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AWARENESS AND PREVALENCE OF DEEPPFAKE CYBERBULLYING: A STUDY OF POLISH STUDENTS AGED 12–15

ABSTRACT

Introduction: One in five teenagers has experienced cyberbullying. However, their families were often not aware of the problem, with 75% of parents believing that their children had not experienced it. Many studies have been devoted to cyberbullying and its devastating psychological consequences, yet few researchers have investigated the potential role of AI in school cyberbullying. This pilot study, part of a larger doctoral dissertation project, aimed to: (1) determine the level of awareness of deepfake cyberbullying among students and teachers; (2) estimate the prevalence of the phenomenon in 12–15-year-olds; and (3) assess their opinions about its consequences and potential countermeasures. **Method:** The study was conducted in two stages among primary school students in the Trzebnica and Milicz communes. In the first stage, 192 students in grades 7–8 (aged 12–15) were surveyed about their experiences with cyberbullying. In the second stage, an online survey was administered to 36 teachers. **Results:** A significant number of students (38.5%) and teachers (44.4%) reported firsthand encounters with AI-generated bullying, indicating that a substantial portion of the surveyed population has been exposed to harmful content created with AI. The surveyed students reported that AI was used to alter existing photos (30.2%), generate new images (15.6%), create short videos or other types of animations (17.7%), and generate audio recordings simulating the victim's voice (15.1%). Moreover, only one-third of students were confident in their ability to recognize such content. **Conclusions:** These results confirm that AI is already being used for cyberbullying and poses a growing challenge. It provides perpetrators with new audiovisual tools that leverage the same digital media formats popular among students.

Keywords: cyberbullying, cyberviolence, artificial intelligence, AI, teenagers.

ŚWIADOMOŚĆ I ROZPOWSZECHNIENIE CYBERPRZEMOCY TYPU DEEPPFAKE: BADANIE WŚRÓD POLSKICH UCZNIÓW W WIEKU 12–15 LAT

STRESZCZENIE

Wstęp: Co piąty nastolatek doświadczył cyberprzemocy. Jednocześnie ich rodziny często nie były świadome problemu, a 75% rodziców twierdziło, że ich dzieci nie doświadczyły cyberprzemocy. Cyberprzemocy i jej niszczyielskim konsekwencjom dla psychiki

poświęcono wiele badań, jednak niewielu badaczy dostrzega potencjalną rolę sztucznej inteligencji (AI) w cyberprzemocy szkolnej. To badanie pilotażowe, będące częścią szerszego projektu doktorskiego, miało na celu: (1) określenie poziomu świadomości uczniów i nauczycieli na temat cyberprzemocy z użyciem deepfake'ów; (2) oszacowanie występowania zjawiska wśród osób w wieku 12–15 lat; oraz (3) ocenę ich opinii na temat skutków i potencjalnych środków zaradczych. **Metoda:** Badanie przeprowadzono w dwóch etapach wśród uczniów szkół podstawowych w gminach Trzebnica i Milicz. W pierwszym etapie 192 uczniów klas 7–8 (w wieku 12–15 lat) zostało przebadanych pod kątem ich doświadczeń z cyberprzemocą. W drugim etapie przeprowadzono ankietę online wśród 36 nauczycieli. **Wyniki:** Znaczna liczba uczniów (38,5%) i nauczycieli (44,4%) zgłosiła bezpośrednie doświadczenie z cyberprzemocą generowaną przez AI, co wskazuje, że znaczna część badanej populacji spotkała się z przypadkami, w których AI była używana do tworzenia szkodliwych treści. Ankietowani uczniowie zadeklarowali, że AI była używana do przerabiania istniejących zdjęć (30,2%), generowania nowych obrazów (15,6%), tworzenia krótkich filmów lub innych rodzajów animacji (17,7%) oraz generowania nagrań audio symulujących głos ofiary (15,1%). Co więcej, tylko jedna trzecia uczniów była pewna, że będzie w stanie rozpoznać takie materiały. **Wnioski:** Wyniki te potwierdzają, że AI jest już wykorzystywana do cyberprzemocy i stanowi coraz większe wyzwanie. Daje sprawcom nowe możliwości audiowizualne, odpowiadające preferencjom komunikacyjnym popularnym wśród uczniów.

Słowa kluczowe: cyberprzemoc, przemoc w Internecie, sztuczna inteligencja, AI, młodzież, nastolatki.

Introduction

Cyberbullying, especially in the school environment, has been a significant concern in the last decade. According to the NASK Teens 3.0 (2021) report, one in five teenagers experienced cyberbullying, and another 20.4% were unsure, perhaps because they did not fully understand what cyberbullying was. Meanwhile, families were often not aware of the problem – 75% of parents stated that their children had not experienced violence on the Internet, while another 15% were not sure.

Schools are becoming increasingly aware of cyberbullying. In response, researchers and practitioners propose intervention procedures for teachers or school counselors to follow when cyberbullying is identified at school. These procedures include actions to secure evidence, implement disciplinary measures against perpetrators, and establish methods of supporting victims (Borkowska, 2009).

However, both the NASK report and most studies of the problem tend to focus on traditional forms of cyberbullying, such as verbal violence, the dissemination of embarrassing materials, and impersonation, without directly addressing the completely new forms brought about by the development of artificial intelligence (AI).

For the purposes of this study, artificial intelligence (AI) is defined as software capable of learning without the need for explicit programming. It is based on vast data sets which it is able to use to synthesize new content, including texts, images, short animations, films, and soundtracks.

Many articles have been devoted to the opportunities offered by AI, including in education, but at the same time, few researchers and theoreticians have addressed the potential role of AI in school cyberbullying. This represents a growing problem that

will become more significant in the coming years because it leads to the automation of harmful behaviors, and thus their greater scalability and potential for harm. It also opens up new avenues for harassment. These include:

- AI-generated content: this includes not only hate speech but also the generation of images using the victim's photos, short videos (often called reels) using their likeness, animations using an avatar resembling them, and manipulated sound recordings.
- Spreading hate content through AI, e.g., using bots to send spam with offensive messages or to automatically share hate speech content on social media.
- Targeting content using AI against specific people or groups of people, e.g., identifying individuals who represent minorities and directing offensive content to them.

Both students and adults have access to numerous programs that use artificial intelligence to generate images that closely resemble photos, manipulate photos, create animations or films using an individual's photos, as well as create audio materials simulating that person's voice. For example, OpenAI's Voice Engine is able to generate a convincing replica of a person's voice based on a 15-second sample of their voice. This gives perpetrators of cyberbullying completely new opportunities to harass the victim by generating content that misuses their image based on photos or recordings available on the Internet or taken without their knowledge.

The creators of some applications, such as Leonard.ai, are aware of this threat and have introduced filters that block the generation of nude photos. However, it is still possible to generate other compromising images in such applications or replace a face from a photo with another image.

An example of artificial intelligence capabilities in this area is shown in Fig. 1, which is a combination of the original portrait of one of the study's authors and the version generated by artificial intelligence.

Figure 1

Sample content generated using artificial intelligence in the Leonardo.ai application. On the left, the original photo provided by the authors. Author: Wiktorja Masłowska



Generation Z and Generation Alpha, who comprise the current student population in primary and secondary schools, prefer visual communication, especially audiovisual materials. Audiovisual materials are typically processed more emotionally and are more memorable than audio or text alone (Kreifelts et al., 2007); consequently, cyberbullying using such content may have a stronger negative impact (Slonje & Smith, 2008), comparable to traditional bullying (Smith et al., 2008). It may lead to significant psychological consequences that have been described for many years in the context of online verbal violence. These consequences of cyberbullying at school include anxiety, fear, sadness, anger, and shame (Esquivel, 2023). It can lead to depression, low self-esteem, and mental health problems, as well as difficulties with concentration and academic performance, as it distracts students and negatively affects their learning and grades (Beghin, 2020; Roth, 2015). Victims may experience loneliness, social isolation, and stress-related disorders, and may even contemplate suicide (Thomas, 2006). The emotional scars of cyberbullying can persist into adulthood, affecting victims' health, emotional well-being, and school performance (Livingstone, 2016).

Sharing intimate images without consent can have even more severe consequences. Research has shown that it causes psychological harm comparable to direct sexual abuse (Naezer & van Oosterhout, 2021). The effects of such abuse extend beyond the victim. Witnesses may feel helpless or even complicit, and impunity for perpetrators may also normalize such behavior. Witnessing such abuse can increase stress, anxiety, and empathy-related distress (Doumas & Midgett, 2020). AI-generated materials can also be used for crimes such as extortion, including sextortion, as well as fraud (Raza et al., 2022).

Both in Poland and in the EU, there is a lack of legal solutions explicitly dedicated to deepfake cyberbullying. It is only possible to use existing criminal and statutory provisions to prosecute perpetrators and provide assistance to victims. This is evident in Poland, where prosecution relies on articles in the Polish Penal Code, such as Article 202 regarding pornography, Article 81.1, which protects an individual's likeness, or Article 190a § 2, which protects against persistent impersonation. However, prosecuting cyberbullying that uses generative artificial intelligence (AI) based on these provisions is often complicated.

Systemic solutions are being implemented in Europe to protect against deepfake cyberbullying. For example, in Great Britain, an act on online safety has been enacted—the Online Safety Act. A Cyberbullying Research Center was also established there. EU countries are guided by the European Strategy for Child Safety on the Internet, which aims to protect children from online threats, including cyberbullying. It includes a range of activities, such as: funding research on the causes, effects, and prevention of cyberbullying; promoting cooperation between researchers from different countries; making research results public; creating information materials; developing training programs for teachers; and deploying online tools to identify and report cyberbullying. However, all these solutions concern cyberbullying in general; the phenomenon of visually-based abuse using materials generated by artificial intelligence is so new that there are no specific solutions yet.

Preventive measures also include applications based on artificial intelligence and learning algorithms aimed at removing harmful content from the Internet (Azeez et al., 2021). In Poland, an AI tool called Samurai is being tested. Cur-

rently, researchers analyzing the issue of AI in cyberbullying focus mainly on this detection aspect, using classic machine learning methods and AI-based systems to distinguish offensive text from ordinary vulgarity (Bansal et al., 2022). However, most of these solutions still concentrate on verbal contexts, neglecting the graphics, animations, and sound recordings that are the primary communication modes for Generation Z and Generation Alpha (Quesada, 2023). While AI that can recognize cyberbullying in images is being developed by the IT industry (Vishwamitra et al., 2021), it is not yet fully efficient.

Researchers analyzing the issue of AI in cyberbullying focus primarily on detection in social media. They use classic machine learning methods and AI-based systems to distinguish targeted, offensive content from general profanity (Bansal et al., 2022). However, most of these solutions still concentrate on verbal contexts, neglecting the graphics, animations, and sound recordings which are the primary communication modes for Generation Z and Generation Alpha (Quesada, 2023). While the IT industry is developing AI for recognizing cyberbullying in images (Vishwamitra et al., 2021), this technology is not yet fully effective.

Study Rationale and Aims

This study aimed to assess the extent of deepfake cyberbullying among students from seven primary schools in the Trzebnica and Milicz communes. These municipalities, with populations of 13,000 and 24,000 respectively, are located in Poland. Trzebnica, a small city in the Wrocław agglomeration, is 30 km from the capital of Lower Silesia. Milicz, just outside the agglomeration, is 62 km from Wrocław.

Cyberbullying is usually defined as any form of bullying or harassment using electronic means. It is increasingly common among teenagers and adolescents because the extensive use of social media gives them more opportunities for such behavior. Harmful bullying can include posting rumors, threats, sexual remarks, a victim's personal information, or hate speech (Smith et al., 2008). Pospiszyl (2012) proposed the term "electronic aggression," which is not a synonym but adequately describes the phenomenon of cumulative, unrelated attacks. However, it has not been widely adopted in the literature, which prefers terms such as "deepfake cyberbullying," "AI-powered cyberbullying," "generative AI cyberbullying," "cyberbullying using AI," or simply "AI cyberbullying." In this paper, we will use these synonymous terms interchangeably. However, for the study results themselves, we will consistently use the term chosen for our survey.

Based on the literature (Umbach et al., 2024), we define deepfake cyberbullying as aggression via electronic media using materials created or processed with the help of artificial intelligence. Generative AI provides perpetrators with new methods for cyberbullying, such as creating faked or manipulated images, moving animations, and audio from content posted online, and allows for their automated dissemination. During the design of our research instrument, we decided to use the more descriptive term "cyberbullying using artificial intelligence" in the survey. This decision was based on a preliminary study we conducted on a group of 147 12- and 13-year-olds, which showed that only half of them were able to provide a correct definition of "deepfake," while nearly 80% correctly defined "artifi-

cial intelligence” and its acronym. “Cyberbullying,” in turn, is a term familiar to over 90% of the students surveyed.

Despite the increasing prevalence of deepfake technology, its malicious application in the form of cyberbullying remains largely unexplored. As a pilot study for a larger doctoral dissertation, this research sought to address this gap with the following objectives.

- To determine the level of awareness of AI-driven cyberbullying among students and teachers.
- To estimate the prevalence of the phenomenon in 12–15 year olds.
- To assess their opinions about its consequences and potential countermeasures.

Method

The study was divided into two stages. In Stage I, a diagnostic survey was administered to students in primary schools. In Stage II, teachers from those same schools were invited to complete a similar survey online.

Participants

With the consent of school principals, 192 students in grades 7–8 (age 12–15) from the Trzebnica and Milicz communes were surveyed in March and October 2024. Participation in the study was voluntary and anonymous. Of the participants, 113 students attended 5 schools in non-urban areas, and 79 attended 3 schools in the cities of Milicz and Trzebnica. After completing the survey, the students participated in violence and cyberbullying prevention workshops.

In Stage II, an online survey of teachers was conducted, in which 36 individuals took part. Teachers were asked to report whether they had encountered specific AI-driven cyberbullying issues among their students, including deepfakes, manipulated videos, the creation of false recordings, and the use of bots to disseminate false information. Although this group is too small for its results to be generalized, it provided preliminary evidence that educators are also aware of the problem of artificial intelligence being used for cyberbullying.

Materials and measures

In Stage I, students completed a diagnostic survey titled “Cyberbullying Using Artificial Intelligence.” The survey was designed to investigate the following:

- Students’ understanding of artificial intelligence.
- The perceived frequency of AI-based cyberbullying.
- The specific forms of AI-based cyberbullying students had encountered.
- The emotional impact of AI-based cyberbullying on victims.
- Students’ perceptions of the seriousness of AI-based cyberbullying

Selected questions from this survey were later adapted into a new questionnaire using a Likert scale instead of yes/no responses; this instrument is publicly available. (<http://wroclawski.eu/hejt/hejt-ai.pdf>)

The survey’s somewhat complex structure was a deliberate design choice, driven by its primary goal of providing practical utility for schools. It was intended to allow

teachers to estimate the prevalence, forms, and severity of violence and cyberbullying at school, taking into account the new phenomenon of AI-based aggression, in order to better adapt prevention strategies to their students' needs. Furthermore, questions about the emotional effects and sources of help also had an educational purpose: not only shedding light on the problem but also encouraging students to reflect.

In Stage II, an online survey of teachers was conducted. Teachers were asked to report whether they had encountered specific AI-driven cyberbullying issues, including deepfakes, manipulated videos, the creation of false recordings, and the use of bots to spread misinformation. While the sample size was too small for generalization, the results suggested a growing awareness among educators regarding the potential dangers posed by these AI-driven threats.

Procedure

Prior to conducting the research, written consent was obtained from the principals of the participating schools and the parents of all student participants. Both students and their parents were informed about the research objectives, its voluntary nature, and the assurance that all responses would be anonymous.

For Stage I, data collection from students was carried out in March and October 2024. Students completed the anonymous questionnaires immediately before participating in workshops on violence and cyberbullying prevention.

In Stage II of the study, an online survey was distributed to all primary school teachers in the Trzebnica and Milicz communes. Teachers had a two-week period to complete the online survey from the time they received the link. All data collected from the surveys were anonymized for analysis.

Data Analysis

After the questionnaires were collected, the data were entered into a database and analyzed using the PS Imago Pro statistical software package.

Results

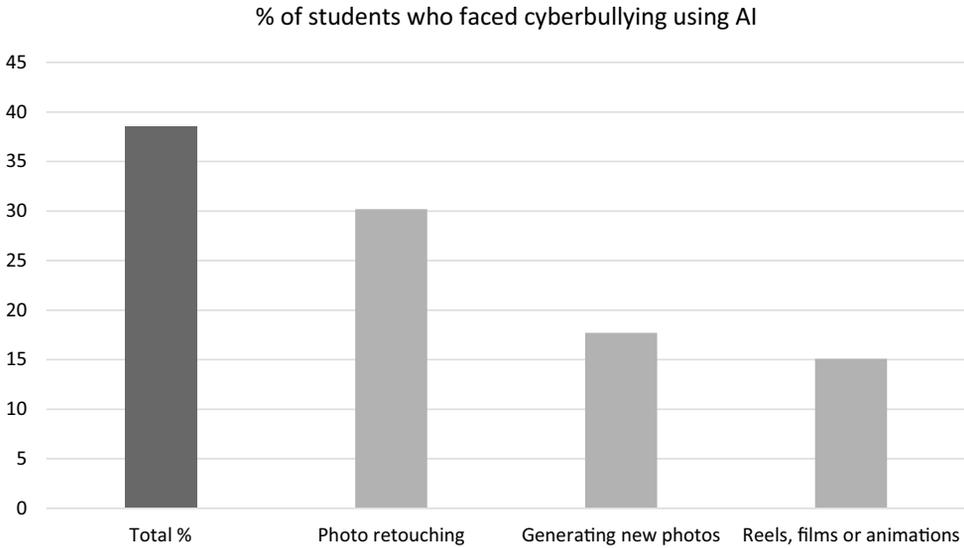
A vast majority of students (94.8%) reported being familiar with the term "artificial intelligence." Furthermore, 38.5% of students had encountered a situation where AI was used to generate materials intended to mock or ridicule someone, or had been a victim of such actions themselves. There were no statistically significant differences in the frequency of experiencing or witnessing AI-based cyberbullying between urban and rural areas.

The surveyed students reported that artificial intelligence was used to ridicule a victim by altering or manipulating existing photos (30.2%), generating new images (15.6%), creating short videos or other types of animations (17.7%), and generating an audio recording simulating the victim's voice (15.1%).

Only 37.5% of students reported that they would be able to recognize if materials used to target a peer were generated by artificial intelligence. A statistically significant relationship was found between students' perception of the issue's seriousness and their tendency to dismiss it as a joke ($\chi^2 = 16.69$; $p < .05$). Specifically, respondents

Figure 2

Percentage of students who encountered cyberbullying using materials generated by artificial intelligence (N = 192)



who considered AI-driven cyberbullying to be a serious problem were significantly less likely to view it as a joke that should be ignored (see Table 1). However, there was no significant difference in the ability to recognize AI content between those who had personally experienced/witnessed such acts and those who had not.

Table 1

Cross-tabulation of student perceptions on the seriousness of AI in cyberbullying versus dismissing it as a joke (N = 180)

	The use of AI for cyberbullying is a serious problem				
	No		Yes		
	N	%	N	%	
This is just a joke, we should not worry about it	No	23	69.7%	138	93.9%
	Yes	10	30.3%	9	6.1%
Total		33	100.0%	147	100.0%

Based on these findings, a large majority of respondents (147 of 180, or 81.7%) believed that the use of artificial intelligence in the context of cyberbullying is a serious problem. They indicated consequences affecting the victim such as mental suffering (36.5%), a loss of their sense of security (30.7%), and problems in relationships (32.3%). Only a small fraction of students (10.6%) said that such activities should not be worried about because they are “just a joke.”

The second stage of the study, conducted on a group of 36 teachers, showed that 16 of them (44.4%) had encountered a case of AI being used to harass students,

Figure 3

Psychological consequences of cyberbullying using AI in the opinion of the surveyed students (N = 192)

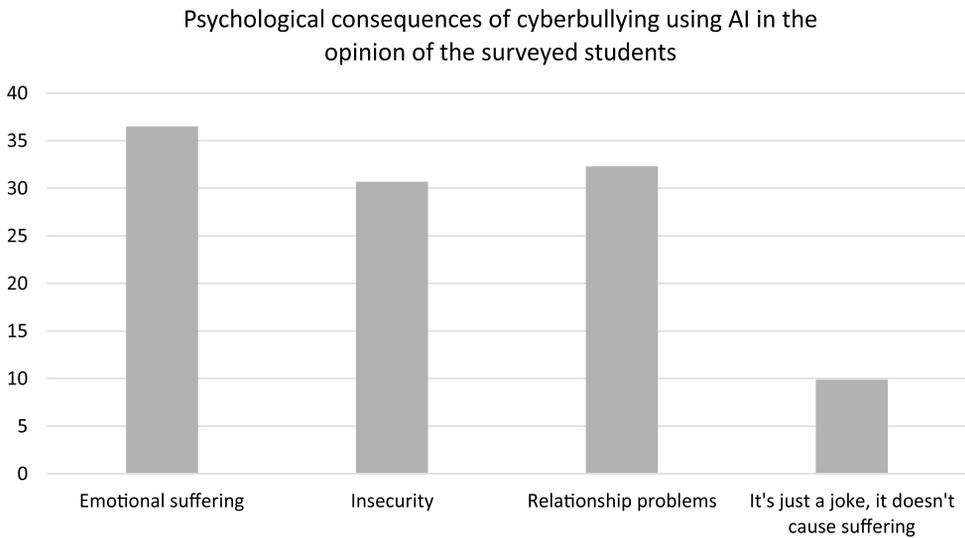
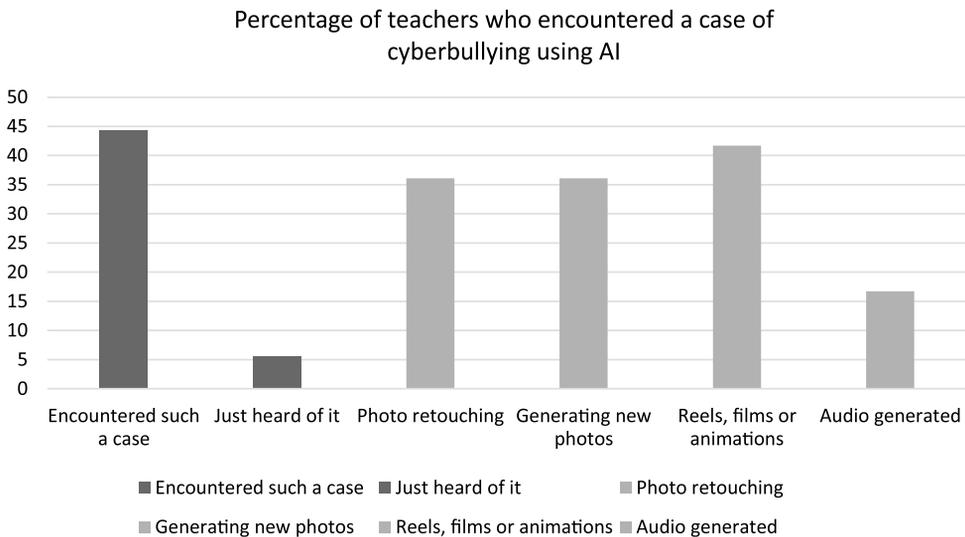


Figure 4

Percentage of teachers who had encountered AI-generated cyberbullying among their students (N = 36)



while another 2 people (5.5%) had not personally encountered such a case but had heard about it.

Regarding specific forms, 13 teachers (36.1%) had encountered images generated to ridicule a student, 15 (41.7%) had seen a generated short video, and 6 (16.7%) were

aware of a case involving a fake audio recording. For comparison, all teachers reported that they had students who were victims of traditional verbal cyberbullying.

Discussion

The sample of both students and teachers is not only small but also unrepresentative of the broader Polish student population. Although access to smartphones is common, with at least 91.5% of students in this age group using them (National Media Institute, 2022), regional differences may exist. The present study could not capture these differences, as it did not include students from large metropolitan centers or from remote villages far from any city. Instead, the sample was drawn from small towns and their surrounding villages that are situated within or near the Wrocław metropolitan area. Interestingly, foreign studies have indicated that cyberbullying is reported more often in smaller towns, though it is not clear whether this reflects a higher prevalence or greater trust in teachers within smaller communities. Our study did not show any significant differences between students from village schools and those from small-town schools. The reason may be that these two groups were quite similar in terms of wealth, transportation, and access to culture and education, factors that typically differentiate rural and urban youth. The participating villages are effectively suburban or satellite communities of Milicz and Trzebnica, which are themselves part of or adjacent to the Wrocław agglomeration.

The results of the only large-scale study on this topic to date (Umbach et al., 2024) showed relatively low levels of deepfake cyberbullying. However, that study focused on a single form of abuse – the use of deepfake technology to create pornographic imagery – and was performed on 16,000 adults. It reported a victimization rate of 2.2% and a perpetration rate of 1.8% across 10 countries.

Furthermore, existing research on traditional (non-AI-assisted) cyberbullying shows that it tends to occur less frequently in adulthood (Wang et al., 2019) and that its intensity varies significantly across countries (Bottino et al., 2015).

This study is only a pilot investigation of a phenomenon that has been poorly researched so far and which poses a new challenge for prevention efforts. The results cannot be extrapolated to the entire population of students in the final grades of primary school because, as mentioned, the sample is unrepresentative and relatively small. However, these findings provide a valuable signal about a problem that many children may expect adults to solve.

The study's next phase, which is already underway, will expand its scope to include approximately 4,000 students from 15 schools. This will create a more representative sample by surveying students from small rural communes, large city agglomerations, and urban schools. The research will also be expanded to include secondary school students and will cover schools in Wrocław, smaller cities in its agglomeration, and a variety of rural schools, including those in Milicz and Trzebnica.

Conclusions

Artificial intelligence represents a growing challenge in the context of cyberbullying in the coming years (Opalska-Kasprzak, 2021). This phenomenon should be analyzed within the broader context of interconnected online and offline aggression, as previous studies have shown that different forms of violence often occur together. Research

indicates a significant overlap, with up to 50.3% of adolescents experiencing cyber, relational, physical, and verbal bullying concurrently (Waasdorp & Bradshaw, 2015).

Nevertheless, AI gives perpetrators completely new opportunities for harassment that go beyond text-based abuse, leveraging the visual and audiovisual media formats preferred by Generation Z and Generation Alpha.

The use of AI may strengthen existing forms of cyberbullying and create new threats that are more difficult to detect and combat. The lack of effective methods to address this type of abuse may lead to impunity for perpetrators, thus encouraging others to use violence. Conversely, the implementation of effective disciplinary mechanisms will send a clear signal to potential perpetrators.

The first step in the prevention of deepfake cyberbullying is to raise awareness of this phenomenon. Children, parents, and teachers should be educated about the potential dangers of AI and available options for protection. Without this foundational knowledge, adults may be prone to downplaying an extremely psychologically destructive phenomenon, leading to negative consequences for victims.

In addition to information campaigns, educational workshops should be organized for various social groups that have direct contact with students, especially teachers. Students should also be equipped with the skills to protect their privacy online. They should be taught to recognize and respond to cyberbullying and how to report abuse. It is also important that students learn the principles of digital ethics and are taught to use technology in a way that respects others. At the same time, care must be taken to ensure that workshops on AI-driven cyberbullying do not become an inspiration or instruction manual for potential perpetrators.

The lack of appropriate knowledge on their part can lead to many negative consequences, and above all to downplaying an extremely psychologically destructive phenomenon.

Schools should also develop new standards for handling incidents involving malicious AI-generated content. These standards should be an integral part of every school's code of conduct or student charter.

Additional information

- Study Preregistration

This study was not preregistered. The manuscript has not been submitted for publication to any other journal.

- Data Availability

Raw anonymized data are available from the corresponding author upon reasonable request

- Funding information

The study was carried out during violence and cyberbullying prevention workshops financed by the Trzebnica commune. The research component of the study received no specific funding

- Conflicts of Interest

The authors declare no conflicts of interest

- Research Ethics Statement

The study was conducted after obtaining approval from the university's Institutional Review Board (IRB) / Bioethics Committee (Approval No. 1/2024). To miti-

gate the risk of the survey inspiring harmful behavior, all student participants took part in a workshop on the effects of cyberbullying and positive response strategies immediately after completing the questionnaire.

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