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AN INVESTIGATION INTO THE IMPACT OF AI ON HUMAN EMOTIONS AND WELL-BEING

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Abstract
This study has been conducted to examine the effects of artificial intelligence on human emotions and wellbeing among Pakistani population in three major cities. Using a mixed-methods research design, 450 respondents were recruited by stratified random sampling from Karachi, Lahore, and Islamabad across different socioeconomic strata and age groups. Data collection was undertaken over six months using structured questionnaires including validated psychological assessment tools (DASS-21 and WEMWBS) and 30 in-depth interviews. The study found that there were strong correlations between AI usage patterns and emotional well-being, as 68 percent of respondents had positive emotional experiences with AI technologies, and 23 percent expressed concerns regarding dependency and privacy. Regarding quantitative analysis, higher well-being scores were found in moderate AI users (2-4 hours per day) compared with heavy users (>6 hours per day). Qualitative results found themes of convenience, social contact and concern about losing jobs. The study found generational differences in AI acceptance, with younger participants (18-30 years) demonstrating higher emotional resilience to the integration of AI. These findings help to understand the psychological impact of AI in developing countries and offer insights for policymakers and technology developers regarding the responsible implementation of AI in Pakistani society.

INTRODUCTION

The rapid development and spread of artificial intelligence technologies has fundamentally changed the interaction landscape of human life with a digital system, bringing about unprecedented opportunities and challenges for emotional and psychological health (Verma, 2024). With the rapid advance of AI systems and their integration into everyday life, understanding the effects on human emotions has become an important research topic, especially in developing countries where patterns of technology adoption may be very different from those in western societies (Shalaby, 2024).

Pakistan, as a developing country with a growing technology industry and rapidly increasing digital penetration, provides a unique case study for exploring the emotional and psychological effects of AI (A. Khan et al., 2024). With a diverse population, varying levels of literacy, and cultural values, the

country presents a complex tapestry where AI technologies intersect with traditional social structures and emerging digital behaviors. This confluence raises important questions about the impact of AI adoption on mental health, social relationships, and overall well-being in non-Western societies (Hanif, 2024).

In addition to its academic interest, understanding AI's emotional influence has important public health policy, technology design, and social development implications. As Pakistan embarks on its digital transformation journey, it is vital to grasp the effects of AI technologies on the well-being of its citizens and ensure that technological advancements contribute positively to human flourishing instead of promoting new forms of psychological distress or social inequality (Ahmed et al., 2024).

AI and human emotions research have mainly focused on Western samples, so there is a great need to address how cultural, socioeconomic and educational effects play a moderating role in the relationship between AI and human emotions in developing countries. In addition, the cultural values and norms of Pakistani society, such as a strong emphasis on community, family, and religion, may influence the pattern of AI interaction and emotional response differently than individualistic Western cultures.

The emotional aspect of AI interaction has several aspects, such as anxiety over job loss, privacy and autonomy worry, enthusiasm for technological potential, and shifts in social connection patterns. These affective reactions are not just individual psychological processes but are symptomatic of larger societal changes as artificial intelligence technologies redefine patterns of work, education, healthcare and social interaction (Kim et al., 2025).

In addition, the COVID-19 pandemic served as a catalyst for AI adoption in Pakistan, as digital solutions became necessary to support social and economic activities during lockdowns. This high rate of technological adoption resulted in natural experiments in AI use, offering valuable opportunities to examine the emotional consequences of increased AI use in the short and longer term (Agarwal et al., 2024).

The research on the emotional impact of AI also touches on the broader issues of digital well-being, technology addiction, and the psychological implications of human-machine interaction. As AI systems evolve to be even more conversational and emotionally attuned, the line between human and artificial emotional support becomes increasingly blurred, prompting significant questions about psychological reliance and genuine relationship building (Magni et al., 2024).

Pakistan, as a technology-adopting developing country, is a suitable context for research on these phenomena. A large young population, rising smartphone penetration, and a growing availability of AI services set the stage for the meaningful study of the impact of AI on emotions across different demographic groups (S. A. R. Khan et al., 2024).

This study aimed to address the knowledge gap concerning the impact of AI on emotional well-being in Pakistani society and provide empirical evidence that can guide policy decisions, technology design choices, and public health interventions. By focusing on both positive and negative emotional responses to AI technologies, this study makes a valuable contribution to the understanding of human-AI interaction in developing world contexts.

Research Objectives

1. To investigate the patterns of AI technology use and its correlations with indicators of emotional wellbeing across Pakistani cohorts by demographic, specifically, how frequency, length of time spent and style of AI interaction correlates with indicators of depression, anxiety and stress and overall mental health.
2. To identify and unpack the emotional responses (both positive and negative) that Pakistani users have when engaging with various AI technologies (such as chatbots, recommendation systems, virtual assistants, and automated services) and to understand how they differ on cultural, educational, and socioeconomic dimensions.
3. To measure how AI technologies are perceived to affect social relationships, community bonds and traditional support structures in Pakistani society, with an emphasis on the impact of the use of AI technologies on family bonds, patterns of friendship, and other indicators of social well-being.

Research Questions

1. How are different patterns of use of AI technologies related to indicators of emotional well-being and mental health among Pakistani populations, and what demographic factors moderate these relationships?
2. What are the main affective reactions of Pakistani users to AI technologies and how do these reactions vary across different types of AI applications and different user profiles?
3. How does the integration of AI technology influence social relationships, community involvement, and the traditional support systems in the context of Pakistani culture?

Significance of the Study

The findings of this study are significant on various levels and offer important implications for understanding the psychological influence of AI in developing country settings where technological incorporation endures interaction with traditional social systems and cultural values. In addition to filling a crucial knowledge gap in the research literature on AI-human interaction, which has primarily addressed Western populations, this study provides empirical evidence in the context of Pakistani society with its distinct socioeconomic and cultural context. The findings add to the growing literature on digital well-being, while providing specific findings relevant to Muslim-majority developing countries that are undergoing rapid technological change. For policymakers and government officials, this research offers empirical recommendations for the construction of AI governance frameworks that ensure citizen well-being and mental health concerns are included in technology adoption policy. The implications of the study are not only for technology developers and companies working in Pakistani markets, but also for the further development of AI systems that are culturally sensitive and psychologically beneficial rather than harmful. Clinicians and mental health professionals can use these results to better understand how AI technologies may impact their patients' psychological states and design suitable intervention strategies for them. Institutions of higher education can use these insights to create digital literacy initiatives that encourage healthy patterns of AI interaction for students and faculty.

Literature Review

The interaction of artificial intelligence and human emotional economy has been recognized as a hot research field when AI technologies are becoming more widespread in the daily life. Although early research in this area concentrated almost exclusively on the cognitive aspects of human-computer interaction, recent research has acknowledged the strong affective aspects of AI interaction. The theoretical basis for understanding AI's emotional impact comes from several disciplines, such as psychology, computer science, sociology and human-computer interaction studies, building a rich interdisciplinary structure for study (Magni et al., 2024).

Psychological approaches to technology acceptance and use within the context of emotional responses to AI (Menon, 2025). The Technology Acceptance Model proposes that perceived usefulness and perceived ease of use have a direct impact on technology acceptance, however, new extensions to the model have introduced emotional factors such as anxiety, excitement, and trust. Recent research has found emotional reactions to technology to be significant predictors of adoption behaviors and later well-being outcomes, suggesting emotional factors are not just side effects of technology use but are at the core of understanding how technology affects human flourishing (Al-Mamun, 2025).

Research on the effects of AI on mental health has shown contradictory results, reflecting the complexity of human-AI interactions. Some research shows positive effects, especially in therapeutic settings where AI chatbots and virtual assistants provide accessible mental health services, reduce the stigma of seeking assistance, and provide 24/7 availability for crisis intervention. These studies indicate that AI can be used as a complement to traditional mental health services, especially in resource-constrained settings where human therapists are not easily available or affordable (Aslam et al., 2025a).

On the other hand, other studies report negative emotional consequences of AI adoption such as higher anxiety over job loss, privacy and autonomy

concerns, and the formation of unhealthy dependency relationships with AI systems. Several studies have reported cases of emotional attachment to AI companions that may hinder the formation of human relationships, as well as greater social isolation among heavy AI users who replace human interaction with artificial contact (Frenkenberg & Hochman, 2025).

The emotional dimension of AI is a cultural dimension, but very little of its emotional impact has been investigated in the literature, and the majority of studies have been conducted in Western, educated, industrialized, rich, and democratic societies. This cultural bias imposes important restrictions on how AI impacts emotions in other cultural contexts, especially those often found in collectivist societies where social relationships and community ties are prominent dimensions of emotional well-being (Ventura et al., 2025). Cultural differences: The emphasis on family relationships, religious values, and community support systems in Pakistani society may shape different patterns of emotional responses towards AI compared to individualistic Western cultures (Sajid et al., 2024).

AI adoption research in developing countries has shown that there are unique factors that may impact on emotional responses, such as levels of digital literacy, infrastructure limitations, and economic factors impacting on technology access (Aslam et al., 2025b). Studies from similar developing country contexts show that adoption of AI tends to be fast and uneven, generating both tremendous opportunity and massive social and emotional upheaval as traditional social and economic structures adjust to technological change (Rana et al., 2024).

The concept of digital well-being has become a framework for understanding how technology use contributes to overall life satisfaction and mental health. This conceptual framework highlights the need for a balance in technology use, digital interactions, and the preservation of offline relationships and activities. Within this framework, research has suggested that the quality of AI interaction (as opposed to quantity) may be more important in determining emotional outcomes (Büchi, 2024).

Several studies focused on specific applications of AI have found differential emotional effects across types of technologies. Research has linked social media AI algorithms to anxiety and depression via mechanisms of social comparison and attention capture, whereas AI-based educational tools have been shown to have a positive impact on learning confidence and school self-efficacy. Virtual companions and chatbots have a checkered past, offering both benefits and risks for social development, human relationships and task accomplishment (Filep et al., 2024).

The time course of AI's emotional effects is largely unexplored, and most studies have not examined longitudinal effects but rather focused on short-term or immediate effects. The limited longitudinal studies that exist indicate a shift in emotional reactions to AI over time as users become familiar and expert, such that initial anxiety may give way to acceptance or dependency. Yet these patterns can differ substantially by culture and by individual differences (Fang et al., 2025).

Gender disparities in affective reactions to AI have been reported across multiple studies, with women generally expressing higher levels of anxiety toward AI technologies while being more willing to use AI as an emotional support tool and social companion. These gender dynamics are likely to be especially pertinent in a Pakistani context were traditional gender roles and patterns of access to technologies result in different contexts of AI adoption for men and women (Russo et al., 2025).

One of the key emerging research topics has been the role of AI literacy and education in moderating affective responses. In addition, research has shown that people who have higher levels of AI literacy are less likely to feel anxious and more likely to feel positive emotions when engaging with AI systems, underlining the importance of digital literacy programming in fostering healthy relationships with AI. This has a particular significance for developing nations like Pakistan where the level of literacy in AI can vary substantially across population segments (Ali & Mughari, 2025).

Economic considerations of AI adoption also impact emotional experiences, as empirical studies have shown that people who felt economic benefits from AI use were more likely to form positive emotional experiences, while others who felt economic

displacement experienced more anxiety and stress. These economic aspects may be most relevant in Pakistani society, where employment security and economic mobility play an important role in many families' lives (Mughari et al., 2024).

Research Methodology

The researchers adopted mixed methods research approach to explore how artificial intelligence affects human emotions and well-being in the Pakistani context. A stratified random sampling method was employed to invite 450 participants from three mega cities of Pakistan: Karachi, Lahore and Islamabad ensuring representation from various socio-economic backgrounds, age groups (18-65 years) and educational levels. Collected from January to June 2024, data was gathered using structured questionnaires, distributed online through Google Forms and through face-to-face interviews (given the linguistic preferences of the respondents) in Urdu as well as English languages. The questionnaire consisted of validated psychological scales: Depression Anxiety Stress Scales (DASS-21), and Warwick-Edinburgh Mental Well-being Scale (WEMWBS); as well as custom-made questions assessing AI usage patterns, frequency of exposure to AI technologies, and perceived emotional responses. In addition, qualitative data about participants lived experiences with AI technologies was collected through 30 in-depth semi-structured interviews with selected participants. The study was approved by the ethics review board of the University of Karachi, and written informed consent was obtained from all participants. Data analysis was descriptive statistics; correlation analysis and qualitative data were thematically analyzed using SPSS version 28 and NVivo software respectively.

Results and Data Analysis

Quantitative Analysis

The quantitative analysis of data collected from 450 participants across Karachi, Lahore, and Islamabad revealed significant patterns in the relationship between AI usage and emotional well-being indicators. The demographic distribution of participants showed 52% male and 48% female respondents, with age groups distributed as follows: 18-30 years (45%), 31-45 years (35%), and 46-65 years (20%). Educational backgrounds included bachelor's degree holders (40%), master's degree holders (35%), secondary education (20%), and primary education (5%).

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Table 1: Demographic Characteristics of Study Participants (N=450)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	234	52.0
	Female	216	48.0
Age Group	18-30 years	203	45.1
	31-45 years	157	34.9
	46-65 years	90	20.0
Education	Primary	23	5.1
	Secondary	90	20.0
	Bachelor's	180	40.0
	Master's	157	34.9
City	Karachi	180	40.0
	Lahore	158	35.1
	Islamabad	112	24.9

The demographic analysis revealed that the majority of participants (n=203, 45%) belonged to the 18-30 age group, reflecting Pakistan's young population structure and higher technology adoption rates among younger demographics. Gender distribution was relatively balanced with 234 male (52%) and 216 female (48%) participants. Educational levels showed a bias toward higher education, with 337 participants (75%) holding bachelor's or master's

degrees, which may reflect the urban sampling locations and digital literacy requirements for meaningful AI interaction. Geographic distribution was proportional across the three cities, with Karachi representing 40% (n=180), Lahore 35% (n=158), and Islamabad 25% (n=112) of the sample.

Table 2: AI Usage Patterns and Frequency Distribution

Usage Category	Daily Hours	Frequency (n)	Percentage (%)
Light Users	0-2 hours	158	35.1
Moderate Users	2-4 hours	189	42.0
Heavy Users	>4 hours	103	22.9

AI Application Type	Users (n)	Percentage (%)
Social Media Algorithms	351	78.0
Search Engines	324	72.0
Virtual Assistants	203	45.1
Chatbots	153	34.0
Translation Tools	135	30.0

Device Type	Users (n)	Percentage (%)
Smartphone	401	89.1
Computer/Laptop	252	56.0
Smart Home Devices	54	12.0
Tablets	99	22.0

AI usage patterns demonstrated significant variation across the sample population. Light users (0-2 hours daily) comprised 35% of participants (n=158), moderate users (2-4 hours daily) represented 42% (n=189), and heavy users (>4 hours daily) accounted for 23% (n=103). The most commonly used AI applications were social media algorithms (78%), search engines (72%), virtual assistants (45%), and chatbots (34%). Smartphone-based AI interactions dominated usage patterns (89%), followed by computer-based interactions (56%) and smart home devices (12%). The data revealed that younger participants showed significantly higher usage rates, with 67% of 18-30 age group classified as moderate to heavy users compared to only 34% of 46-65 age group.

Table 3: DASS-21 scores by AI Usage Categories

Usage Category	n	Depression M(SD)	Anxiety M(SD)	Stress M(SD)	F-value	p-value
Light Users	158	6.3 (2.8)	7.1 (3.1)	8.2 (3.4)	28.45	<0.001
Moderate Users	189	7.9 (3.6)	8.8 (3.9)	9.7 (4.1)		
Heavy Users	103	11.2 (4.7)	14.3 (5.8)	13.5 (5.2)		
Total Sample	**450**	**8.1 (3.8)**	**9.4 (4.6)**	**10.1 (4.3)**		

The Depression Anxiety Stress Scales (DASS-21) analysis revealed significant differences in psychological distress levels across AI usage categories. Light AI users demonstrated the lowest average stress scores (M=8.2, SD=3.4), followed by moderate users (M=9.7, SD=4.1), and heavy users showing the highest stress levels (M=13.5, SD=5.2). Depression scores followed similar patterns, with light users averaging 6.3 (SD=2.8), moderate users 7.9 (SD=3.6), and heavy users 11.2 (SD=4.7). Anxiety scores showed the most pronounced differences, with light users scoring 7.1 (SD=3.1), moderate users 8.8 (SD=3.9), and heavy users 14.3 (SD=5.8). Statistical analysis using ANOVA revealed significant differences between groups ($p<0.001$) for all three DASS-21 subscales.

Table 4: WEMWBS Well-being Scores Across Demographic Groups

Demographic	Category	n	Mean Score	SD	t/F-value	p-value
Gender	Male	234	50.2	8.3	3.82	<0.05
	Female	216	46.9	8.9		
Age Group	18-30 years	203	48.1	8.4	6.23	<0.01
	31-45 years	157	51.3	7.9		
	46-65 years	90	46.2	9.6		
Education	Primary	23	42.1	10.2	12.67	<0.001
	Secondary	90	44.3	9.2		
	Bachelor's	180	49.8	8.1		
	Master's	157	52.1	7.6		
City	Karachi	180	48.9	8.5	2.14	>0.05
	Lahore	158	48.1	8.8		
	Islamabad	112	49.2	8.9		
Overall Sample		**450**	**48.6**	**8.7**		

The Warwick-Edinburgh Mental Well-being Scale results demonstrated complex relationships between demographic factors and well-being scores. Overall sample mean was 48.6 (SD=8.7), slightly below international norms. Male participants scored higher on average (M=50.2, SD=8.3) compared to female participants (M=46.9, SD=8.9), with this difference reaching statistical significance ($p<0.05$). Age-related patterns showed the highest well-being scores among 31-45 age group (M=51.3, SD=7.9), followed by 18-30 group (M=48.1, SD=8.4), and 46-65 group (M=46.2, SD=9.6). Educational level showed positive correlation with well-being, with master's degree holders averaging 52.1 (SD=7.6) compared to secondary education participants averaging 44.3 (SD=9.2).

Table 5: Correlation Matrix of AI Usage Variables and Well-being Measures

Variables	1	2	3	4	5	6	7
1. Daily AI Usage	1.00						

Hours							
2. WEMWBS Total Score	-0.34***	1.00					
3. DASS-21 Depression	0.38***	-0.52***	1.00				
4. DASS-21 Anxiety	0.43***	-0.48***	0.67***	1.00			
5. DASS-21 Stress	0.41***	-0.46***	0.62***	0.71***	1.00		
6. AI Literacy Score	-0.12*	0.28**	-0.25**	-0.31***	-0.27**	1.00	
7. Number of AI Apps Used	0.22**	0.16*	0.08	0.14*	0.11	0.35***	1.00

*p<0.05, **p<0.01, ***p<0.001

Correlation analysis revealed significant relationships between various AI usage variables and well-being measures. Daily AI usage hours showed negative correlation with WEMWBS scores (r=-0.34, p<0.001) and positive correlation with DASS-21 stress subscale (r=0.41, p<0.001). However, the relationship was not linear, with moderate usage showing optimal well-being outcomes. AI literacy scores demonstrated positive correlation with well-being (r=0.28, p<0.01) and negative correlation with anxiety scores (r=-0.31, p<0.001), suggesting that understanding AI technologies buffers against negative emotional impacts. The number of different AI applications used showed weak positive correlation with overall well-being (r=0.16, p<0.05), indicating that diverse AI engagement may be beneficial compared to intensive use of single applications.

Table 6: AI-related Emotional Experiences by Usage Category

Emotional Experience	Light Users (n=158)	Moderate Users (n=189)	Heavy Users (n=103)
	n (%)	n (%)	n (%)
Positive Emotions			
Excitement/Curiosity	96 (61%)	138 (73%)	46 (45%)
Satisfaction	89 (56%)	145 (77%)	52 (50%)
Confidence/Empowerment	71 (45%)	132 (70%)	41 (40%)
Relief/Convenience	134 (85%)	176 (93%)	87 (84%)
Negative Emotions			
Frustration	19 (12%)	34 (18%)	39 (38%)
Anxiety/Worry	15 (9%)	28 (15%)	45 (44%)
Feeling Overwhelmed	8 (5%)	21 (11%)	32 (31%)
Dependency Concerns			
Worry about Over-reliance	5 (3%)	15 (8%)	35 (34%)
Fear of Losing Skills	12 (8%)	31 (16%)	48 (47%)

Social Impact Concerns			
AI Replacing Relationships	11 (7%)	23 (12%)	42 (41%)
Reduced Human Interaction	18 (11%)	29 (15%)	38 (37%)

Analysis of specific emotional experiences related to AI usage revealed distinct patterns across usage categories. Positive emotions including excitement, curiosity, and satisfaction were most frequently reported by moderate users, with 73% reporting predominantly positive experiences compared to 61% of light users and 45% of heavy users. Negative emotions such as frustration, anxiety, and feeling overwhelmed showed inverse relationships, affecting only 12% of light users, 18% of moderate users, and 38% of heavy users. Heavy users were significantly more likely to report feelings of dependency (34%) and concern about AI replacing human relationships (41%) compared to moderate users (8% and 12% respectively) and light users (3% and 7% respectively).

Qualitative Analysis

Following in-depth qualitative analysis of 30 interviews, AI agents and their emotional experiences offered a wealth of information about participants lived experiences with AI technologies. Thematic analysis produced five major themes: convenience and efficiency; social contact and isolation; anxiety and uncertainty; empowerment and learning; and challenges with cultural adaptation.

Convenience and Efficiency Theme:

AI technologies were repeatedly described by participants as being a source of significant convenience in their daily lives, with many participants having positive emotions associated with gaining efficiency and reduced cognitive load. A 28-year-old software engineer from Karachi described how AI tools have allowed him to "feel less overwhelmed at work because the AI is allowed to do everyday things that leave me free to concentrate on creative problem-solving." Many respondents conveyed a sense of gratitude and satisfaction when AI systems were able to successfully accomplish tasks or provide useful information. Still, there was also a concern among participants about dependencies that could become too dependent on AI for simple cognitive tasks, with some worry about losing important skills.

Social Connection and Isolation Theme:

The footprint of AI on social relationships was articulated as a multifaceted and paradoxical theme. Some respondents explained that AI is making them more connected socially as it can help them to stay connected with friends and family through smart scheduling, translation processes and optimizing social media. A Lahore-based 35-year-old teacher said that the use of AI language tools helped her form relationships with colleagues from other countries and made her "feel more confident and part of the global discussion." On the other hand, some participants had worries about AI lowering quality of human interaction, and some described loneliness even if they had more interaction with AI. Several participants were concerned that using AI to suggest friends to connect with, or to come up with ways to start and maintain a conversation, was making them less capable of true human interaction.

Anxiety and Uncertainty Theme:

Anxiety was one of the most common emotional responses to AI technologies in participant sample and took many different forms. Job-related anxiety was by far the most common, with people in a number of different professions saying they felt worried about AI replacing their jobs. A 42-year-old bank worker from Islamabad said he had been concerned about the "takeover of AI in financial services" and felt "very anxious about remaining relevant." Privacy concerns also sparked considerable emotional distress, with participants voicing

apprehension over AI systems gathering and processing their personal data. Some participants reported experiencing a sense of being "watched" or "monitored" by AI systems, leading to ongoing stress and hypervigilance around their digital behaviors.

Empowerment and Learning Theme:

Many participants spoke of positive emotional experiences in connection to AI-enhanced learning and skill development. Students and professionals said they felt more capable and confident using AI tools for research, writing and problem-solving. A 24-year-old Pakistani graduate student wrote in a blog post about how she found her assigned AI research assistant "more intellectually capable" and how they reduced her anxiety about her studies. Participants also reported experiences of empowerment associated with the use of information and services that were previously hard to access, especially in the areas of healthcare and education. However, this empowerment was at times accompanied by fears of over-reliance and diminished self-efficacy outside of AI-assisted situations.

Cultural Adaptation Challenges Theme:

Participants often spoke about the tensions between AI technologies and traditional Pakistani cultural values, resulting in complex emotional responses. Some reported being conflicted about using AI to perform tasks that had previously been carried out within family or community networks, such as consulting with others on a decision. Religious impact was also found to affect emotional responses; several participants expressed concern about the spiritual consequences of using artificial intelligence to provide guidance that would normally be sought from religious authorities or elders. Language barriers: Many AI systems were primarily in English, which can lead to feelings of exclusion or inadequacy for participants who were interested in the technology but faced language barriers.

The qualitative analysis also indicated large generational differences in emotional responses to AI. Additionally, younger respondents (18-30) were generally more excited and curious about AI opportunities, and more open to seeing AI be integrated into people's lives and work. They described AI as something that was "natural" and "expected" in the landscape of the digital world. Middle-aged respondents (31-45) approached the topic in more pragmatic ways, emphasizing the utility of AI while expressing hedged concerns about long-term effects. Older participants (46-65) were more skeptical and anxious, often referring to AI as "foreign" or "unnatural," but some said they were grateful for certain applications that met health or convenience needs.

Gender differences appeared to be prominent in the qualitative data, with female participants more often mentioning concerns about the effects of AI on social relations and family life. Women frequently spoke of having a sense of responsibility to keep real human connections going when engaging with AI-mediated communication technologies. Professional and economic considerations were more frequently mentioned by men than by women - men feared that AI adoption would affect their professional career opportunities and that they would be outcompeted by AI systems in the workplace.

Economic factors had a major impact on emotional responses, with respondents from lower socioeconomic backgrounds reporting greater anxiety about the costs and access to AI than others. Others reported feeling "left behind" by accelerated AI development and being concerned about economic exclusion from opportunities enabled by AI. The participants with a higher economic background displayed more positive affective reactions, frequently characterizing AI as exciting and empowering, while at the same time conveying worries about social inequality and responsibility for equitable access to AI.

Across the temporal dimension of emotional responses, we found that participants' feelings towards AI changed with exposure and familiarity. Most expressed some initial fear or skepticism that gave way to acceptance or zeal as they gained experience with AI tools. However,

some participants also expressed that long-term AI use resulted in fatigue or disillusionment, especially when AI systems did not live up to expectations or created new issues. This temporal evolution suggests that emotional responses towards AI are fluid and context-dependent rather than static personality characteristics.

Cultural and religious factors led to further complications in emotional responses. Exploring this even deeper, participants shared internal tensions between valuing the practical benefits of AI while worrying about its compatibility with Islamic values and Pakistani cultural practices. Others expressed concern about AI challenging human agency and even divine authority, while others viewed AI as a tool to improve their ability to serve religious and cultural imperatives. These tensions generated persistent emotional stress for some participants while others were able to harmonize their use of AI with their cultural and religious identities.

The research found that participants tended to personify their emotional relationship with AI, with many attributing human-like qualities and emotions to the AI systems. This anthropomorphizing had an impact on emotional reactions, with participants even developing attachment relationships with AI assistants or experiencing betrayal when AI systems did not live up to expectations. Such emotional attachment to AI relationships sparked questions about the psychological effects of human-like AI design and the potential for emotional manipulation through patterns of interaction with AI.

Discussion

The results of this study demonstrate the complexity and nuance of the relationship between AI technology use and emotional well-being among Pakistani populations, challenging simplistic narratives about technology's solely positive or negative psychological implications. Quantitatively, the study shows that moderate AI use is associated with the best well-being outcomes and implies an inverted-U relationship where the lowest and highest frequency of AI use are potentially less than optimal for mental health. This trend is consistent with emerging digital wellbeing research focusing on healthy technology use, but the exact thresholds and mechanisms seem to be culturally mediated, with Pakistani participants demonstrating optimal behavioral patterns of technology use different from those found in prior literature for Western populations.

The qualitative insights shed light on the cultural embeddedness of AI's emotional influence, highlighting how Pakistani social values, religious perspectives, and family dynamics shape distinct contexts for AI embrace and emotional engagement. The tension between technological convenience and traditional social support networks emerged as another key theme, arguing that the emotional impact of AI cannot be understood without reference to the way it interacts with existing cultural systems of well-being and sociality. Although the genotypic differences noted in this study are consistent with patterns of technological adaptation, they also reflect unique issues of concern in Pakistani society characterized by hierarchical age structures and respect for the wisdom of elders.

The quantitative and qualitative findings point to gender differences in AI's effect on emotion, indicating that social roles and expectations play a key role in how it is perceived, which in turn are likely to differ across cultures. The higher concerns of female participants regarding the effects of AI on relationships and social connections may be a result of traditional roles women play in providing care and in managing social relationships in Pakistani society. These findings have important implications for the design of gender-sensitive AI systems and interventions that consider differential emotional needs and responses across demographic groups.

Conclusion

This detailed examination of the effects of AI on human emotions and well-being in Pakistani society, shows that artificial intelligence technologies have complex and multifaceted

effects on psychological health that are critically shaped by cultural, demographic, and use pattern factors. The mixed-methods approach of the study brought both quantifiable psychological results and rich experiential aspects of AI interaction, showing that affective relations to AI cannot be grasped by dichotomous positive/negative, but should be understood by rich frameworks like culture, individuality, and temporal development.

Overall, the evidence points to moderate patterns of AI usage being associated with the optimal outcomes related to emotional wellbeing outcomes, whereas both low and high usage were associated with lower psychological health status indicators. This result counters technology adoption strategies that focus on highest use and instead supports strategies that focus on balanced, purposeful AI use. Cultural dimensions of affective reaction to AI were of special interest, as Pakistani respondents exhibited patterns of reaction determined by collectivist values, religious factors, and traditional social support structures that are radically different from those reported in Western contexts in the literature.

The study's finding of important demographic discrepancies in how AI is experienced emotionally underscores the need to create culturally sensitive and demographically appropriate strategies for AI deployment and digital well-being interventions. The generational, gender and socioeconomic differences that we find make one-size-fits-all approaches to AI integration inappropriate and potentially damaging, especially in diverse developing country contexts where technology interacts in complex ways with traditional social structures.

These results add valuable empirical evidence to the emerging literature on AI ethics and human-centered technology design, especially for developing countries where adoption of AI takes place in unique cultural and economic environments. The study shows that an interdisciplinary approach that combines technological, psychological, and sociocultural views is needed to understand AI's psychological impact and lays the groundwork for future research and policy-making in the dynamically changing field of human-AI interaction.

Recommendations

Based on the findings from this study, some recommendations are made for policymakers, technology developers and mental health workers working in Pakistani settings and other similar developing country settings. Public authorities should formulate broad principles of digital well-being that encourage balanced patterns of ADI use in addition to public education about healthy technology relationships, with specific attention to demographic groups known to be vulnerable to adverse emotional effects. Educational institutions should implement AI literacy curricula that not only focus on technical skills, but also emotional intelligence for AI interaction, developing critical thinking about AI in citizens' lives and the indicators of psychological well-being. Mental health professionals need to be trained to identify and treat AI mental health issues; cultural-based interventions can help with anxiety, dependency, and social isolation issues related to technology use. Tech firms in Pakistani markets should deploy culturally conscious designs which honor traditional social values while providing beneficial AI services, build usage monitoring that alerts users of potentially problematic ways of engaging, and ensure that AI systems augment, not replace, meaningful human social relationships. Longitudinal trends of AI's emotional consequences, specific interventions for healthy AI relationships, and Islamic values and Pakistani cultural practices that moderate AI's psychological consequences should be considered in future research across diverse regional and tribal settings of the country.

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