How Adolescents Search for and Appraise Online Health Information: A Systematic Review

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Objective To conduct a systematic review of the evidence concerning whether and how adolescents search for online health information and the extent to which they appraise the credibility of information they retrieve.

Study design A systematic search of online databases (MEDLINE, EMBASE, PsycINFO, ERIC) was performed. Reference lists of included papers were searched manually for additional articles. Included were studies on whether and how adolescents searched for and appraised online health information, where adolescent participants were aged 13-18 years. Thematic analysis was used to synthesize the findings.

Results Thirty-four studies met the inclusion criteria. In line with the research questions, 2 key concepts were identified within the papers: whether and how adolescents search for online health information, and the extent to which adolescents appraise online health information. Four themes were identified regarding whether and how adolescents search for online health information: use of search engines, difficulties in selecting appropriate search strings, barriers to searching, and absence of searching. Four themes emerged concerning the extent to which adolescents appraise the credibility of online health information: evaluation based on Web site name and reputation, evaluation based on first impression of Web site, evaluation of Web site content, and absence of a sophisticated appraisal strategy.

Conclusions Adolescents are aware of the varying quality of online health information. Strategies used by individuals for searching and appraising online health information differ in their sophistication. It is important to develop resources to enhance search and appraisal skills and to collaborate with adolescents to ensure that such resources are appropriate for them. *(J Pediatr 2017;■■:■■-■■).*

A dolescence is a critical developmental period that is often characterized by changes in social pressures, cognitive capacity, and autonomy, which are important for a healthy transition to adulthood.[1] Many adolescents face health challenges and have questions about their health, often relating to areas such as mental health disorders, sexual health, and acne.[2] The Internet may be an appealing resource for adolescents to obtain health information,[3] given they are generally amenable to more innovative and interactive approaches to obtaining health information in a multimedia environment.[3] The Internet enables the relative ease of access to information in comparison with alternative offline sources,[4,5] and is important for the growing number of adolescents who own a smartphone (web-enabled mobile phone).[6] According to a 2015 US report, 92% of adolescents access the Internet on a daily basis, a percentage that is higher than for any other age group.[7]

Despite the availability of online health information, the Internet is still not the primary medium through which all adolescents access health information. A 2010 study found that only 31% of adolescents reported using the Internet to search for health, diet, or fitness information[8]; however, a 2016-2017 study found that 58% adolescents used online information for health problems and 62.9% used online information to maintain a healthy lifestyle.[9] Many adolescents seek health information from interpersonal sources, including teachers, parents, and peers[10-12] instead of, or in addition to, the Internet.[9] Some research has found adolescents prefer to obtain health information from interpersonal sources for sensitive topics such as sexual health.[12] Other research has found adolescents prefer to obtain health information from the Internet on sexual and mental health topics because they can cause conflict or embarrassment if discussed with parents or peers[13]; this finding is important in rural and remote areas with limited health services.[9] There seems to be some divergence between adolescents' affinity with technology and their ability to use it effectively across different platforms and for different purposes. This finding calls into question common assumptions about

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COREQ	Consolidated criteria for reporting qualitative research
ENTREQ	Enhancing Transparency in Reporting the Synthesis of Qualitative Research

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adolescents being "digital natives,"[14] with a high level of computer literacy and confidence in using technologies such as the Internet.[15]

Making use of online health information requires skills associated with eHealth Literacy, or "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."[16] eHealth Literacy plays a significant role in determining the benefit that adolescents can gain from using the Internet as a source of health information.[17] eHealth Literacy requires reading and analytical skills; low levels of literacy[18] and evaluative skills[19] are obstacles for adolescents who want to access and adequately appraise online health information.

Without the necessary eHealth Literacy to effectively search for and appraise online health information, adolescents may be left vulnerable to the vast quantities of misinformation and poor quality health resources that pervade the Internet.[12] This lack can have undesirable consequences, including access to illicit nonprescription medication,[20] or engagement with destructive information that could cause harm, such as pro-anorexia Web sites, or information about committing suicide and self-harm.[3,21,22] Another source of online health information,[7] social media, can be used to rapidly spread biased, inaccurate, and poor quality health information,[1] which can prompt some adolescents to adopt behavior that is dangerous to their health.[23]

As a first step in helping adolescents develop their eHealth Literacy, a deeper understanding of contemporary adolescent eHealth Literacy behaviors is needed, acknowledging the potential divergence between adolescents' abilities and interests in using online health information. This systematic review aimed to synthesize the published evidence concerning whether and how adolescents search for online health information and the extent to which they appraise the credibility of the information they retrieve.

Methods

To ensure this synthesis of qualitative studies was explicit and comprehensive, we conducted it in line with the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement.[24]

Studies with a focus on whether and how adolescents search for and the extent to which they appraise online health information were retrieved from relevant information sources. Those that met the following criteria were included in this review: participants were adolescents in the 13-18 years age range; and examined adolescents' searching and/or the extent to which they appraise the credibility of online health information. Included papers were original qualitative studies, as well as mixed methods studies, quantitative studies, practical tasks and reviews. Papers with an English language title were included, even if the paper itself was in another language. It should be noted that the definition of adolescent varies greatly. Some studies consider the broad adolescent age range to be 10-25 years, whereas others specify a more limited scope of 13-18 years. The focus for this review was the 13-18 years age group;

however, studies that took a broader definition were included if they covered a portion of the 13-18 years age bracket and did not extend below the age of 10 or above the age of 28. Papers whose concern was purely outside the 13-18 years age range (eg, "college students aged 18-24") were excluded from this review. Papers regarding searching for online information not related to health were also excluded.

Four databases (MEDLINE, EMBASE, PsycINFO, and ERIC) were searched systematically, from inception to August 24, 2016, for peer-reviewed literature pertinent to adolescents' searching for and evaluation of online health information. Reference lists of included papers were also searched for additional relevant papers.

A search strategy was constructed for MEDLINE and underwent minor adjustments according to the specifications of the other 3 databases (**Appendix**; available at www.jpeds.com). Groups of terms, including Medical Subject Headings terms and "free terms," relating to 3 domains (the Internet, health information, and searching or appraising), were developed by the authors to fulfil the objectives of this review. The terms were combined with the Boolean operators AND and OR in the database and the results were limited to include only the age group "adolescent (13 to 18 years)."

The titles and abstracts of all articles retrieved by the search strategy in each database were screened, and all eligible studies were retrieved. The full text of any prospective relevant study was assessed if the information in the abstract alone was insufficient to make an informed decision about the relevance of the article. Any discrepancies between the researchers were discussed until consensus was reached.

We used the consolidated criteria for reporting qualitative research (COREQ) checklist to appraise the transparency of reporting for each of the included papers that primarily reported qualitative data.[25] We did not use COREQ for papers that presented mixed methods research with primarily quantitative data, studies with quantitative data or practical tasks, or reviews. The COREQ checklist included items relevant to areas such as the research team, methods, context of the study, study results, and analysis. Two reviewers evaluated each study independently using these criteria. The authors discussed any discrepancies until consensus was reached.

Data were extracted from all papers that met the inclusion criteria. To preserve the context of each paper, we developed a data extraction table to record information regarding the study design, year of publication, location, setting, participants, and recruitment method(s). In accordance with our research questions, we used line-by-line coding to extract data from the results about search strategy (online sources of health information identified, finding and use of Web sites, search techniques identified, and issues encountered) and details about appraisal strategy (Web site evaluation criteria identified and information evaluation criteria identified). These data were in the form of descriptions and quotations, following Thomas and Harden.[26]

Following Thomas and Harden,[26] thematic synthesis methodology was used to analyze and synthesize the information from the included papers to develop analytical interpreta-