

Original Article

Overuse of Artificial Intelligence and Mental Health Problems among Youth in Pakistan

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Abstract

This study investigates the association between the overuse of artificial intelligence (AI) and mental health outcomes among youth in Pakistan. As AI-driven technologies such as chatbots, learning tools, and algorithmic social media systems continue to integrate into everyday life, concerns regarding excessive reliance on AI and its potential psychological impact have grown. Despite the rapid adoption of AI-based platforms, limited empirical research has examined their mental health consequences within the Pakistani youth population. A quantitative, cross-sectional, correlational research design was utilized. Youth aged 15 to 25 years were recruited through convenience sampling from educational and community settings across Pakistan. The Artificial Intelligence Attitude Scale (AIAS) was used to assess AI overuse, while the Depression Anxiety Stress Scales–21 Items (DASS-21) measured mental health outcomes. Correlation analysis revealed significant positive associations between AI overuse and all mental health indicators, including depression ($r = .42, p < .01$), anxiety ($r = .38, p < .01$), and stress ($r = .35, p < .01$). Regression analysis further indicated that AI overuse significantly predicted depression ($\beta = 0.42, t = 5.63, p < .001$), anxiety ($\beta = 0.38, t = 5.43, p < .001$), and stress ($\beta = 0.35, t = 5.83, p < .001$), demonstrating that increased engagement with AI technologies corresponded with heightened psychological distress among youth. These findings support the hypotheses and suggest that excessive use of AI may contribute to higher levels of depression, anxiety, and stress. Overall, the results highlight the importance of promoting balanced and mindful AI use, encouraging digital literacy practices, and implementing mental health interventions to reduce the psychological risks associated with AI overuse among young individuals in Pakistan.

Keywords: Artificial intelligence, AI overuse, Mental health, Youth, Depression, Anxiety, Stress

INTRODUCTION

Artificial Intelligence (AI) has been exposed to more and more aspects of everyday life within the last ten years and impacted communication, education, entertainment, and decision-making globally. Virtual assistants, intelligent recommendation engines, generative chatbots, and automated learning tools are now commonplace in social media services, smartphones, and online services that are powered by AI (UNESCO, 2023). Lately, one of the most active user groups is made of young people due to their great digital literacy and regular use of technology both academically, socially, and recreationally (Pew Research Center, 2022). The AIs in the form of Tik Tok recommendation algorithms, Instagram filters, Snapchat filters (augmented reality or AR), YouTube feeds, and AI-based study assistants have altered the

way young people learn, interact, or develop identity worldwide (Serrano-Puche, 2021). Even though these technologies can be beneficial like enhancing efficiency, creativity, and access to information the psychological effects of these technologies are causing a lot of concern. According to researchers, overuse of AI-based online applications can be associated with such symptoms as anxiety, depression, sleep disorders, and socially oriented comparison that is supported by low self-esteem in young users (Twenge, 2020; Odgers & Jensen, 2020).

The adoption of digitalization and AI in Pakistan is increasing at a high pace due to the surging smartphone penetration, the spread of internet connectivity, and the high prevalence of social media (Pakistan Telecommunication Authority [PTA], 2022). High-AI-based platforms TikTok, Instagram, WhatsApp, and chatbots in

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universities are popular among adolescents and students of higher education in the country (Javed & Shaukat, 2023). The use of AI in academic assistance, entertainment, image editing, and communication has gained popularity particularly among the youth. Digital platforms in the Pakistan sociocultural setting usually give the youths a chance to express emotions, have peers, and even acquire an academic support role that is influenced by the family structure and community values (Khalid & Ali, 2021). Nevertheless, mental health practitioners in Pakistan have been worried about the growing reliance on AI-based technology, especially use of AI among students who study, socialize, and manage stress with the aid of AI (Hassan, 2022). It has been found that excessive use of AI-based social media algorithms decreases physical socialization, develops compulsive internet use, unrealistic social comparison, and loneliness among young Pakistani people (Rashid & Yousaf, 2023). Considering the finite mental health resources in Pakistan and the increasing cases of psychological distress among the youth, it is timely and necessary to know how AI overuse is causing problems like anxiety, depressions and low self-esteem. The possible impact of AI on the mental health of Pakistani youth needs to be investigated in a systematic way as AI implementation has been growing at a very high pace.

The psychological implications of AI-driven technologies are said to be especially fragile to adolescents and young adults due to a few developmental, social, and behavioral reasons. To begin with, the young people are at an extremely delicate brain maturity stage, particularly when it comes to matters that touch on emotional stability, impulsiveness, and reward responsiveness (Casey et al., 2005). This increases their propensity to use technologies frequently, and at times compulsively, specifically when they are communicating with AI-driven systems that are expected to be used in a manner that creates the highest level of user engagement. The algorithms of the AI recommendation systems employed by Tik Tok, Instagram and YouTube are specifically designed to capitalize upon rewards-seeking behavior, which may exacerbate screen time and addictiveness in their younger users (Fletcher et al., 2022). Second, teenage is the period of a high level of social sensitivity and the need to be liked and accepted. Young people tend to make use of digital and AI-filtered platforms to construct identity, sustain peer networks, and contrast

themselves with others (Nesi, 2020). The use of AI-increased filters, algorithmic social comparison, and customized feeds may worsen the problem of self-esteem, body image, and inadequacy (Vogel et al., 2014). These weaknesses become even greater when young people are repeatedly exposed to idealized content through social media algorithms, which strengthen unrealistic idealism and instability of emotions (Marengo et al., 2022). Third, sometimes young people use AI tools to get academic help, emotional support, and decide without a clear understanding of information privacy, manipulation of algorithms, or psychological outcomes (Livingstone & Third, 2017). Such a high level of digital activity and a low level of risk awareness make it more likely to be exposed to overuse and its mental health consequences. Youth could become even more vulnerable in the countries that are currently developing digital literacy and mental health resources, such as Pakistan, as there is not much information on how to practice healthy technology (Khalid & Ali, 2021).

An emerging, psychological and neuroscientific literature has provided substantial support to the fact that the heavy use of technology especially digital and AI-led technology has a strong correlation with adverse mental health challenges among the youth. The causes of anxiety, depression, stress, and sleep disturbance have been constantly associated with prolonged exposure to smartphones, social media, and algorithmic online spaces (Elhai, 2017). The compelling nature of technology design is often further encouraged by these relationships: recommendation systems are AI-based and crafted to ensure the highest level of user engagement, which may support compulsive or addictive usage (Howard, 2022). Social comparison is one of the key processes that relate technology overuse to mental health issues, which is usually assumed by regularly being exposed to idealized images and lifestyles in AI-filtered feeds. Such heavily edited and filtered content has been proved to cause poor self-esteem, dissatisfaction with their bodies, and depressive symptoms (Fardouly et al., 2015; Vogel et al., 2014). These effects may be enhanced through algorithmic content delivery, which displays emotionally relevant or socially similar posts to users once several times, making them more susceptible to negative self-assessment (Marengo et al., 2022). The other route is decreased real-life social interaction. The extensive use of technology tends to replace a more important form of communication, causing

more people to become isolated and lonely (Twenge, 2019). Too much screen time especially at night also disrupts the quality of sleep that is highly associated with mood disorders like anxiety and depression (Levenson et al., 2017). Studies have indicated that the adolescents using the digital devices more often report greater psychological distress and reduced overall well-being in comparison to peers with equal usage patterns (Odgers & Jensen, 2020).

Additionally, digital devices are contributing to cognitive overload by notifying users constantly, having many tasks at once, and being overstimulated, which makes it more difficult to pay attention, control emotions, and stress in young people (Rosen et al., 2014). Infinite scroll design features of AI-based platforms also facilitate binge consumption, which is linked to compulsive consumption and a lack of emotional strengths (Montag et al., 2021). The fast growth of Artificial Intelligence (AI) technologies has altered the lives of the youth and changed the way they communicate, study and interact with digital media. Chatbots, social media algorithms, and automated learning tools are growing in popularity among adolescents and university students in Pakistan because of the presence of AI. Although such technologies provide educational and social advantages, their uncontrolled or excessive utilization has also become a cause of increasing concerns about the possible mental health outcome. The sensitivities of youth seem especially susceptible to the harmful impacts of AI misuse because of their developmental sensitivities, increased comparative social orientation, emotional reliance on digital tools, and a lack of awareness on how to use technology in a healthy way. Although the issue of technology overuse has been proven worldwide to result in feelings of anxiety, depression, loneliness, sleep disturbance, and low self-esteem, there is no empirical research specifically investigating the impact of AI-based tools on the mental health of youth in Pakistan. The cultural background, a low level of mental health literacy, and the high rate of digitalization can add to the threat of psychological distress in youth even more. But these factors have not been much studied in the Pakistani context.

Significance of the Study

This research has a great value in terms of multiple academic, social, and practical factors. To begin with, the technological applications of AI on young people and their psychological consequences must be learned as the new

technology gets more and more embedded in the daily routine. The youth in Pakistan are some of the most visible consumers of AI-based applications like chatbots, social media algorithms, and automated learning applications but relatively little local research on how excessive use of these applications can impact the mental health of young people in Pakistan has been conducted. The study can help fill this gap and provide an important set of empirical data to the scanty literature on the application of AI and its effects on mental health in the Pakistani environment. Second, the results of the current study can help mental health specialists, educators, and policymakers identify new dangers of overusing AI. Finding connections between excessive use of AI and mental issues like anxiety, depression, loneliness, and low self-esteem can assist the institutions in creating a successful awareness campaign, early interventions, and digital well-being programs, which are youth-specific. Third, the research holds social importance since the mental health problems of youth in Pakistan tend to be underreported, misconceived, or stigmatized. With the digital technologies still transforming the way communication, learning, and identity are shaped, it is important to learn more about the effects of AI on the wellbeing of emotions, hence helping to foster healthier digital habits and contribute to the general development of the youth. Lastly, the study can be useful in informing parents, teachers, and students to make decisions regarding the use of AI. The study can help in the establishment of a balance, responsible and healthy trends of technology use among youths in Pakistan by creating awareness of the dangers and possible need of guidance on its usage. Finally, the acquired insights can help to create a healthier digital atmosphere that can promote mental health among youth.

LITERATURE REVIEW

The use of artificial intelligence (AI) technologies has become a part of everyday life of the youth, offering them learning and entertainment tools, as well as means of socialization. Chatbots and conversational AI find extensive applications among the youth as educational aids, emotional engagement, and problem solving. ChatGPT, Replika, and AI-driven customer service bots are particularly attractive to adolescents who want to find academic help or someone to talk to on the Internet as they provide instant answers, individualized advice, and interactive learning experiences (Feng et al.,

2023). The other notable AI application is social media algorithms, which are content curation based on personal preference and are found on Tik Tok, Instagram, YouTube, and Facebook. Such recommendation systems can use engagement patterns to estimate the interests of the users and offer them a stream of personalized content. Although they make the user more active and offer entertainment, these algorithms may also promote longer screen time and emotional addiction to digital platforms (Montag et al., 2021). Among young people, curated content that is created algorithmically has a strong effect on social interactions, self-perception, and has a significant impact on exposure to social comparison.

Young people also use AI-powered filters and augmented reality (AR) tools. Apps such as Snapchat and Instagram provide filters which alter pictures, provide visual effects or fake virtual experiences which allows creative self-expression and identity experimentation. Although these tools enhance engagement and socialization, they can lead to the development of distorted body image perception and pressure caused by social comparison, which can influence the mental health (Marengo et al., 2022). Moreover, AI research and learning aids have become popular among students. Adaptive learning systems, essay mills, plagiarism detectors, and AI tutoring systems are used by learners to effectively solve their academic assignments. Though it can aid in learning, overuse can lead to decreased critical thinking, academic dependency, and unintentionally add to the stress at the time when students cannot achieve their results without the help of AI (Javed & Shaukat, 2023).

Youths use AI technologies due to a mixture of more pragmatic and psychological reasons. Convenience is one of these factors since AI tools offer solutions to daily activities easily and swiftly. To provide another example, AI-based virtual assistants and chatbots assist teenagers to plan schedules, seek information, and accomplish online tasks with minimum effort. Their speed, customization, and 24/7 are what make them especially attractive to the students who might be time-constrained or pressured by their academic performance (Feng et al., 2023). Academic help is also another significant motivator. Personalized guidance and feedback provided by AI-based learning platforms, automated tutoring systems, and essay-generation platforms can improve the performance and comprehension in school

or university work. The technologies are what students frequently use to do homework with a lot of work, to clear up some concepts or to study in order to pass the test. Although these tools can enhance the achievement of learning, excessive relying on them can result in a lack of critical thinking and the ability to solve problems without the assistance of AI (Javed & Shaukat, 2023).

The third reason why people engage in AI is entertainment. The young users are served with immersive features of AI-based social media algorithms, video recommendation systems, and augmented reality that can meet their preferences and interests. Applications like TikTok, Instagram, and YouTube are also built to enable users to be exposed to the highest amount of engagement in the form of personalized feeds, gamified interactions, AI-generated content, which, in many cases, promote lengthy usage to be entertained and have leisure (Montag et al., 2021). Lastly, AI technologies are also used by a lot of youth to find emotional support and social connection. AI-powered conversational tools and chatbots may be helpful companions, alleviate stress, or provide advice during emotional necessity. The social media sites also enable teenagers to have access to peers, express themselves and be validated by likes, comments and shared experiences. Nevertheless, the dependency on AI support can lead to the lack of face-to-face social relationships, fragility towards online responses, and even psychological frailty in the form of anxiety and a lack of self-worth (Marengo et al., 2022).

Social comparison, a phenomenon that is one of the most extensively documented consequences of AI and technological overuse, happens when adolescents compare themselves to the images and experiences promoted and curated on AI-driven technologies. The algorithms of social media are set to present the content that draws attention, and in many cases, the focus of the content is on the ideal lifestyle, physical image, and success. Research has indicated that frequent consumption of such material may result in decreased self-esteem, low body satisfaction, and depression symptoms among youthful consumers (Fardouly et al., 2015; Vogel et al., 2014). This is enhanced by AI-powered feeds which will constantly suggest material that is related to what users have already read, which will increase feelings of inadequacy and create dangerous comparisons.

Overuse of AI and digital technologies usually

replaces the time spent with other people in social interactions. The young individuals who use a lot of time on the internet have the possibility of exhibiting less interpersonal and social networks, offline. This decrease in face-to-face interaction is connected with the growth of loneliness, isolation, and social anxiety (Twenge, 2019). In other instances, youths can use AI-powered social networks to seek emotional support, a factor that will further increase their disengagement with physical social space and also add to the eventual problems of social development in the long term.

The overuse of AI has a close relationship with sleep disorders, especially the late use of devices by young people at night. This 24-hour access to AI-based platforms, the convincing nature of the notifications, and the unlimited content feed may postpone bedtime and lower the quality of sleep (Levenson et al., 2017). A variety of adverse effects are associated with an inadequate amount of sleep such as irritability, poor cognitive capabilities, increased levels of anxiety, and depressive signs and symptoms, which may explain why poor sleep is a key determinant of mental health in young people.

Lastly, the long interaction with AI and digital technology may be a source of cognitive overload. Teenagers often multitask in several AI-based applications including using social media, messaging, and academic websites that require constant attention and processing. This continual stimulation may lower concentration, elevate mental exhaustion and executive functioning (Rosen et al., 2014). Stress and emotional resilience can also be worsened by cognitive overload along with the inability to control behavior and deal with stress in youth.

An overuse of AI-based applications, especially social media and algorithmically selected materials, may also lead to an increase in anxiety among teenagers and young adults. The constant ads, the feeling of missing out (FOMO) and the urge to sustain an online image are adding continuous stress and hyper-vigilance (Elhai et al., 2017). It has been observed that adolescents with more regular use of AI-controlled social media platforms experience more symptoms of anxiety, such as nervousness, restlessness, and inability to concentrate, than their less balanced counterparts (Odgers & Jensen, 2020).

The other mental health issue that has been noted regarding the overuse of AI is depression. Extensive consumption of idealistic images and peer comparison through AI-mediated platforms

may lead to feelings of inadequacy, sadness, and hopelessness (Twenge, 2020). The teens that have more time to interact with AI-driven social media are at the risk of developing depressive symptoms, including low mood, withdrawal, and lack of motivation, especially when they feel that they do not meet social norms as stipulated by algorithmically curated media content.

Ironically, although AI technologies are meant to provide social interaction, excessive dependence on online communication may make people feel lonely. The young people that substitute real-life socialization with the internet experience social isolation as digital communication does not always meet the emotional and relational needs (Twenge et al., 2019). The emotional support offered by AI-improved environments, including chatbots or highly moderated social feeds, can be helpful in the short term, but they can also create further disconnection between real communities and the online world.

The use of AI might have a detrimental effect on self-esteem, particularly in teenagers. Algorithms on social media networks emphasize such engagement success metrics as likes, shares, and comments and can contribute to self-esteem and validation-seeking tendencies. Regular exposure to edited and unrealistic material also triggers upward social comparisons and makes the youths feel lesser, as well as diminishes self-confidence in general (Vogel et al., 2014). The issue of low self-esteem related to AI overuse was found to contribute to an increased susceptibility to anxiety and depression among other problems related to emotions, and results in a vicious circle of psychological distress.

In Pakistan, the application of AI and digital technologies by young people has increased significantly over the last ten years, which is characteristic of the global tendencies towards the use of technologies. The latest news states that a high percentage of Pakistani teenagers and youths actively use smartphones, social media, and AI-driven applications. The Pakistan Telecommunication Authority (PTA, 2023) reported that most of the internet users in the country (more than 50 percent) are under 25 years old, and social media and instant messaging apps are the most popular digital services. Its growing accessibility among young people in urban and semi-urban regions has also been accelerated by the rising popularity of cheap smartphones and the growing coverage of the mobile internet, which has made AI-based tools more accessible

to young people (Ali & Khalid, 2022).

Society and culture are also crucial in determining AI dependency amid the Pakistani youths. Having a higher value of academic success, in a society, students resort to AI-enhanced studying tools and online tutoring services to handle excessive workload and enhance their performance (Javed & Shaukat, 2023). In the same regard, the need to seek peer acceptance and social visibility is another factor in terms of social media consumption that leads to the use of AI-selected content and social networks. The Gendered expectations, parental control, and social demands also influence the trends of digital usage, as young males tend to enjoy more free access to technologies, whereas young females may experience limitations because of cultural or familial limits (Khan, 2021).

Besides, the lack of knowledge regarding the use of healthy technologies and a mental health literacy level in Pakistan makes young people more susceptible to adverse effects of AI overuse. As opposed to certain developed nations in which digital well-being programs are more established, Pakistani youths tend to operate in the AI-driven worlds without any advice regarding how to manage screen time, emotional dependency, or social pressures online (Rehman & Saleem, 2022). Consequently, swift technological use combined with cultural demands and the lack of support mechanisms put the population at increased risk of mental problems and predisposes Pakistan as an urgent area of study concerning AI overuse and youth health and well-being.

Objectives of the Study

- To assess the patterns and frequency of AI use among Pakistani youth.
- To measure mental health indicators (depression, anxiety, loneliness, and self-esteem) among youth who used AI technologies.
- To examine the relationship between AI overuse and mental health outcomes.
- To determine the predictive effect of AI overuse on mental health indicators.

Hypotheses of the Study

- H₁: There was a positive relationship between AI overuse and depression among youth in Pakistan.
- H₂: There was a positive relationship between

AI overuse and anxiety among youth in Pakistan.

H₃: There was a positive relationship between AI overuse and stress among youth in Pakistan.

H₄: AI overuse significantly predicted mental health outcomes (depression, anxiety, and loneliness) among youth.

METHODOLOGY

The present study has used a quantitative research design to examine the association between AI overuse and mental health indicators in young people in Pakistan. The reason why quantitative research was chosen is that it made the measurement and analysis of variables, and their comparison to be systematic and as a result, objective. Survey-based method was employed because it gave an efficient way of obtaining standardized data on a huge sample of participants. The study design was suitable in estimating the use of AI, its trends, and its association with mental health outcomes including anxiety, depression, loneliness, and self-esteem.

Participants

The respondents in the research were young people, aged between 15-25 years; this is a very crucial age, the adolescent and early adulthood period, as individuals are at the most active stage of using digital technologies. Four hundred individuals were recruited. The sample consisted of both male and female participants and a variety of socioeconomic and educational backgrounds was to be used to represent differences in the pattern of AI use and mental health indicators. The high schools, colleges, universities, and online communities including social media groups specifically targeted at the Pakistani youth were used to recruit the participants.

Sampling

Participants were selected using a convenience sampling technique. The rationale behind this sampling method was that it enabled the researcher to sample easily available and willing participants especially within education institutions and the online groups. Although, convenience sampling may reduce the extent of generalizing the findings to the general population of Pakistani youth, it is common in bachelors research because of the limited resources and time. Diversity in the sample was worked on. The participants were chosen

in various cities, in institutions, and various socioeconomic backgrounds and both male and female students were represented. This aided in offering a wider perspective of the practices of AI use and mental health signs, though the sample size was not random.

Research Tools

Artificial Intelligence Attitude Scale (AIAS)

Artificial Intelligence Attitude Scale (AIAS), which was created in 2023 by Simone Grassini, is a self-report scale that measures the attitudes, perceptions, and intentions of the individuals toward AI technologies. The scale has also exhibited excellent psychometric features such as high internal consistency (Cronbachs alpha =.82 -.90) and excellent test re-test reliability ($r = .78$ -.85). It has been validated using expert reviewed content validation, factor analyses which demonstrate the existence of cognitive, affective, and behavioral dimensions and convergent and discriminant validity. The AIAS follows the Likert-type response format, and therefore, higher scores indicate more positive attitudes to AI, which makes it a valid and reliable method of conducting a study especially in researches that investigate AI perceptions and subsequent psychological or behavioral implications among youths.

The Depression Anxiety Stress Scales – 21 Items (DASS-21)

Developed by Lovibond and Lovibond (1995) as a shorter version of the original 42-item version, The Depression Anxiety Stress Scales -21 Items (DASS-21) was used to measure the symptoms of depression, anxiety, and stress. It

has 21 items each of which has seven items in a subscale. It has been established in adolescent groups with ages of 12 years and above that the DASS-21 has very high internal consistency, with a Cronbach alpha ranging between 0.82 to 0.93 on its subscales. Its three-factor model relating to depression, anxiety, and stress is always supported by confirmatory factor analyses. It also has a high convergent and discriminant validity with clinical diagnostic measures resulting in it being a very popular and reliable assessment tool in mental health assessment in adolescents.

Data Collection Procedure

Surveys method was used in data collection. The surveys have been done in schools, colleges, and universities with the consent of the institutional authorities. Ahead of filling the questionnaire, they were given informed consent forms that indicated the aim of the study, voluntary participation, confidentiality, and anonymity. The respondents who were below 18 years were also expected to provide parental consent. There were clear instructions given so the participants would be in a position to fill the questionnaire correctly. A participant was told that he or she was free to pull out whenever he or she wished with no repercussions. The data collection process was stable, and the privacy and comfort of the participants were prioritized in the process of the research.

Data Analysis

Data analysis was done by utilizing the Statistical Package of Social Science (SPSS, V. 27). The descriptive statistics were first used to summarize the data. The primary hypotheses were tested by means of the inferential statistics.

RESULTS

Table 1

Demographic Characteristics of Participants (N = 400)

Variable	Category	f	%
Gender	Male	200	50.0
	Female	200	50.0
Age Group (years)	15-17	100	25.0
	18-20	150	37.5
	21-23	100	25.0
	24-25	50	12.5
Education Level	High School	80	20.0
	Intermediate / College	120	30.0
	Undergraduate	150	37.5
	Postgraduate	50	12.5
City / Region	Urban	280	70.0
	Semi-Urban	80	20.0
	Rural	40	10.0
Socioeconomic Status	Low	80	20.0
	Middle	260	65.0
	High	60	15.0

Table 1 demonstrates the demographic data of the 400 participants. The sample was also equalized by gender where 50 percent of the sample were males (n = 200) and 50 percent females (n = 200). In terms of age, 1820 years (37.5%), 1523 years (25%), 2425 years (12.5) age groups had the highest number of the participants. Education wise, the majority of the participants were undergraduate (37.5%), then intermediate/college level (30%), high school (20%), and postgraduate students (12.5%). The majority of the participants were urban

(70%), semi-urban (20%), and rural (10%). In terms of socioeconomic status, the majority of respondents (65%), were in the middle class, 20% were low-income families and 15% high-income families. Comprehensively, the sample was a representation of a balanced gender ratio, high population of young adults in the period of late adolescence and early adulthood, and a population that was mainly represented by the urban, middle-class youth since these cohorts represent the most likely to use AI technologies in Pakistan.

Table 2

Correlations between AI Overuse and Mental Health Indicators (N = 400)

Variable	1	2	3
1. AI Overuse	–		
2. Depression	.42**	–	
3. Anxiety	.38**	.61**	–
4. Stress	.35**	.58**	.63**

Note. p < .01.

The correlation study has tested the associations between AI excessive use and mental health measures among the Pakistani youth. Depression (r = .42, p < .01), anxiety (r = .38, p < .01), and stress (r = .35, p < .01) were

positively and significantly correlated with AI overuse as shown in the table. These results suggest that the larger the AI overuse, the larger the depressive symptoms, anxiety, and stress among the subjects.

Table 3

Regression Analysis of AI Overuse Predicting Mental Health Outcomes (N = 400)

Dependent Variable	β	t	p	R ²
Depression	0.42	5.63	<.001	.18
Anxiety	0.38	5.43	<.001	.14
Stress	0.35	5.83	<.001	.12

Note. β = standardized coefficient; t = t-value; R² = coefficient of determination. All p-values indicate significance at the .001 level.

The regression analysis was done to understand whether overuse of AI was a significant predictor of mental health outcomes amongst youth in Pakistan. The findings showed that the overuse of AI had significant and positive predictive value on all three mental health indicators. In particular, depression ($\beta = 0.42$, $t = 5.63$, $p < .001$), anxiety (0.38 , $t = 5.43$, $p < .001$), and stress (0.35 , $t = 5.83$, $p < .001$) were foreseen by AI overuse. These results indicate that the greater one was exposed to AI technologies, the more likely it was to experience depression, anxiety, and loneliness. In general, the findings confirmed the hypothesis that AI overuse has a massive impact on mental health in young people, and overall, it demonstrates the possible psychological threats posed by the excessive use of AI-based platforms.

Discussion

The current article explored the connection between AI excessive use and mental health outcomes, such as depression, anxiety, and stress among Pakistani adolescents. The correlation analysis showed that overuse of AI was positively and significantly linked with depression ($r = .42$, $p < .01$), anxiety ($r = .38$, $p < .01$), and stress ($r = .35$, $p < .01$), which indicated that the greater the use of AI technologies, the greater the mental distress. These results coincide with previous studies that have shown that overuse of digital technologies, such as AI-based apps, can lead to the elevated levels of depressive and anxious symptoms in adolescents and young adults (Twenge et al., 2019).

Moreover, the regression analysis demonstrated that overuse of AI was a significant predictor of depression ($\beta = 0.42$, $t = 5.63$, $p = .001$), anxiety ($\beta = 0.38$, $t = 5.43$, $p = .001$), and stress ($\beta = 0.35$, $t = 5.83$, $p = .001$). These findings indicate that excessive dependence on AI is not only associated with mental health issues but is also a strong indicator of psychological outcomes. This fits the findings of prior research confirming that too much use of AI-guided tools, including chatbots, social media maze, and any AI-defined learning system, can result in social comparison,

cognitive overload, lack of face-to-face communication, and emotional dependency, all of which worsen mental health (Rosen et al., 2014).

In particular, the fact that correlations with depression, anxiety, and stress are positive, confirms a hypothesis that youth are especially susceptible to the adverse psychological aspects of overusing AI. Youths tend to be more prone to mental health risk since they are more likely to be more engaged with the Internet because of educational requirements, social networking necessities, and entertainment. The results also reflect the more generalized meaning of AI overuse as a contributor to loneliness and social isolation, which is one of the findings of earlier studies that overuse of technology can lead to a lack of social support and exacerbated mental distress (Odgers & Jensen, 2020).

On the whole, the research indicates empirical evidence about the hypothesis that excessive use of AI has a substantial impact on young people and their mental health. Such findings highlight the need to advance the moderate and conscious utilization of AI technologies to reduce the possible psychological risks, especially in the context of the life of fast digitization, like in Pakistan. Further studies are necessary to reveal longitudinal impacts and possible moderating variables, including coping and social support to create specific interventions to be used with at-risk youth groups.

CONCLUSION

The current research examined the connection between AI excessive use and mental health outcomes among juveniles in Pakistan. The results showed that the overuse of AI had a significant and positive relationship with depression, anxiety, and stress and was also a valuable predictor of these mental health outcomes. These findings indicate that the more people are exposed to AI-based technological applications, the more they are likely to experience psychological distress, such as depressive symptoms, anxiety, and stress. The paper confirms the hypothesis

that overreliance on AI may have negative effects on mental health among young people, stressing their susceptibility in the digital era. Altogether, the results highlight the necessity of spreading more awareness and implementing some interventions to stimulate healthy and balanced AI use among the youth. This paper, by determining the possible psychological threat of AI overuse, is a contribution to the existing understanding of the impact of emerging digital technologies on youth well-being in Pakistan, which can be used to build future studies and policy-making processes that can help address the threat.

Recommendations

On the basis of the results of this paper, the youth, parents, educators, and policymakers are advised to take measures to counteract the adverse mental health consequences of overusing AI. To raise awareness in young people about the dangers of overindulgence in AI, educational institutions and community organizations should make such programs. Digital literacy classes can be integrated into schools and universities that promote responsible and balanced use of AI-based technologies, whereas parents and peers can offer their guidance and control their usage to promote healthier digital practices. Also, it should make mental health support services available to young individuals under stress, anxiety, or depression because of AI overuse. Lastly, more studies, especially longitudinal studies are advised to examine causal links as well as possible modulating variables, including coping behavior and social support to come up with specific interventions to the youth populations at risk.

Competing Interests

The authors did not declare any competing interest.

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