



SCREEN SMARTS: THE FACTORS AND INTERVENTIONS OF MEDIA AND DIGITAL HEALTH LITERACY IN CHILDREN AND ADOLESCENTS

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ABSTRACT

As children and adolescents begin using social media at a younger age and social media becomes a prominent source of health information, media and digital health literacy are necessary to help children and adolescents critically evaluate the health information widely available on these platforms. Media and digital health literacy can provide a protective influence to minimize the risk of adverse health outcomes and disparities. This opinion review explores different factors influencing media and digital health literacy in children and adolescents, including education of adolescents and caregivers, self-efficacy, and socioeconomic status. Interventions such as incorporating media and digital health literacy education into school curriculums, health education programs targeted towards caregivers, and nontraditional education frameworks attempt to address these issues. This review explores successful interventions to identify effective strategies for improving media and digital health literacy and discusses the importance of involving children in research. By understanding key risk factors and effective strategies, this review hopes to inform the targeting and design of future media and digital health literacy programs.

INTRODUCTION

Social media has become an integral part of day-to-day life and an important medium for connecting people [1,2]. In 2023, most Canadians had a minimum of one social media account, with 33.1 million total social media users in Canada, out of the 40.5 million individuals living in Canada in 2023 [3,4]. Despite the potential benefits of social media, including the facilitation of community, connection, and self-expression, there are also negative consequences on users, with social media being found to impact adolescent mental health, sleep quality, self-esteem, diet,

and the regulation of their behaviour [5,6,7]. A 2023 survey found that 40% of children in America aged between 8-12 years use social media, despite most social media platforms having a minimum age requirement of 13 years to create an account [5]. Uptake is even higher among adolescents that have met the minimum age requirement, with a survey conducted in 2018 in America finding that 97% of adolescents aged 13-17 use social media platforms [8]. Adolescents and children are eager to engage with social media and are regularly exposed to it. For the purpose of this opinion review, we define children to be prepubescent and adolescents as the transition between puberty and adulthood.

Social media platforms, most notably Facebook, YouTube and Instagram, have become popular tools for obtaining health-related information both actively and through passive exposure [9]. A Pennsylvania-based cross-sectional study found that while only 3.5% of adolescents reported using social media for health information, 66.7% to 91.7% of these respondents reported seeking health information on social media about topics such as fitness and sexual health when asked specifically about said topics [10]. However, the convenience of social media comes with a caveat, as it can be a significant source of misinformation and disinformation [11]. According to the Canadian Centre for Cyber Security misinformation is defined as, “false information that is not intended to cause harm” [12]. Disinformation on the other hand is false information that is created and spread deliberately with the intention to “manipulate, cause damage, or guide people, organizations, and countries in the wrong direction” [12]. Social media is filled with both mis- and disinformation which is more likely to be shared and reposted than accurate information. Disinformation is produced more rapidly and makes bolder, attention-grabbing claims compared to scientifically-backed content [12]. For instance, a post that claims a serious health condition has been completely cured will attract more attention than a carefully-worded post that explains the scientific

process and limitations of the research. The spread of inaccurate health information can have detrimental effects, including delaying proper treatment to patients [13]. Given the increasing popularity of the internet and social media as sources of health information and the prevalence of mis- and disinformation on social media platforms it is important to develop media health literacy to provide adolescents with the skills required to critically and confidently evaluate online health information [11,24].

Media health literacy is defined as addressing or solving a health problem through the application of knowledge gained from health information found, understood, and appraised from society's means of mass communication.¹⁴ In contrast, digital health literacy is defined by the World Health Organization as, "the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem."¹⁵

Many risk factors overlap between poor personal health and low media and digital health literacy, including, but not limited to, age, race/ethnicity, socioeconomic status, and education level [15]. These lower levels of media and digital health literacy may lead to broadening existing gaps in health equity [15]. Adolescents with low health literacy have shown an increase in risky behaviours and obesity, and a decrease in healthy behaviours [16].

This opinion review will examine central factors related to media and digital health literacy and associated interventions with the goal of informing future strategies for developing these skill sets in children and adolescents. Central factors including self-efficacy, socioeconomic status, and the educational background of adolescents and their caregivers, were determined through the 2022 systematic review by Jindaratnaporn et al. and more recent research as this field is rapidly expanding [15,17]. In this review we will discuss the importance of identifying and analyzing the determinants contributing to low levels of media and digital health literacy and implementing targeted interventions. We will also discuss targeted interventions including incorporating media and digital health literacy education into school curriculums, health education programs targeted towards caregivers, and nontraditional education frameworks.

METHODS

The literature review process followed a structured approach to ensure comprehensive coverage of relevant studies. Initially, a broad scan of existing literature, including gray literature, was conducted using Google and Google Scholar to identify key themes and gaps in research. Following this preliminary stage, searches were performed using PubMed, Ovid MEDLINE, SAGE Journals, and Web of Science to retrieve peer-reviewed

articles. Searches included terms related to media health literacy, digital health literacy, adolescents, children, factors influencing media health literacy, and interventions. The search terms were combined through truncations and Boolean operators, "AND" and "OR".

To assess research quality, studies were prioritized based on methodological rigor, relevance, and credibility. While a formal empirical assessment was not conducted, preference was given to peer-reviewed studies with clear methodologies, including systematic reviews and primary research. Review papers provided synthesized insights, while primary studies contributed specific data on media and digital health literacy in children.

Articles were eligible for inclusion if they: (1) were available in English; (2) contained relevant information on factors and associated interventions affecting media and digital health literacy in children; and (3) written in the last 24 years. Studies aligning with the framework from Jindaratnaporn et al. (2022) were emphasized, with additional research post-2020 incorporated for up-to-date perspectives [17].

Data interpretation was guided by thematic analysis, identifying common patterns across studies related to factors influencing media health literacy. Findings were synthesized to highlight key determinants, challenges, and intervention strategies, ensuring a well-rounded perspective on the topic.

FACTORS & INTERVENTIONS

Education of Children and Adolescents

The education of children and adolescents, and its impact on cognitive development depends on the quality, availability, and accessibility of teaching within the school system.¹⁸ Education plays a crucial role in media health literacy as the dissemination of health information, and thus achievement of health literacy, requires knowledge, comprehension, understanding, appraisal, and evaluation [18]. A study conducted with adolescent students in Lithuania suggests a positive correlation between individuals with more school achievements and high media health literacy.¹⁹ This identified relationship has been attributed to the development of cognitive abilities attained through higher education [18]. Conversely, lower education levels, low educational aspirations, and reading, spelling, or mathematics difficulties correlate to low media health literacy [19].

In order to improve the media health literacy of children and adolescents, interventions must be implemented within the school system. To this end, the Learning for Life (L4L) intervention aimed to promote media health literacy and healthy lifestyle behaviours by providing diverse health education resources to teachers [20]. Teachers can tailor the resources provided to suit different learners and implement resources into the

standard classroom curriculum [20]. The intervention effectively enhanced students' media health literacy, particularly their ability to identify ways technology can support their health and identify good and poor health information [20]. The results suggest that interventions such as L4L can potentially improve children and adolescents' media health literacy and should be considered an essential component of school-based health education programs.²⁰ Furthermore, another promising intervention for promoting media health literacy involves adopting the health promoting school education framework [21]. This framework is designed to achieve educational goals by addressing health issues [21]. This approach provides students with opportunities to develop skills in self-advocacy and empowerment in alignment with media health literacy [21]. Despite the promising evidence supporting the health-promoting school, more evidence is needed to establish it as the definitive standard for promoting media health literacy [21].

Education of Caregivers

The formal education level of caregivers has been found to impact their children's digital health literacy positively [14]. It has been suggested that a higher education level in caregivers provides a stronger parental foundation of digital health literacy than when caregivers had less education [14]. It has been posited that this academic foundation can then be relied upon while discussing media and related critical thinking skills with their children [14]. The demonstrated relationship between education and digital health literacy appears to hold across countries and cultures [14]. For example, Israeli children whose mothers were in school for 15 or more years had greater digital health literacy than children whose mothers had less than 12 years of education [14]. Similarly, a Swiss study found a positive association between a caregiver's understanding of the importance of a healthy lifestyle and their children's health literacy [22]. Lastly, a study from Taiwan showed that caregivers with a lower education level had lower levels of digital health literacy and tended to have children with lower levels of digital health literacy [23].

Given that caregivers' education level and digital health literacy impact their children's digital health literacy, interventions focused on teaching caregivers digital health literacy would seem to improve that of their children [23]. The implementation of digital health literacy courses into parenting programs has been proposed as one way to improve the digital health literacy of caregivers and children [24]. In a 2021 review of digital interventions on health literacy in caregivers with children with a health condition, 60% of the included studies reported satisfaction with their respective intervention [24]. All of the study interventions included an educational aspect, with 80% of the studies incorporating interactive communication components, a portal to connect caregivers with health care providers, videos, and online discussion channels [24]. Measured by a positive change in health behaviour

or increase in knowledge, all of the studies in the review found improvement in caregivers' health literacy [24]. The review highlighted the lack of digital health interventions developed for caregivers [24].

Self-Efficacy

The Social Cognitive Theory (SCT) states that learning, functioning, and actions result from the ongoing and polydirectional interaction between personal, environmental, and behavioural factors [25]. A key component of SCT is self-efficacy, an individual's perception of and general trust in their abilities [25]. Self-efficacy is vital for successful health outcomes and explains how health behaviours are sustained when an individual believes in their ability to start, complete and maintain a desired behaviour [25]. Self-efficacy is critical for adolescents using the internet and social media as it impacts their ability to access, evaluate, and apply health information.²⁵ According to one study conducted in Australia, 21 participants ages 12-17 completed an eHEALS self-report digital health literacy measure to assess their perceived digital health literacy [25]. Then, they participated in a practical search task using both a think-aloud protocol and an interview to assess their demonstrated digital health literacy.²⁵ The results showed that overall, participants had high levels of perceived digital health literacy and reported using strategies to search and appraise online health information but did not understand or demonstrate these strategies in practice during the search task [25]. This study concluded that adolescents desire to improve their digital health literacy so they can confidently appraise online health information, but there is a discrepancy between their perceived and demonstrated digital health literacy skills [25].

In order to enhance adolescents' self-efficacy and digital health literacy, it is important to involve adolescents in the design and development of interventions [25]. Co-designing school-based and healthcare-based interventions can improve efficacy and uptake and demonstrate trust in and appreciation of adolescents' knowledge and creativity [25]. School-based interventions can promote the development and progression of adolescents' digital health literacy through the curriculum and by providing a supportive environment [25]. Healthcare professionals should assume that adolescents use online health information during appointments and discuss this with them [25]. Overall, interventions should focus on improving adolescents' self-efficacy as it is pivotal to developing and retaining healthy behaviours and a predictor of digital health literacy [25].

Socioeconomic Status

Household socioeconomic status (SES) strongly predicts health outcomes and behaviours in adolescents [25]. Media and digital health literacy is directly involved in the relationship between low SES and unhealthy lifestyle behaviours [26,27]. A systematic review identified five studies where high SES was significantly associated with

higher scores on a digital health literacy scale among adults, carrying significant implications for adolescent development given the parent's role as a teacher [28,20]. In California, fifth graders from lower-SES households were more likely to consume sugar-sweetened beverages, believe incorrect health information, and underestimate the impact of advertisements, indicating poor media health literacy [29].

SES's strong association with media health literacy deficits makes it the perfect marker for targeting health literacy initiatives. High-quality education interventions are especially effective when administered to younger or more disadvantaged adolescents [30]. Investments in combatting SES inequality lead to long-term societal cost savings as adolescents grow to be more productive and healthier [30]. *The Bigger Picture* (TBP) is an arts-based public literacy program that educates high schoolers on health literacy in the context of systemic injustice and youth empowerment [28]. TBP successfully increased student media health literacy in a low SES high school despite being moved online due to the COVID-19 pandemic [31]. Interventions such as TBP help in the short-term by increasing youth awareness of health risk factors through personal connections and discussions [31]. The program also addresses SES in the long term by promoting civic engagement and social justice by prompting students to acknowledge their identities and their role and power in the systems surrounding them [31].

DISCUSSION

This opinion review explored four key factors associated with adolescent media health literacy [17]. The mechanisms behind these relationships are difficult to determine due to the observational nature of studies that explore environmental factors and the length of time between a potential environmental change and a measurable difference in media health literacy [18]. Nevertheless, there is value in studying these environmental risk factors to help identify the need or potential value of media health literacy programs. Lower levels of adolescent self-efficacy, SES, adolescent education level, and parental education level were all identified as risk factors for poor adolescent media health literacy. Future programs may benefit from prioritizing higher-risk communities, indicated by these factors, to prevent widening gaps in health equity.

The reviewed research included a variety of strategies for improving adolescent media or digital health literacy. Online information sessions effectively improved media health literacy when combined with arts-based mediums (poetry and poster-making), suggesting that virtual interventions may be effective for reducing potential cost barriers and that arts improve engagement [31]. Adolescent empowerment is another key feature of successful interventions since programs that involved adolescent empowerment through their incorporation in program design, an emphasis on self-advocacy, or civic

health literacy [21,25,30]. Programs may also find success in targeting caregivers who impact their children's media health literacy through their environment and direct education. Beyond their at-home environment, successful interventions implemented health education resources into the standard classroom curriculum [23,24]. These strategies should be considered when designing future adolescent media health literacy programs.

With reliance on media for health information rapidly increasing and its suggested association with adolescent health outcomes, more research is required on the contributing factors to create targeted, evidence-based interventions to best promote the health of adolescents [2]. More specifically, future research is needed to ascertain which factors most indicate poor media health literacy and which interventions work best for adolescents.

As research moves forward in examining the media health literacy of adolescents, it is important to consider how to ethically involve this population in such research. It is critical to utilize primary data from adolescents as their health literacy is thought of as distinct from that of adults [18]. This stage, as well as any developmental stage, while interconnected, comes with unique milestones, with adolescents growing as independent decision-makers and forming health attitudes, beliefs, and behaviours related to health literacy [32-34]. Research on health interventions benefits from the involvement of the target population to inform the prioritization of intended health outcomes [35]. The Children's Advisory Group established by the London South Bank University Ethics Committee provides an example of how to prioritize children's perspectives in health literacy research [36]. Child-friendly research methods, revised consent forms, and more accessible methods of results dissemination are examples of changes that can be applied to health literacy research for more active integration of children's perspectives [36].

By understanding the potential risk factors associated with poor adolescent media and digital health literacy and identifying successful intervention strategies, future programs may best address the broadening gaps in health literacy and equity.

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