with learning objectives. Integrating digital technology into education

aligns with achieving better education for all [30]. Consequently, educators should adjust how they deliver information about drug abuse to cater to the preferences of tertiary students in the digital age.

Incorporating real-life scenarios and case studies relevant to Generation Z's experiences makes the information more relatable. Generation Z prefers practical, real-world learning experiences [31-34]. Incorporating real-life scenarios and relevant case studies is crucial for Generation Z education as these scenarios enhance content relevance, connecting learning to Gen Z's experiences and fostering engagement. They provide contextual learning, bridging theoretical knowledge with practical situations for a deeper understanding. Exposure to real-life scenarios prepares Gen Z for future challenges, contributing to the development of adaptability and problem-solving skills. Moreover, incorporating relatable scenarios motivates Gen Z students, resulting in improved information retention and application. In summary, by integrating real-life scenarios, educators can create a resonant and effective learning environment for Generation Z.

Additionally, incorporating Bloom's Taxonomy can capture the interest of Generation Z tertiary students in attending drug abuse educational programs. The taxonomy is useful in two important ways [35], first, it encourages instructors to think of learning objectives in behavioural terms, considering what the learner can do as a result of the instruction; second, considering learning goals in light of Bloom's taxonomy emphasizes the need for including objectives that require higher levels of cognitive skills, leading to deeper learning and the transfer of knowledge and skills to a greater variety of tasks and contexts. Bloom's taxonomy contains six categories of cognitive skills ranging from lower-order skills that require less cognitive processing to higher-order skills that require deeper learning and a greater degree of cognitive processing [35]. In addition, the drug abuse educational program should establish objectives based on Bloom's taxonomy. Applying Bloom's Taxonomy in a drug abuse education program holds the potential to enhance the knowledge of tertiary students. Aligned with specific learning objectives, the taxonomy offers educators clarity, aiding in the design of targeted and effective prevention programs while fostering progressive skill development. This taxonomy promotes active participation, engagement, and

a deeper understanding of the subject matter. Objectives are strategically planned based on the six stages of Bloom's taxonomy development [35], enhancing students' focus. Beginning with recalling factual information about drugs, classifications, and effects, students showcase their memorization skills. Progressing to the understanding level, they comprehend the mechanisms, risks, and consequences of drug use, demonstrating the ability to explain concepts and interpret substance abuse information. As students advance to applying their knowledge, they engage in real-life scenarios, making informed decisions and proposing actions related to drug effects and risks. Further, the analysing stage prompts students to evaluate diverse perspectives on drug abuse, considering social, cultural, and psychological factors. The evaluating level requires students to assess the effectiveness of prevention and intervention strategies, offering reasoned judgments. Finally, at the creating stage, students develop and propose innovative strategies for promoting drug awareness, prevention, and support. In summary, the thoughtful application of Bloom's Taxonomy in a drug education program holds the potential to elevate the knowledge and overall learning experience of tertiary students, guiding them beyond mere rote memorization to foster critical thinking and practical application of knowledge.

Challenges in drug education programs emerge from Generation Z's disinterest in conventional approaches, influenced by their dependence on digital technology. Educators from older generations may face challenges in connecting with Generation Z's distinctive experiences, emphasizing the need to understand their characteristics for effective teaching. Moreover, the integration of digital technology into education aligns with global objectives for 2030 and emphasizes the importance of real-life scenarios and case studies to cater to Generation Z's inclination for practical learning. In summary, the overarching strategy recommends that educators adapt teaching methods by integrating real-life scenarios, grasping Generation Z's characteristics, and leveraging technology to establish an effective and resonant learning environment for this generation.

## 5. CONCLUSION

Investigating the drug abuse knowledge level among Generation Z tertiary students holds

immense significance in various critical domains. Firstly, it assumes a pivotal role in safeguarding their health as the comprehension of their awareness regarding drug abuse enables the development of tailored interventions, ensuring the protection of their well-being and mitigating potential health risks associated with substance misuse. Secondly, this research is instrumental in crafting effective programs by providing insights that can guide the development of educational initiatives resonating with Generation Z's preferences and learning styles. This not only ensures that the programs are informative but also engaging, thereby enhancing their efficacy in imparting essential information about drug abuse prevention and treatment. Furthermore, the findings derived from studying drug abuse knowledge contribute significantly to evidence-based policy development. Policymakers can leverage this information to formulate targeted and well-informed strategies, regulations, and preventive measures specifically addressing the unique needs and challenges faced by Generation Z. Consequently, this fosters a supportive environment that encourages healthier choices and behaviours. In summary, a key outcome of studying Generation Z's drug abuse knowledge is the effective communication of information on drug abuse prevention and treatment through educational programs and materials. The utilization of interactive and dynamic formats, such as mobile apps, online platforms, and peer-led initiatives, ensures that the dissemination of information is not only comprehensive but also aligned with the preferences and technological inclinations of Generation Z, thereby maximizing the impact of drug abuse education efforts.

## CONSENT

In this study, the researcher obtained consent from the selected student participants after providing a comprehensive explanation of the study's objectives, procedures, potential risks, confidentiality measures, and participants' rights. Consent is deemed valid when students voluntarily agree to respond to the questionnaire without coercion. Participants maintain the freedom to withdraw from the study or opt not to respond to the questionnaire if they perceive any potential threats to their credibility or psychological well-being

## ETHICAL APPROVAL

The study adheres to ethical standards by implementing rigorous measures, including

obtaining informed consent and ensuring participants understand the study's purpose, procedures, risks, and benefits. Participants voluntarily acknowledge their involvement and the right to withdraw without consequences. Collected data is kept confidential, with personal identifiers replaced during analysis to prevent the disclosure of participants' identities. These measures aim to protect participants' rights, maintain confidentiality, and uphold research integrity. Additionally, the researcher prioritized anonymity, implemented privacy controls, and communicated transparent privacy policies during data collection through Google Forms, effectively safeguarding both data security and participant confidentiality.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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