

# A Systematic Review of the Use of E-Mentoring to Address Youth Health

**Dr. Umme Thayyiba Khatoun<sup>1</sup>, Saleha Ali Ahmed Alhazmi<sup>2</sup>**

<sup>1,2</sup>Lecturer, Business Administration, Jazan University, Kingdom of Saudi Arabia 45142

## **Abstract:**

Electronic mentoring, also known as e-mentoring, is the practice of using digital technology to facilitate mentoring relationships. It has been increasingly popular in recent times. However, there has been no comprehensive analysis of the effectiveness of e-mentoring in addressing youth health issues. The present study conducts a systematic review and evidence quality assessment to analyze the impact of e-mentoring on the health and well-being of youth aged 10-24 years. Out of the 833 records that were found, only 14 matched the eligibility criteria. These criteria included being published in English since 1995, targeting adolescent health and/or youth with health difficulties, and having communication that was fully digital or integrated with in-person engagement. The findings indicated that most studies on health-focused e-mentoring mostly focused on young individuals with pre-existing health concerns, rather than exploring the application of e-mentoring to enhance general health and well-being. The programs provided mostly focused on implementing mentoring for specific groups of young people who may face difficulties with traditional face-to-face models. The quality assessments of the studies included in the analysis indicated that the strength of the evidence is of moderate quality. The results indicate that e-mentoring can reach young individuals with specific health issues and encourage them to independently manage their health conditions as they transition into adulthood. Nevertheless, it is necessary to conduct more thorough evaluations of e-mentoring programs with bigger groups of participants.

**Keywords:** Youth, Mentoring, Digital communication, Health, e-health, mHealth

## **Introduction**

In recent years, electronic mentoring (e-mentoring) has gained prominence due to the widespread use of digital communication and the pervasive use of technology among adolescents, particularly exacerbated by the COVID-19 pandemic. Although technology is increasingly integrated into various mentoring programs aimed at diverse youth subgroups and desired outcomes, research concerning the efficacy of technology in enhancing mentoring remains preliminary. Digital technology has been utilized with notable effectiveness in health behavior interventions, including health-oriented applications and telehealth, and may guide the integration of technology into health-centered adolescent mentoring. Nevertheless, the existing literature on the integration of mentorship and technology concerning juvenile health has yet to be synthesized. This study does a systematic review to synthesize the literature on e-mentoring aimed at enhancing health outcomes in kids.

Youth mentoring is defined as a process wherein a non-parental adult or older peer, functioning in a non-professional role, establishes and sustains a supportive relationship with a young individual [1] Mentors offer guidance, support, and encouragement to foster healthy development [1][2]. Mentoring has been

extensively implemented as an intervention strategy to enhance the academic achievement, social-emotional development, and career preparedness of youth, while also mitigating detrimental behaviors that result in adverse outcomes (e.g., delinquency, truancy, substance abuse) as individuals transition into adulthood [3]. In contrast to mental health therapy and other forms of healthcare, mentoring is delivered by an individual lacking advanced professional training as a healthcare provider (e.g., licensed therapist). Therefore, regarding mental health issues, mentors are not responsible for delivering official psychological or psychiatric interventions. In contrast to formal mental health treatment and other healthcare services, mentor-mentee relationships generally have fewer restrictions.

Interactions are analyzed by frequency, location, modality (e.g., informal text or email conversations), and the nature of activities and debates involved. These distinctions may facilitate the cultivation of more profound human relationships than those characteristic of formal care and can offer a broader array of possibilities and resources for the mentees.

E-mentoring models differ based on the requirements of a program and the youngsters it serves. The predominant models consist of (1) solely digital communication between the mentor and mentee, (2) predominantly digital communication with intermittent in-person meetings, and (3) a preponderance of mentoring conducted in person, with digital communication augmenting the relationship [4].

E-mentoring programs can cultivate a distinctive environment for the establishment of mentor-mentee relationships, providing emotional and instrumental support for kids, as well as facilitating connections between youth and adults [5] [6] [7]. Digital technology can facilitate more profound discussions on sensitive subjects, including sexual and reproductive health as well as mental health, thus mitigating the shame and stigma sometimes associated with in-person conversations about these matters [8].

Prior studies have established an initial comprehension of the potential influence of e-mentoring on youth outcomes, including academic achievement, school attendance, and enhanced peer connections [9]. A 2017 review determined that evidence regarding the enhancement of youth outcomes across various domains (e.g., self-esteem, career readiness, academic achievement) is inconclusive. It also found that sustainable e-mentoring programs have thrived due to the presence of clear guidelines, structure, and organizational tools. The published evidence indicates that general online support mechanisms, aside from e-mentoring, can enhance health indicators in young individuals, including depressive thinking and the impacts of bullying [10].

## **Present Research**

Despite the growing prevalence of digital communication among adolescents, particularly in mentoring relationships, research on the effects of e-mentoring on juvenile health has yet to be synthesized. This systematic review aimed to analyze the empirical literature about e-mentoring programs intended to enhance adolescent health outcomes, as mentors are ideally situated to advise kids on adopting healthy behaviors that can persist into late adolescence and young adulthood. E-mentoring may improve the capacity of mentoring relationships to tackle sensitive health issues or expand access to mentors for kids with specific health difficulties. The present review aimed to identify the youth populations (age range, gender, health status, etc.) targeted for health-related e-mentoring (Research Question 1) and to evaluate the efficacy of e-mentoring interventions in enhancing youth health outcomes (Research Question 2).

## **Approaches**

This review was executed and documented in compliance with the directives outlined by the Preferred

Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement [11]. No registered protocol is available for this systematic review.

**Sources of Information**

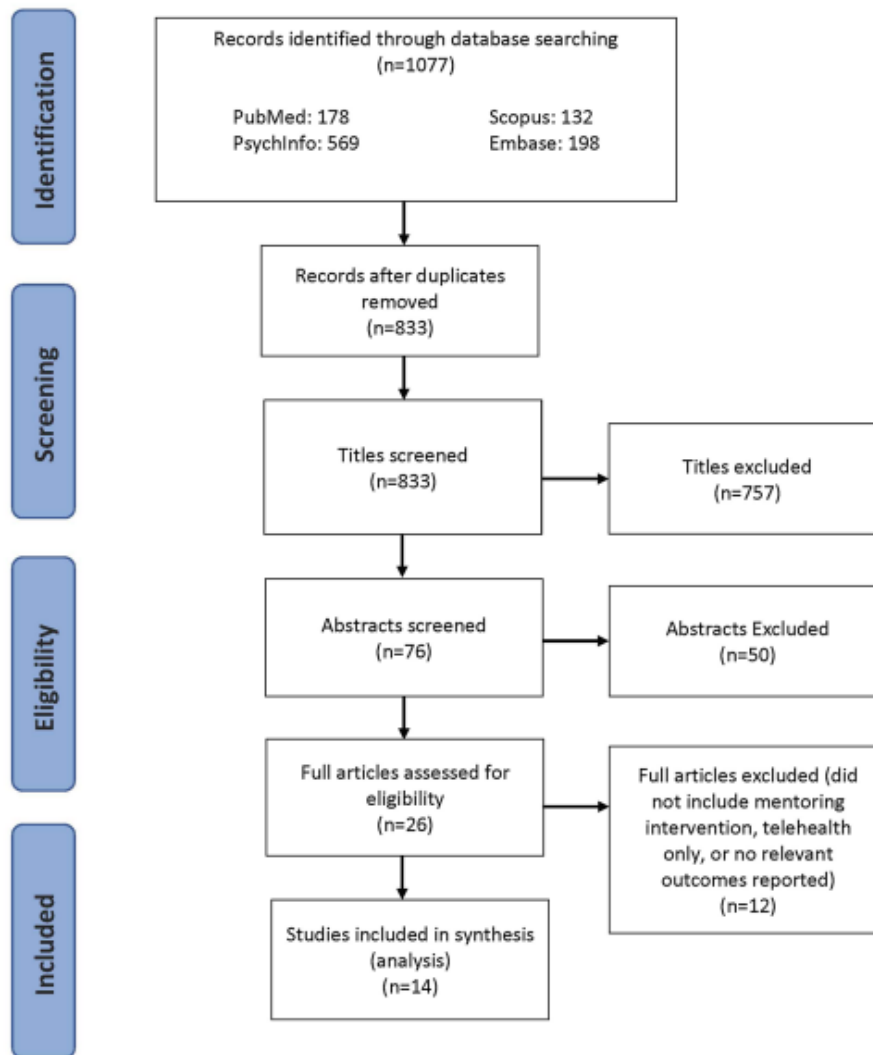
A systematic literature search was performed to locate peer-reviewed works that reference e-mentoring for kids, thereby qualifying for inclusion in the systematic review. In light of the focus on adolescent and young adult health within mentorship contexts, research including individuals aged 10 to 24 years, as defined by the World Health Organization, was incorporated.

In this review, e-mentoring denotes a significant relationship between a youth and an adult or older peer with shared life experiences, functioning in a non-professional role. The mentorship may be executed wholly or partially by digital communication methods, including email, text messaging, social media, messaging programs, video chats, or computer platforms utilized to foster the relationship. This encompasses the utilization of technology to facilitate and/or augment in-person mentoring relationships (e.g., employing email communication to maintain contact between meetings to further develop the connection). For this evaluation, e-mentoring excludes the utilization of web or mobile device services designed for concurrent in-person interaction between a mentor and mentee. For instance, if a mentoring pair utilizes a website to practice skills during in-person meetings, this is not classified as e-mentoring; yet, if they employ a website or mobile application to communicate and maintain contact between in-person sessions, that is included. This evaluation excluded studies of mentoring programs that comprised just digital mentor training modules, which were accessible only to mentors.

**Table 1 Key terms used in database searches**

| Subject area      | Keywords  |
|-------------------|---|
| Youth             | <ul style="list-style-type: none"> <li>• Youth development</li> <li>• Youth Mentorship</li> <li>• Adolescent support</li> <li>• Youth empowerment</li> <li>• Young adults mentoring</li> <li>• Peer mentoring for youth</li> <li>• Digital youth mentoring</li> <li>• Online youth support</li> <li>• Virtual youth guidance</li> </ul> |
| E-mentoring       | <ul style="list-style-type: none"> <li>• E-mentorship programs</li> <li>• Digital mentoring</li> <li>• Online mentorship</li> <li>• Virtual mentor-mentee relationship</li> <li>• Remote mentoring</li> <li>• Technology-assisted mentoring</li> <li>• Internet-based mentoring</li> <li>• E-learning mentorship</li> </ul>             |
| Electronic mentor | <ul style="list-style-type: none"> <li>• Online mentors</li> <li>• Remote mentors</li> </ul>  |

|                                 |   |
|---------------------------------|---|
|                                 | <ul style="list-style-type: none"> <li>• Digital mentorship platform</li> <li>• Virtual mentoring systems</li> <li>• Internet-based mentors</li> <li>• Technology-mediated mentoring</li> <li>• Cyber mentoring</li> </ul>  |
| Online mentor                   | <ul style="list-style-type: none"> <li>• Web-based mentoring</li> <li>• Online mentor platform</li> <li>• Virtual coach</li> <li>• Internet mentoring</li> <li>• Digital mentorship programs</li> <li>• Online mentorship tools</li> <li>• Remote mentor support</li> </ul>   |
| Virtual Mentor                  | <ul style="list-style-type: none"> <li>• Virtual Coaching</li> <li>• Remote mentoring support</li> <li>• Tele-mentoring</li> <li>• Virtual learning mentor</li> <li>• Virtual guidance</li> <li>• Virtual advisor</li> <li>• Online educational mentor</li> </ul>   |
| Tele mentor or Telementor       | <ul style="list-style-type: none"> <li>• Tele-mentoring</li> <li>• Telementorship</li> <li>• Video conferencing mentor</li> <li>• Remote academic mentorship</li> <li>• Virtual distance mentor</li> <li>• Online tele-mentor</li> </ul>  |
| Social media mentor             | <ul style="list-style-type: none"> <li>• Social media coaching</li> <li>• Digital influence mentoring</li> <li>• Social media career mentor</li> <li>• Virtual mentor on social platforms</li> <li>• Social media-based guidance</li> <li>• Online mentor communities</li> <li>• Mentoring through social networks</li> </ul> |
| Other relevant key search terms | <ul style="list-style-type: none"> <li>• Distance mentoring</li> <li>• Mentoring platforms</li> <li>• Virtual education mentor</li> <li>• Remote career mentoring</li> <li>• Digital age mentoring</li> <li>• Online skill-building mentor</li> <li>• Cyber guidance for youth</li> <li>• Internet-based coaching</li> </ul>  |



**Fig. 1 PRISMA diagram**

### Conduct a search

A focused search was performed in December 2019 utilizing the library databases PubMed, Scopus, PsycINFO, and Embase. Essential search phrases encompassed children, youth, e-mentoring, online mentoring, electronic mentoring, digital mentoring, and its variants (see Table 1). The reference lists of included papers were examined for supplementary articles not identified in the keyword search. Research cited in chapters and previous literature studies related to e-mentoring was also examined for potential relevance [12][13].

### Selection of Studies

Studies were incorporated into the review if they satisfied the following criteria: (1) published from 1995 to 2019 (1995 was selected as the year the Internet gained mainstream prominence in Silicon Valley); (2) composed in English; (3) concentrated on a mentoring program aimed at improving youth health outcomes (i.e., indicators of health behaviors and/or physical or mental well-being) and/or addressing youth with health concerns; and (4) the communication and interaction between mentor(s) and mentee(s) in the program was exclusively digital or a hybrid of digital and in-person engagement.

Studies were excluded if they: (1) referenced the inclusion of an e-mentoring component but instead detailed a telemedicine tool for youth and/or their parents that did not foster a significant mentoring relationship and/or was delivered within a professional care context (e.g., utilizing technology for remote diagnosis and treatment of patients); (2) did not concentrate on youth as the prospective beneficiaries of the mentoring; (3) presented formative research for intervention development; and (4) were commentaries, conference abstracts, unpublished dissertations, or gray literature and/or reports. Certain mentoring programs use e-mentoring in their design but lack the means to perform assessments or disseminate their findings in peer-reviewed journals. The literature reviewed may exhibit bias towards programs with adequate resources for conducting assessments and disseminating results.

Figure 1 displays a PRISMA diagram that delineates the literature search, screening, and review procedure. After the keyword search, two members of the study team independently evaluated titles and abstracts in distinct phases for inclusion based on established review criteria. Screeners categorized an item into a "proceed" or "do not proceed" folder, which was subsequently analyzed and evaluated by the study team. In instances of disagreement, team members deliberated on the specific study in alignment with the inclusion criteria and reached a determination.

If the article in question would advance through the review cascade. After the initial title screen, article abstracts were reviewed to assess their alignment with the established inclusion criteria. The articles subsequently underwent comprehensive scrutiny.

The data abstraction for each study encompassed the following elements: year of publication, characteristics of mentees and mentors, sample size, e-mentoring intervention, measured outcomes, and outcome statistics. The included papers were meticulously examined utilizing the National Institute for Health Care Excellence (NICE) quality appraisal checklists for both qualitative and quantitative research (NICE, 2012) to assess the robustness of the evidence provided. Each article included was coded and evaluated by one of the writers, with 20 percent of the articles subjected to duplicate coding.

## **Outcomes**

### **Summary of Included Studies**

After eliminating duplicates from the 833 identified records, 76 potentially relevant full-text articles were assessed for eligibility. Of these, 14 studies, encompassing analyses from 9 distinct samples, satisfied the eligibility requirements and were incorporated into the final evaluation (refer to Table 2). Numerous research detailed interventions for children facing health difficulties but failed to address the impact of mentoring on their health outcomes specifically [14-17]. Several studies documented protocols or preliminary work; however, no further papers presenting intervention outcomes were found [18-20]. Research frequently used minimal sample sizes, typically due to the studies being in the pilot phase [21-23].

### **Study Attributes and Outcomes**

None of the research encompassed in the evaluation documented the effects of e-mentoring on specific health behaviors or outcomes, including diet, fitness, and substance use prevention. Studies indicated aspects that may precede health behaviors, including social-emotional outcomes, mentees' self-efficacy in managing their health conditions, perceived social acceptance, and an overall sense of emotional well-being resulting from mentoring. Published studies to date have concentrated on documenting e-mentoring interventions aimed at a specific youth subpopulation with a particular health issue and the effect of such



mentoring on the alleviation of that health challenge (e.g., pain management or reduction of depressive symptoms). The caliber of the quantitative studies was subpar, with only two meeting the majority of the quality evaluation criteria [24-25], five satisfying parts of the criteria, and one meeting few or none of the checklist items. The quality of the qualitative investigations was significantly superior, with six meeting all or most of the requirements on the checklist and two meeting part of the criteria (refer to Table 2). Although studies frequently referenced the ages of mentees and mentors, as well as occasionally noting gender or other demographic attributes, they generally did not examine outcomes based on mentee developmental stage or gender. Findings are delineated concerning these elements for studies in which they were incorporated.

The presentation of the included papers is categorized into three health problems: chronic diseases, transplant recipients, and impairments. Most research assessed the impact of e-mentoring on youth with physical and/or mental disability.

### **Persistent Health Disorders**

Three research, employing an identical multiple methods data set, concentrated on juvenile idiopathic arthritis (JIA) and presented the findings of a specific e-mentoring program, iPeer2Peer. These investigations documented health effects for kids about their capacity to manage JIA [26-27]. Although this program was assessed through a waitlist randomized controlled trial [28] and included several data collection methods [29], the sample size was notably limited, even for a pilot program (n=15 mentoring pairs). A significant majority of the mentors (90.9%) and mentees (93%) were female. The investigations indicated that mentees exhibited enhancements in their perceived capacity to manage JIA [30] and may have inadvertently offered assistance for mentors' illness self-management, as mentors were marginally older peers who also had JIA [31].

Peer mentors offered and obtained both informational assistance (knowledge, facts, guidance on actions) and emotional support (care, worry, empathy, sympathy) from mentees and fellow mentors [32]. Mentoring couples predominantly engaged in discussions regarding the effects of their illness and self-management, while also addressing non-illness-related topics pertinent to youth, such as post-secondary aspirations, hobbies, and social contexts [33].

Challenge Your Arthritis is a digital self-management resource featuring peer coaching for individuals aged 16 to 25 with rheumatic diseases. A feasibility study was performed to assess the utility, usability, and user acceptance of the web tool [34]. Mentee participants deemed the online tool beneficial and demonstrated significant attainment of self-assessed objectives related to the self-management of their condition (e.g., managing fatigue, pain, and depressive feelings; seeking support from others; regulating anger). No metrics aside from user experience and goal attainment were evaluated.

A study examined an online peer support intervention for adolescents with asthma and/or severe allergies [35]. The peer mentors, each of whom had a rheumatic illness, offered weekly chat assistance for three months. The results indicated no significant differences from pre- to post-intervention, save for a notable decrease in loneliness; yet, the sample size was exceedingly tiny (n=10). Females participated in fewer conversation sessions than males. Qualitative interviews with the kids indicated potential beneficial outcomes of the program, such as enhanced confidence and improved communication of their condition due to the intervention.

**Table 2: Final review articles on using e-mentoring to improve youth health (see Additional Table 1 for quality assessment).**

| Author & Date                   | Intervention                                       | Study  | Design                      | Key Findings   | Quality Appraisal                                 |
|---------------------------------|--|--|-----------------------------|--|---|
| El Aoufy et al. (2024)          | Telemedicine in rheumatic and musculoskeletal care | Scoping review                                 | Review                      | Evidence of heterogeneity in telemedicine approaches for rheumatic diseases.                 | High, based on a comprehensive literature review. |
| Linkiewicz et al. (2023)        | Peer support for adolescents with chronic pain     | Perceptions of adolescents                     | Reflexive thematic analysis | Adolescents value peer support, but concerns include trust and shared experiences.           | Moderate, reflexive but context-specific.         |
| Kaufman et al. (2024)           | Youth e-mentoring readiness                        | Organizational Readiness for Digital Mentoring | Mixed-methods study         | Organizations demonstrate varying levels of digital readiness for e-mentoring.               | High, with rigorous data collection.              |
| Xu et al. (2024)                | Expert-based collective advising                   | Educational equity                             | Qualitative study           | Expert advising improves educational equity in some contexts.                                | Moderate, context-dependent findings.             |
| Ma et al. (2024)                | Online social support                              | Problematic Internet use                       | Meta-analysis               | Online social support correlates with problematic internet use.                              | High, meta-analysis confirms results.             |
| de Zeeuw Wright & Morgan (2024) | Peer support for homelessness                      | Certified peer support                         | Qualitative study           | Peer support provides significant emotional and practical benefits for homeless individuals. | High, robust qualitative data.                    |
| Van Ryzin et al. (2024)         | Mentoring for adolescent males with disabilities   | Review and evidence gap map                    | Review                      | Evidence gap for mentoring programs  | High, systematic review.                          |



|                       |   |  |                                   |   |   |
|-----------------------|---|--|-----------------------------------|---|---|
|                       |   |  |                                   | targeting adolescent males with disabilities.   |   |
| Hennig et al. (2024)  | Virtual mentoring programs                                  | Designing mentoring programs                     | Qualitative study                 | Virtual mentoring programs should be designed based on student motivation to participate.       | Moderate, qualitative but insightful.     |
| Butt et al. (2024)    | Pediatric to adult transition care in neurogastroenterology | Transition care                                  | Position paper                    | Gaps exist in transition care for adolescents moving into adult neurogastroenterology services. | High, expert consensus.                   |
| Riley et al. (2024)   | Virtual mentoring in academic institutions                  | Virtual mentoring expansion in medical education | Qualitative study                 | Senior mentors in academic institutions face challenges in expanding virtual mentoring.         | Moderate, specific to medical context.    |
| Chen et al. (2024)    | Dietary management in elderly patients                      | Cognition of diet quality                        | Qualitative research study        | Elderly patients in western China need more support in understanding dietary management.        | Moderate, qualitative with limited scope. |
| Shi et al. (2024)     | eHealth interventions                                       | Managing multiple lifestyle risks                | Systematic review & meta-analysis | eHealth interventions effectively manage lifestyle risk behaviors among older adults.           | High, strong evidence base.               |
| Kaufman et al. (2022) | E-mentoring for youth health                                | Systematic review                                | Review                            | E-mentoring can improve health outcomes for youth, but  | High, systematic review of studies.       |

|                          |  |   |                     |   |  |
|--------------------------|--|---|---------------------|---|--|
|                          |  |   |                     | implementation varies across contexts.  |  |
| Wedge et al. (2024)      | Peer mentors in rehabilitation camps                 | Peer mentor experiences                           | Qualitative study   | Peer mentors feel personal growth and empathy while assisting others at rehabilitation camps.                         | Moderate, small sample size.                 |
| Igler et al. (2024)      | Young adults' reaction to chronic illness disclosure | Chronic illness and peer support                  | Mixed-methods study | Disclosure of chronic illness can strengthen friendships, but may also create discomfort depending on peer reactions. | Moderate, mixed-methods but context-limited. |
| Deng & El-Hag (2024)     | Digital inequality                                   | Digital divide in online learning                 | Mixed methods study | Digital inequality persists among underserved college students, with two levels of divide identified.                 | High, detailed mixed-methods approach.       |
| Berkanish et al. (2022)  | Technology-based peer support for chronic illness    | Peer support for adolescents with chronic illness | Systematic review   | Technology-based peer support has a positive impact on adolescents with chronic illness.                              | High, based on systematic review.            |
| Andersen & Wellen (2023) | Virtual mentoring for youth                          | Undergraduate mentors' experiences                | Exploratory study   | Undergraduate mentors benefit personally from providing virtual mentoring.  | Moderate, exploratory with a small sample.   |
| Sallam (2023)            | ChatGPT in healthcare education                      | ChatGPT utility in education and research         | Systematic review   | ChatGPT shows potential in healthcare education but   | High, systematic review.                     |

|                          |                       |                                     |                      |   |   |
|--------------------------|-----------------------|-------------------------------------|----------------------|---|---|
|                          |                       |                                     |                      | raises valid concerns.  |   |
| Richardson et al. (2022) | Digital health equity | Framework for Digital Health Equity | Conceptual framework | Digital health interventions need to address equity issues to be effective. | High, conceptual framework with wide application. |

**Organ Transplant Recipients**

A study on peer e-mentoring for pediatric transplant patients [36] examined technology usage data (logins, interaction duration, virtual spaces created) to analyze mentor/mentee interactions and investigate the potential effects of mentoring on mentee well-being through a textual analysis of conversational logs. The regular presence of e-mentors for youth was associated with a notable enhancement in the emotional well-being of the mentees.

**Impairments**

The majority of the research examined pertained to kids with diverse disabilities, encompassing physical, mental, and learning impairments. While these studies did not indicate alterations in health outcomes associated with the disability, they concentrated on facilitating access to resources for these youths. The Keeping It Together for Youth toolkit and the Transition to Adulthood with Cyber Guide Evaluation (TRACE) interventions, both detailed in a single paper, were developed to assist youth with physical disabilities in enhancing their self-management of daily life and facilitating their transition to adulthood [37]. The research employed a longitudinal mixed-method prospective cohort design, enrolling 50 juvenile participants and retaining 36 for the adult assessments. Engagement with the interventions was rather low; nonetheless, users reported high satisfaction, and both goal attainment and satisfaction rose in correlation with the duration of usage for each intervention. The participation of girls in these interventions was observed to exceed that of males.

The Empowering Youth Towards Employment program is an online initiative that provides e-mentoring for youth with physical limitations [38]. The program underwent feasibility testing in a randomized controlled trial involving 28 kids; however, no health outcomes were assessed. No significant effects were observed in the intervention group relative to the control group, except that youth engagement was greater in the intervention group (which included e-mentoring) than in the control group (which did not include e-mentoring).

Shpigelman and associates have conducted extensive research on e-mentoring for youth with diverse disabilities over several years. An initial study examined an email-based mentoring initiative termed Electronic-Mediated Mentoring for All, wherein adolescent mentees with special needs were matched with young adult peer mentors possessing similar needs [39]. The content analysis of the email communications indicated that the e-mentoring relationship evolved similarly to in-person mentoring relationships, encompassing phases such as personal acquaintance and exploration of mutual interests. Data indicated that mentees valued the program, experienced acceptance from their mentors and that mentors welcomed the opportunity to support others. A further study examining email interactions from this program provided evidence that email contact may have diminished the visibility of participant limitations and enabled mentees to perceive themselves as more "typical" youngsters [40].

A separate investigation conducted by this group was a qualitative outcomes research examining e-mentoring for children aged 15 to 20 with disabilities [41]. The e-mentors were somewhat older university students possessing at least one impairment. The authors identified three essential components that may have facilitated the success of an e-mentoring relationship: mentor characteristics (prior experience in supportive roles and proficiency in text-based communication); the integration of real-time communication through chats or video meetings; and a mentor who embodies acceptance of their own and others' disabilities. Results beyond the success of the relationship were not disclosed.

A study examined computer-mediated peer support for youth with cerebral palsy and spina bifida, where teenage mentees and young adult mentors with the same condition convened weekly in online chat rooms [42]. A multi-method analysis revealed that participants felt liberated to express themselves in the online environment, cultivated heightened self-awareness by connecting with others who shared their condition, and obtained both emotional and practical help from their mentors. In this study, females posted much more messages than males. A second study evaluating the program's outcomes from pre-intervention to immediate post-intervention and a three-month follow-up revealed that the teenagers' self-reported coping capacity did not exhibit significant change over time [43]. There was a significant increase in measures of social acceptance and sense of community. A gender-based comparison of outcomes indicated that males participated in fewer online sessions than females, females contributed more messages than males, and males experienced smaller social networks, diminished social acceptance and sense of community, and increased feelings of loneliness. Male mentees requested support less frequently than female mentees.

A study examined a virtual mentoring program centered on STEM (science, technology, engineering, and mathematics) for adolescents with disabilities, including learning, attention, and psychological issues [44]. In a pre-/post-evaluation design, findings indicated enhancements in self-reported self-determination and self-advocacy; however, racial/ethnic minority students did not demonstrate the same level of change in self-determination as their majority counterparts. There was a decline in interest in science among minority students and kids with learning difficulties, indicating that the virtual platform may have been unhelpful and potentially harmful to some students' STEM interests.

## Discussion

With the advancement of digital communication technologies, e-mentoring has arisen as a viable intervention for youth.

Research conducted in the last ten years has concentrated on diverse e-mentoring models, particularly their application in promoting health and well-being. This evaluation was performed to consolidate and evaluate the methodological quality of the literature about e-mentoring efforts aimed at enhancing juvenile health outcomes.

The initial study topic, aimed at delineating the categories of children engaged by e-mentoring, remains predominantly unresolved. The classifications of health status are more defined; adolescents with chronic health disorders, disabilities, or those who have had organ transplantation have been incorporated into e-mentoring research concentrating on health outcomes. Nevertheless, the investigations are excessively varied among several health conditions to reach any definitive conclusions. Despite this limitation, it is evident that the interventions examined in this review predominantly aimed to provide mentoring to youth subpopulations that may encounter difficulties with in-person mentoring models—specifically, those with distinct health requirements and/or physical constraints that could hinder their participation in conventional, peer-based, face-to-face mentoring [45, 46].

The gender of participants concerning outcomes was predominantly unreported in this research; exceptions include [47-49]. In all other studies, when participants' gender was provided, the sample sizes were either insufficient for significant gender-based analysis or, in the instance of the iPeer2Peer program, the overwhelming majority of participants were female. Other research identified a deficiency in the gender-based analysis of mentees in their limitations.

The intended age range of adolescents differed significantly across investigations, frequently encompassing broad age spans within individual studies (e.g., 12 to 18 years), and the researchers did not delineate findings about early, middle, and/or late adolescence. The interventions in these trials primarily targeted older kids approaching maturity, who are commencing the transition to autonomously managing a health condition.

This emphasis is justified, as mentoring may facilitate the transition to an independent life and the management of health conditions. Future research must concentrate more intentionally on the developmental phases of youth to elucidate the suitability of e-mentoring throughout various periods of adolescence.

The second research topic concerning the efficacy of e-mentoring treatments in health remains mainly unresolved.

The qualitative evidence examined was predominantly of good quality; however, the quantitative studies are largely underpowered and lack comparison groups, hence diminishing their efficacy. Moreover, although the studies encompassed in this review indicate the potential for digital mentoring to effectively engage youth with health and disability issues, no research has yet examined how digital mentoring can enhance health outcomes for adolescents beyond the specific dimension of psychosocial well-being (e.g., perceived capacity to manage chronic conditions, feeling like a "typical" teenager).

Digital mentoring has demonstrated the capacity to offer the opportunities traditionally associated with face-to-face mentoring to kids who may be difficult to engage through in-person models (e.g., rural youth, youth with limited access to mentors in their community who have similar professional aspirations, etc.). [50-51]. The uncertainty lies in whether digital mentoring can function as a primary or secondary preventive measure for various health issues in children transitioning from adolescence to adulthood, or as a method to address and manage detected health conditions. Although certain research within this review presents encouraging findings on the latter, there is inadequate evidence to substantiate claims about the beneficial effects of digital mentoring on youth health. The types of digital mentorship programs that are developmentally suitable for specific age groups in youth are not established. The studies examined diverse health concerns (multiple chronic diseases, transplant recipients, disabilities) and infrequently assessed the program's effects relative to a comparison group of kids who did not get mentorship. The fragmented character of the literature at this juncture precludes definitive conclusions; however, participant feedback and preliminary findings indicating positive trends suggest that digital mentoring may beneficially influence youth health.

In light of these favorable trends, digital mentoring may facilitate discussions between adults and kids on sensitive health topics that are sometimes more challenging to address in person. Digital mentoring models may be employed by mentors in primary prevention initiatives to discuss stigmatized health behaviors, including substance use, sexual conduct, and mental health issues, without the mentee perceiving judgment from their mentor during in-person interactions [52]. This programming requires mentors who possess advanced skills in empathy and digital communication, as well as comprehensive knowledge of the health subject matter. Depending on the program's focus, mentors may require on-call access to

licensed practitioners for situations that exceed the capabilities of a paraprofessional, such as a mentor. Digital mentoring may assist mentees in managing health behaviors, including nutrition, exercise, and stress reduction, similar to the functioning of online health coaching programs for adults [53]. This could serve to enhance clinical care, wherein a mentor assists a young individual in information acquisition regarding their diagnosis, advises on the logistics of managing a health condition (e.g., medical appointments, medication compliance, necessary accommodations), and offers emotional support, including reassurance and encouragement during challenging times, as well as validation of emotions. Mentoring support has been successful in enhancing health outcomes when implemented in person, but with restricted accessibility and acceptance [54-56]. E-mentoring as an adjunct to clinical care could address deficiencies in this area and may be particularly significant for adolescents moving to adulthood and acquiring the skills to autonomously manage a health problem.

Traditional mentoring programs frequently focus on low-income adolescents and individuals in resource-poor environments, and the perceived deficiency in technological access may have resulted in a scarcity of digital mentoring initiatives for these populations. The "digital divide" has rendered technology-driven programs unattainable for certain youths from lower socio-economic backgrounds or impoverished regions [57-58]; nonetheless, the availability of complimentary Wi-Fi hotspots and more affordable digital devices and data plans has mitigated this divide [59]. However, discrepancies in technology access persist among certain children regarding their ability to obtain mobile devices and dependable internet connections, as evidenced during the COVID-19 epidemic and the necessity for remote learning [60-62]. Future digital mentorship programs should consider this element. None of the studies encompassed in this evaluation examined the matter of technology access, as all mentor and mentee participants were either supplied with a device and adequate mobile data or were mandated to possess one to qualify for the study. A further domain for prospective investigation is identity and self-image concerns that may be explored through e-mentoring.

When youth with health concerns or disabilities perceive themselves as more "typical" due to mentorship [63-65], especially from a mentor with a shared experience, it may promote favorable long-term outcomes, including academic success, management of disabilities or illnesses, and coping with health challenges. E-mentoring may positively influence identity development, acting as a facilitator for attaining intended program results. Mentors in digital mentoring programs may also experience advantages, as they have the opportunity to share their personal experiences with health challenges with a young individual embarking on a similar journey, provided they have a shared background. This evaluation did not prioritize mentor benefits; nonetheless, limited research investigated the effects on mentors working with kids, even though mentors frequently have health experiences akin to those of mentees.

This systematic review has many limitations. The emphasis was on e-mentoring initiatives aimed at health and wellness outcomes for children; however, the research indicated a concentration on e-mentoring for adolescents with pre-existing health issues. The subsequent phase of the study on digital mentoring should involve the analysis of e-mentoring platforms for application with bigger, more diverse young populations as a strategy for illness prevention and health promotion. This review is constrained by its focus on published peer-reviewed articles. Gray literature, doctoral dissertations, and other unpublished articles could enhance the knowledge base in this emerging field of study, particularly since many programs often have limited participant numbers, complicating the identification of statistically significant effects in evaluations and potentially resulting in publication bias.



This review's strengths lie in its summary of an emerging yet significant field—the application of digital technology to improve youth mentoring. This review was systematic and employed a quality evaluation checklist to evaluate the robustness of the evidence available to date. This review's emphasis on health issues uncovered further potential advantages of e-mentoring, in addition to its accessibility for hard-to-reach youngsters. Technology-driven or enhanced mentoring programs enable young individuals with potentially stigmatizing conditions or characteristics to receive mentorship, even if they are physically unable to participate in conventional community-based mentoring initiatives.

E-mentoring enables youth with health conditions to connect with individuals who share similar experiences, irrespective of the mentor's geographic location. This facilitates the normalization of their feelings and challenges while providing practical guidance from someone who comprehends their situation first-hand. Preliminary data indicate that mentorship may enable kids with health issues to acquire effective coping mechanisms and essential life skills for a healthy transition to adulthood and autonomous health management.

### Conclusion

E-mentoring has gained prominence as a method to integrate technology with mentoring, facilitating connections between kids and mentors tailored to their individual needs. Notwithstanding its popularity, understanding of the efficacy of e-mentoring for youth is constrained, especially with health-oriented mentoring. This study synthesized and evaluated the current knowledge on e-mentoring's impact on youth health by a systematic evaluation of peer-reviewed articles and an assessment of the quality of the material. The review indicated that e-mentoring within the health domain predominantly targets children with particular health conditions, with evaluated outcomes primarily centered on youth self-efficacy and the social-emotional dimensions of managing a health condition. The existing literature fails to provide significant insights into the effects of e-mentoring on mentees' health concerning developmental stage or gender since several studies possess insufficient sample sizes for substantive analysis by young subgroups. The literature quality is inconsistent, exhibiting superior quality in qualitative studies relative to the bad quality of quantitative studies. Although the literature on e-mentoring for enhancing youth health is still in its infancy, existing studies suggest that e-mentoring holds the potential for engaging specific youth subpopulations who may be physically incapable of in-person meetings with mentors or who possess unique health conditions that complicate mentor accessibility. The results indicate a possibility for e-mentoring in youth health to assist young individuals in acquiring the skills required to manage a health condition or impairment as they transition to independence in adulthood. Considering the pervasive utilization of digital technology to enhance communication, particularly in health communication, mentoring programs, and health researchers need to persist in examining the possible efficacy of e-mentoring to promote the health and well-being of youth.

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