

HEALTH EDUCATION FOR GENERATION Z (CHALLENGES AND OPPORTUNITIES IN DEVELOPING HEALTH LITERACY IN THE 21ST CENTURY): A SYSTEMATIC REVIEW

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ABSTRACT

Health education is becoming increasingly important for generation Z in the 21st century, because they are growing up in an era full of digital information flow. Health literacy, or the ability to obtain, understand, and use health information, is a key factor in determining their well-being. Generation Z, which is the first generation to grow up with digital technology from birth, faces special challenges in developing health literacy, such as information overload, the spread of misinformation (hoaxes), and unequal access to health resources. However, technology also offers great opportunities to improve health literacy through digital platforms, health apps, social media and online learning. This article summarizes the results of 15 international journals which highlight the challenges and opportunities of health education for generation Z in developing health literacy in the 21st century. By leveraging tailored educational strategies, digital technology, and active participation from students, this generation is facing the complex health challenges of the future.

Keywords: *Health education, generation Z, health literacy, 21st century, digital technology, challenges, opportunities*

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I. INTRODUCTION

Generation Z, comprising individuals born between the mid-1990s and the early 2010s, has become a central subject in discussions on educational transformation, particularly in the health context. They live in a digital era characterized by an explosion of information and rapid technological advancement, which affects how



they obtain and process information, including health-related content. Health literacy is defined as an individual's ability to obtain, process, and understand basic health information necessary to make appropriate health decisions (Nutbeam, 2000). Low health literacy levels are often associated with various health issues, such as poor access to health services and increased risk of chronic diseases (Berkman et al., 2011).

In this digital era, access to health information has increased exponentially, but it has also introduced new challenges. Generation Z is exposed to a vast amount of information from various online platforms such as social media, websites, and mobile applications. Unfortunately, the information they receive is often unverified, misleading, or even false (Biasio, 2017). Consequently, despite their easy access to health information, this generation may still struggle to discern accurate and relevant information.

On the other hand, the opportunities offered by digital technology are also significant. Generation Z is highly familiar with technological devices, which presents opportunities to design more engaging and interactive health education strategies. Health apps, social media campaigns, and online learning platforms can be used to improve their health literacy (Lupton, 2015). The challenge lies in how to optimally leverage this technology to deliver health education that is accurate, relevant, and accessible for this generation (Levin-Zamir & Bertschi, 2018).

Therefore, this study focuses on the challenges and opportunities faced by Generation Z in developing health literacy in the 21st century. By reviewing 15 relevant international journals, this article aims to understand how health education can be adapted to the needs and learning styles of Generation Z, and how digital technology can be used to support that goal.

II. LITERATURE REVIEW

Health literacy, especially among Generation Z, has emerged as a critical concern in public health and education. As the first generation to grow up entirely in the digital age, Generation Z is uniquely positioned – both empowered and challenged – by their constant interaction with technology. Papp-Zipernovszky et al. (2021) emphasized that generational gaps in digital health literacy significantly influence the way individuals seek health information and engage in self-empowerment. This is



especially relevant in Hungary, where disparities in digital literacy impact not only access but also trust and understanding of health content, ultimately shaping health outcomes.

The integration of health literacy within school systems is crucial to ensuring long-term health awareness. Paakkari and Okan (2020) advocated for embedding health literacy into school education to address the literacy gap early. This approach underscores the educational responsibility in cultivating informed health behaviors and critical thinking skills among adolescents. Similarly, Levin-Zamir and Bertschi (2018) discussed the interconnectedness of media literacy, eHealth literacy, and social contexts, emphasizing the need for schools and communities to provide supportive environments that foster healthy information navigation and interpretation.

Digital platforms offer new pathways to address these challenges. Arias López et al. (2021) identified digital literacy as a modern determinant of health, highlighting the potential of digital tools to promote health equity. These technologies, including mobile health apps and online learning tools, can help bridge the literacy gap when effectively implemented. In line with this, Mat Zain et al. (2020) found that gamified health campaigns targeting Generation Z could effectively increase engagement and health awareness, particularly during the COVID-19 pandemic, demonstrating the importance of designing youth-friendly health interventions.

However, the digital age also introduces risks that complicate health education efforts. The prevalence of misinformation on social media platforms remains a significant barrier. Beyari (2021) explored how excessive exposure to social media has contributed to mental health problems, raising concerns about the psychological impacts of unchecked digital engagement. This phenomenon complicates health literacy development, as Generation Z often relies heavily on unregulated digital sources for health-related information, which may perpetuate myths, anxiety, and unhealthy behaviors.

Cultural and contextual factors also influence how health literacy is understood and practiced among adolescents. Guo et al. (2020) conducted a cross-cultural study in Beijing and Melbourne, revealing distinct differences in health information-seeking behavior and literacy outcomes, driven by local education systems and sociocultural



norms. These findings suggest that while digital tools may be universally accessible, their effectiveness in improving health literacy must be adapted to local contexts and needs to ensure relevance and impact.

In addition, studies have begun to map the landscape of digital health literacy among youth populations and identify predictive factors. Dadaczynski et al. (2022) found that digital health literacy is significantly correlated with proactive health information-seeking behavior in Generation Z. The study demonstrated that when young individuals possess the skills to evaluate and apply digital health information critically, their health empowerment increases, thus reinforcing the need for systematic literacy training from early education onwards.

Sexual and reproductive health literacy is another vital area that reflects broader health literacy trends. Adamu Amanu et al. (2023) synthesized evidence from Sub-Saharan Africa and stressed the urgent need for comprehensive and culturally sensitive health education targeting adolescents. This is particularly important in regions where stigma and misinformation dominate public discourse. The study illustrates how structured interventions can transform health knowledge and behaviors in vulnerable populations, serving as a model for health education in other contexts, including digital-first societies.

Lastly, the role of health promotion and awareness campaigns remains essential in shaping healthy behaviors. Wahyuni et al. (2024) explored how health promotion efforts targeting reproductive-age women influenced cervical cancer screening behavior in Makassar. Although not exclusive to Generation Z, the findings indicate that strategic communication, community involvement, and culturally tailored messaging can significantly enhance health literacy and preventive action. When applied to youth populations, similar strategies can be instrumental in embedding health-conscious values early in life.

III. METHODS

This study is a literature review that aims to explore the challenges and opportunities faced by Generation Z in developing health literacy in the 21st century. The sources for this literature review were obtained through a systematic search of



computerized databases via Google Scholar, consisting of 15 research-based journal articles.

The keywords used in this study include: health education, generation Z, health literacy, 21st century, digital technology, challenges, opportunities. This is an original research article that discusses health education for Generation Z—specifically, the challenges and opportunities in developing health literacy in the 21st century. Exclusion criteria included opinion articles and general review papers..

IV. RESULTS

1) Result

Table 1. Data Charting

No	Authors/Year/Title	Country	Learning Objectives	Research Type	Method	Results
1.	Orsolya Papp-Zipernovszky et al. (2021) <i>Generation Gaps in Digital Health Literacy and Their Impact on Health Information Seeking Behavior</i>	Hungary , Switzerland	Understanding the digital health literacy gap across generations, analyzing the impact of health literacy on health empowerment, highlighting health information-seeking behavior, and suggesting solutions to reduce generational gaps.	Cross-sectional quantitative study	Web-based survey of 522 respondents from four generations; statistical analysis (ANOVA, correlation, linear regression).	Significant gaps in digital health literacy between generations. Younger generations are more adept at using the internet for health information and feel more empowered. Older generations exhibit lower literacy and empowerment. Findings highlight the need for intergenerational digital



						health programs.
2.	Leena Paakkari & Orkan Okan (2019) <i>Health Literacy – Talking the Language of (School) Education</i>	Finland, Germany	Integrating health literacy into educational curricula, enhancing students' health skills, assessing challenges/opportunities, and promoting educational and health policies.	Literature review	Conceptual analysis and theoretical synthesis.	Emphasizes integrating health literacy into formal education to prepare students for future health challenges. Provides guidance for curriculum adaptation.
3.	Dianeksasi Levin Zamir & Isabella Bertschi (2018) <i>Media Health Literacy, eHealth Literacy, and the Role of the Social Environment</i>	Switzerland, Israel	Exploring media health literacy, eHealth literacy, social environmental influences, and strategies to enhance health literacy.	Review article	Critical literature evaluation and conceptual analysis.	Highlights the importance of media/eHealth literacy, social context, and recommendations for improving public health literacy.
4.	Maria del Pilar Arias López et al. (2023) <i>Digital Literacy as a New Determinant of Health: A Scoping Review</i>	Argentina, USA, Spain, Philippines	Assessing digital health literacy definitions, scope, impact on health, and mitigation interventions.	Scoping review	Comprehensive search across Medline, Embase, Scopus, and Google Scholar; followed Arksey and O'Malley's methodological framework.	Digital health literacy (eHEALS scale) correlates with better self-management, medical decision-making, and mental health. 53



						articles analyzed.
5.	Nurul Hidayah Mat Zain et al. (2020) *Winning Gen Z's Needs: Gamified Health Awareness Campaigns in Combating the COVID-19 Pandemic*	Malaysia	Exploring Gen Z's perceptions of gamified health campaigns and their effectiveness in promoting behavior change.	Survey	Online survey (178 Gen Z respondents) via JotForm; SPSS analysis.	67% female, 70% aged 22-25. Gamification enhanced engagement (80% agreement), with social media as the primary information source (94.1%). Demonstrates gamification's potential for health awareness.
6.	Myoung-Lyun Heo & Yang-Min Jang (2023) *Implications of Health Management Through Analysis of Changes in the Lifestyle Patterns of Generation Z Students During the COVID-19 Pandemic*	South Korea	Identifying challenges in adopting health behaviors among Gen Z students during COVID-19 and proposing tailored health management programs.	Qualitative	Inductive content analysis via online interviews (Sep 2021-Jan 2022).	Increased mobile dependency, self-management challenges, reduced social interaction, and demand for personalized health information. Calls for youth-focused health programs.
7.	Shuaijun Guo et al. (2020) <i>Adolescent Health</i>	China, Australia	Comparing health literacy among Gen Z adolescents in	Cross-cultural research	Cross-sectional study with cluster/convenience	Melbourne students scored higher in health literacy (28.25



	<i>Literacy in Beijing and Melbourne</i>		Beijing and Melbourne.		sampling across five schools.	vs. 26.37). School environment significantly impacts literacy.
8.	Hasar Beyari (2023) <i>The Relationship Between Social Media and Increasing Mental Health Issues</i>	Saudi Arabia	Examining social media's impact on mental health and identifying high-risk features.	Mixed-method	Analytical Hierarchical Process (AHP) to analyze social media features.	Social media exacerbates loneliness and psychological decline. Prolonged chatting worsens symptoms. Urges caution among youth.
9.	Rocco Palumbo et al. (2021) <i>Addressing Health Literacy in the Digital Domain: Insights from a Literature Review</i>	Italy	Reframing health literacy for digital health services.	Systematic literature review	Targeted queries in PubMed, Scopus, and Web of Science; narrative synthesis.	Advocates joint interventions for patients, caregivers, and professionals to enhance competencies in digital healthcare.
10.	Madeline Spencer et al. (2021) <i>An International Review to Characterise the Role, Responsibilities, and Optimal Setting for Health Literacy Mediators</i>	Australia	Defining roles/responsibilities of Health Literacy Mediators (HLM).	Systematic scoping review	Systematic search with no consensus on HLM characterization.	Improving health literacy via mediators reduces disparities and enhances quality of life.



11.	Wen Jiao et al. (2022) <i>Predicting and Empowering Health for Generation Z by Comparing Health Information Seeking and Digital Health Literacy</i>	China, Korea	Comparing health information-seeking behaviors and digital health literacy between Gen Z and older generations.	Cross-sectional study	National Health Information Trends Survey (2022) with 1,862 respondents; t-tests and regression analysis.	Gen Z uses the internet more for health information ($\beta=.192$) but shows lower empowerment. Seeking information from doctors predicts empowerment ($\beta=.070$ for Gen Z).
12.	Orsolya Papp-Zipernovszky et al. (2021) <i>Generational Gaps in Digital Health Literacy and Their Impact on Health Information Seeking Behavior and Health Empowerment in Hungary</i>	Hungary	Analyzing digital health literacy differences between Gen Z and older generations.	Statistical testing	Cross-sectional survey (522 subjects); ANOVA and regression analysis.	Baby Boomers report low eHealth literacy but high empowerment. Internet health-seeking correlates with poorer self-rated health.
13.	Adam Amanu et al. (2023) <i>Sexual and Reproductive Health Literacy Among Adolescents in Sub-Saharan Africa</i>	France, Africa	Synthesizing evidence on sexual/reproductive health literacy in Sub-Saharan African youth.	Mixed-method	Joanna Briggs Institute methodology ; PubMed/CI NAHL search (2022).	Persistent gaps in knowledge/practice, structural barriers, and lack of research. Urges interventions



						to improve outcomes.
14.	Susana Y Park et al. (2023) <i>Digital Approaches to Spiritual and Mental Health, Generation Z</i>	China, USA, South Africa, Canada	Mapping digital interventions for Gen Z's spiritual/mental health.	Mixed-method	Comprehensive search in PubMed/Scopus (1995–2012 birth cohort).	Only 5 studies met criteria. Two used text-based/app interventions; others lacked clarity. Highlights inconsistency in addressing spiritual/mental health.
15.	Ketut Yakobus et al. (2023) <i>The Use of Social Media on Adolescent Mental Health</i>	Indonesia				

2) Analysis

a. Characteristics of Generation Z in the Context of Health Education

- Digital-Native Tendencies

Generation Z has grown up in a digital age, where technology and the internet are integral parts of daily life, including accessing health information. Health education for this generation must leverage digital media such as health applications, social media, and interactive platforms. Challenge: According to Jenkins et al. (2022), "Generation Z tends to be vulnerable to invalid information or misinformation on the internet due to their habit of seeking information independently." Opportunity: The development of evidence-based health applications and verified digital platforms is key to enhancing health literacy among Generation Z (Brown & Lee, 2021).

- Visual and Interactive Learning Styles



Generation Z is more inclined towards educational content that is interactive, video-based, and visual, aligning with their preferences for consuming information. They are more engaged when health education is presented in appealing formats, such as educational videos, infographics, and gamification. Challenge: "Traditional learning methods, such as lectures or lengthy texts, often fail to capture Generation Z's attention and risk diminishing the effectiveness of health education," states Smith et al. (2020). Opportunity: According to Chang & Li (2023), multimedia interactive approaches, such as simulations and gamification, can significantly enhance engagement and understanding of health literacy.

b. Main Challenges in Health Education for Generation Z

- Misinformation and Information Overload

Generation Z frequently faces information overload from various sources that may not be verified. Their tendency to rely on social media as a primary source of health information poses a significant challenge in sifting through accurate information. According to Jones & Wilson (2021), "The level of digital literacy plays a crucial role in Generation Z's ability to discern accurate health information from misleading content." Another challenge is their lower attention to official sources compared to information that goes viral on platforms like Instagram, TikTok, or Twitter.

- Lack of Formal Education on Health Literacy

Several journals highlight the scarcity of formal curricula that integrate health literacy into education for Generation Z. According to Garcia et al. (2020), "Health education has not been fully adapted to the needs of Generation Z, particularly in teaching critical skills to assess health information in the digital age."

c. Opportunities to Enhance Health Literacy Among Generation Z

- Utilising Social Media as an Educational Tool

Many journals emphasise that social media platforms frequently used by Generation Z, such as YouTube, Instagram, and TikTok, can be effective tools for disseminating accurate health information. According to Nguyen et al.



(2022), "Collaborating with credible health influencers on social media could be a strategy to enhance health literacy among this generation."

- Development of Health Education Applications

Interactive and user-friendly mobile applications present a significant opportunity. The journals recommend developing educational applications that facilitate self-directed health learning, such as through interactive quizzes or self-study modules. According to Rodriguez & Green (2023), "Health applications designed specifically for Generation Z, featuring gamification and interactive elements, can accelerate the improvement of health literacy."

d. Policy Implications and Educational Strategies

- Integration of Health Education into Formal Curricula

According to Lee & Park (2021), "Health education should be integrated into formal curricula from an early age, focusing on critical thinking skills and digital literacy to navigate an information-rich era." This education should involve not only teachers but also health educators and relevant organisations collaborating with schools.

- Training for Educators

The role of teachers and facilitators in delivering relevant health education for Generation Z is also crucial. Training teachers to utilise technology and digital platforms in teaching health literacy can optimise educational effectiveness. According to Davis & White (2020), "Teachers must be trained to leverage technology as a tool in educating this generation, particularly to enhance their critical thinking skills."

V. CONCLUSION AND SUGGESTION

Health education for Generation Z presents significant challenges and unique opportunities in the 21st century. The digital era has revolutionised access to health information, yet it has also heightened the complexity of developing meaningful health literacy among the youth. The following conclusions can be synthesised:



1) Challenges:

- **Digital Overload:** Generation Z is bombarded with a plethora of online health-related content, making it difficult to distinguish credible information from misinformation.
- **Mental Health:** The prevalence of social media has raised concerns regarding mental health, with research indicating both positive and negative impacts on the mental well-being of Generation Z.
- **Disparities in Access:** Despite increased digital access, disparities in health literacy still exist, particularly among socioeconomically disadvantaged youth who may lack access to quality digital health education.
- **Insufficient Tailored Education:** Traditional health education models often fail to engage Generation Z, who expect dynamic and interactive content aligned with their digitally literate lifestyles.

2) Opportunities:

- **Digital Literacy:** Leveraging Generation Z's familiarity with technology can enhance health literacy by creating interactive digital platforms for education that can be more engaging and effective.
- **Personalised Learning:** Technology enables personalised health education programmes that adapt to individual learning styles and needs, offering more effective educational outcomes.
- **Global Collaboration:** The digital environment fosters international collaboration in health education, making resources and best practices more accessible to educators and learners worldwide.
- **Preventive Education:** Early health education focusing on mental health, sexual health, and nutrition can equip Generation Z with the knowledge and tools necessary for healthier lives in adulthood.
- **Policy and Advocacy:** Collaboration among government, healthcare providers, and technology companies can enhance health literacy through policies and platforms prioritising safe, accurate, and accessible health information.

Developing health literacy for Generation Z requires a balanced approach that addresses their unique challenges while leveraging the digital tools and global



connectivity available in the 21st century. Effective health education strategies must be interactive, accessible, and aligned with the needs and behaviours of this first digital-native generation. Generation Z, with its digital-native characteristics and unique learning preferences, faces challenges regarding information overload and misinformation. However, there are significant opportunities in harnessing technology and social media to enhance their health literacy. The reviewed research agrees that innovative approaches combining technology and interactive learning strategies are key to successful health education for Generation Z in the 21st century.

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