

Generative Artificial Intelligence in Children and Adolescents: Impact and Future Directions

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Introduction

Over the last few years, Artificial Intelligence (AI) has been rapidly integrated into practically all areas of society. Today, it is embedded in how we work, entertain ourselves or communicate; and is shaping how the next generations interact with the world. According to a guide on AI prepared by UNICEF for teenagers, AI refers to computers or machines programmed to carry out tasks normally performed by humans, copying people's behavior or thinking. This technology is used to predict situations, make recommendations or decisions and even produce text or images [1]. As a reflection of what is happening in society, the number of articles published in scientific journals and on the Internet about AI, its uses and scope, has been increasing progressively. However, it has not been until recently, within the last couple of years, that the rise of AI has become truly significant, especially with the advent of Generative Artificial Intelligence (GAI or Gen AI) solutions such as Chat GPT or other similar ones. These solutions enable direct interaction among users and technology systems, as well as facilitate user-machine conversations through natural language. This current trend is palpable, not only in the databases and information sources consulted, but also in the media, social networks, and debate forums (whether virtual or in-person) within society.

Given this newfound, interest in knowing and assessing the impact that the use of AI can have on users also increases. Among these users, teens and adolescents, as the youngest age group, may present the greatest risk if they do not know how to manage the information that can be accessed or generated through AI. It also often involves certain level of users' decision-making, which could impact different aspects of their life. This population group view technology as a constant element in their daily lives. One that has been there for as long as they can remember, as reliable as ever changing. They are used to communicating with their peers through social media, assessing information using the Internet and adapting to the quickly evolving technologies as comfortably as they hold a pencil. Moreover, since it plays such a significant role in their lives, the way they think and behave is naturally influenced by these methods and the shared information they can access.

Nowadays, most of the children and adolescent population has a smartphone and spend much of the time connected online. Young citizens today are known as "digital natives". That is, they have lived immersed in the world of technologies practically since their birth [2]. This world has change rapidly over the last decade, and teenagers have learned to adapt to every one of its updates, thus quickly integrating AI into their lives. However, using a technology does not necessarily mean knowing how to use it correctly and responsibly. Parents, educators and health professionals have warned about the importance of this issue and its impact on young people. However, AI can also be understood as an essential part of the technological advance that occurs in society, with a wide range of possibilities. Indeed, many current technologies have integrated some form of AI over the years. The objective of this report is to review the scope of the situation of the use of AI during childhood and adolescence, its impact, and future directions.

Methods & Materials

We carried out a review of the scientific and gray literature to know the scope of the situation under study. We searched articles in the MEDLINE database during the previous 5 years (from 2019) using the key words "artificial intelligence", "childhood", and "adolescence", as well as the wording "Use of artificial intelligence in adolescence". We used the same wording when conducting the search in Internet looking for studies, white papers or other gray literature.

Results

The search in the MEDLINE database showed 2,778 articles published during the last five years. After screening these, we identified 415 articles published in the previous year (2023). From them, we selected a total of 36 reviews or systematic reviews. None of the 36 reviews was useful for the purpose of this report (14 referred to the use of AI in the diagnosis of health problems or diseases and 22 were not related at all with the study's objective). The Internet search of Google showed 144,000,000 results. Of these, those in the top positions were articles or scientific reports on the subject elaborated by health or government organizations. These manuscripts were indeed focused in how children and adolescents use AI and what is the impact of this utilization in youth education and health.

As search results, one can extrapolate, that AI can have very positive effects or just the opposite depending on who creates the content, the training on its use and its applications [3]. In the educational arena, educators and researchers have begun to introduce different teaching methodologies through AI [4]. Individualized learning tools can be developed based on the needs of each student; thus, ensuring that they are having an adequate progress and that no child is being left behind. In this way, AI-based educational technology, such as intelligent tutorial systems, personalized curriculum plans, virtual reality, or interactive learning experiences, can improve educational outcomes [5]. Using this methodology, learning disorders and special education needs can also be diagnosed more quickly and earlier. Therefore, students will have more time to learn how to manage their situation successfully, and teachers could be better equipped to provide the necessary adaptations. In the area of health and wellness, many personalized AI and GenAI-based applications have been developed to manage the health and healthy lifestyles of adolescents [6]. There are many examples to improve the health of young people, from promoting healthy habits and lifestyles to guides for children with chronic diseases. This also facilitates early detection and intervention (especially in more vulnerable groups of young people), support in adherence to treatment or transition to adult care [2,5,7].



The same criteria can be applied in the area of leisure and entertainment. Furthermore, the advances produced in the environment of interactive games favor young people's transition from consumers to content producers. Currently, teenagers and adolescents already produce a lot of online contents. AI is contributing to the creation of this content, especially photography and images that can be very realistic, with the consequent danger that this situation can cause if it is not treated correctly. Likewise, in the workplace, technological innovation is transforming the type of work and the way it is done, with the automation of many tasks [5]. But also, the creation of new and different job positions.

However, these technologies also pose a challenge for the people who use them. One of the most notable problems that the use of AI can present at these ages is related to the security, privacy and well-being of the person who uses it. AI-powered devices can collect and process personal data, create user profiles to target products or apps, and often rely on large datasets for training. Therefore, it is necessary to educate the youth on how to use this technology and about the dangers of entering data or personal information into the AI system. It is important to promote critical and responsible AI use. Furthermore, the existing differences between social groups in the population could increase in the case of the use of AI-based technologies, due to the difficulty of access for the most disadvantaged groups at a socioeconomic level [5].

Another aspect studied is social adaptation. Teens, adolescents (or any other person) who are continually connected to the AI network have a greater probability of social isolation, which may also be related to certain mental health problems [2]. However, other studies stated that the use of these technologies is also changing the way people socialize. For example, it is possible that some AI or GenAI mental health applications bring some advances when used to help adolescents monitor their emotional well-being, provide advice and recommendations based on behavioral patterns and record emotions. In all these cases, the family plays an important role in keeping the youth "connected" with reality and their environment [4].

Discussion

No systematic reviews have been found in the recent literature on the impact of AI and its use in children and adolescents. However, there is a body of gray literature, reports and white papers from different health organizations and the field of education focused in this topic and highlight the scope of the problem of AI use in youth. Even more, although not to have systematic reviews could be a limitation of this paper, it is partly logical because the rise in the use of AI and the study of its implications is still very recent. In light of the results obtained, there are a series of aspects that must be taken into account to plan actions and recommendations for the immediate future.

The consequent evolution of the AI technologies can facilitate the creation of new job opportunities for young people, since society will need specific professional profiles that did not previously exist. This evolution can also have a positive impact on adolescents' awareness of the appropriate use of these technologies and on aspects related to information privacy, security and ethics. It is important that today's young people know and understand how AI works, as well as the implications it has on the ethical, social and personal aspects of its use, in order to promote critical and responsible use [5]. In turn, researchers and developers of these technologies must take into account the ethical and regulatory aspects related to the privacy of the information they use. This includes aspects such as informed consent, data security, user autonomy, plagiarism or data ownership, among other aspects [6].

A recent study carried out by UNICEF at an international level on the opinion of 245 adolescents, aged 12 to 19, regarding AI highlights that, for young people, the decisions currently made about these technologies are focused on adults. What teenagers think about it is not usually taken into account. The study also highlights that young people learn about AI with their friends or at home, but rarely do so at school. There is a certain variability between those who are critical of these methodologies and those who are not. The majority are not alert or do not know their risks, and the majority believe that parents have an important role in reducing them [3]. On the other hand, the fact that adolescents are accustomed to actively using these technologies can be used to implement interventions that improve results, both in education and health [2]. Furthermore, they constitute a fundamental demographic group when involving them in the design, development and testing of this type of technological applications.

The use of AI by adolescents, therefore, presents challenges that must be considered. In addition to the benefits it generates, it is important to know and detect the risks or problems that may arise from its use in young people. This entails identifying strategies that allow the adolescent to control and manage these situations of risk, thus, their use can be beneficial [6]. For example, some apps that teenagers usually use utilize algorithms with AI; therefore, these users receive information of the same opinion or similar to what they like. This makes them think that they are informed. It is necessary to empower them in order to have a critical view of these apps and the information they share. Users should have critical thinking that can help them validate the veracity of the information they access.

The future of AI, its continued development and application, offers great opportunities, both for its developers and for users, in this case, teenagers and adolescents. The fields of education, entertainment, and health promotion are those that are most directly related to this age group. Training becomes a priority issue for society. More studies need to be conducted on the use and impact of AI and GenAI in children and adolescents. As well as involving them more actively in the co-design of the research, so that the solutions found are acceptable and useful for this population [8].

Conclusion

AI and GenAI will continue to advance and move forward in society. These technologies can have a positive or negative impact, depending on its uses and applications. It is necessary to design solutions based in these technologies responsibly, in a way that safeguards the privacy of information, as well as other related ethical aspects. Another important aspect would be to guarantee equity in access to these technologies by adolescents (regardless of, for example, social situation, ethnicity, and functional diversity or other possible variables or biases). There is a need for the responsible design a utilization of AI-based technologies.

The adequate education of children and adolescents about the uses and applications of AI, as well as the ethical aspects it encompasses (specifically in terms of health and education), is essential. This kind of education should empower youth to be critical regarding AI content and use. In addition, it can have a direct impact on their present and future health literacy. Children's and adolescents' immediate environment (their parents and educators) are important in guiding them through the challenges of AI. It is also necessary to involve children and adolescents in the participation and decision-making regarding AI and GenAI; as well as acknowledge their opinion and needs.

Future Directions

Given the content and conclusions of this review, there are some future directions that could be relevant and can influence the future of AI use among children and adolescents. Parents and educators: the youth immediate environment (family and teachers) is crucial to guide and teach them how to interact with AI-derived technologies. It is important to incorporate young people in the design and development of AI-based technologies, in order to know what their needs and preferences are; as well as to ensure that the technology is suitable for this audience. It is necessary to assess the ethical implications of AI in the lives of young people and see how they should be trained in its use. Finally, further research is needed to assess the impact of AI-based technologies on young people, so that they can be critical in terms of their design and application, especially with regard to education and health or wellbeing.

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