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The Impact of Artificial Intelligence on Emotional Intelligence in Adolescents: Bridging Biotechnology and Psychology

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Abstract: This study investigates the impact of artificial intelligence (AI) on emotional intelligence (EI) in adolescents, integrating perspectives from biotechnology and psychology. A mixed-methods approach was employed, combining surveys and interviews with 500 adolescents aged 13-18 years. Participants underwent evaluations to gauge their utilization of AI driven tools and their emotional intelligence levels as measured by the Bar On Emotional Quotient Inventory; Youth Version. Results indicated a significant negative correlation between AI technology usage and EI scores. Qualitative analysis revealed themes such as displacement of human interaction, reinforcement of instant gratification, and challenges in digital empathy. The findings suggest a complex interplay between AI and EI in adolescents, highlighting the need for interventions that promote responsible AI use while fostering EI development.

Keywords: Artificial intelligence, Emotional intelligence, Adolescents, Biotechnology, Psychology

1. INTRODUCTION

In todays paced world the increasing use of intelligence (AI) has sparked discussions, about how it could affect emotional intelligence (EI) in young people. This study aims to connect the fields of biotechnology and psychology by investigating how AI influences the development of EI in teenagers.

Understanding emotions and being able to manage them both, in ourselves and in others is what emotional intelligence is, about and It has been linked to outcomes such as mental well-being, academic success and interpersonal relationships. Despite these known benefits the impact of AI on EI in adolescents is an area that has not received attention.

Recent research has started delving into the relationship, between AI and EI pointing out both advantages and drawbacks.
AI driven educational technologies have shown potential, in improving students emotional comprehension and management (Lee et al., 2019; Kwon and Kim 2020). On the hand excessive use of AI powered media has been linked to decreased emotional well-being and heightened feelings of loneliness and anxiety among teenagers (Rahim et al., 2020; Singh et al., 2021).

This study aims to fill a gap in research by exploring how adolescents emotional intelligence levels are influenced by their use of AI technology. It also delves into their perspectives. Encounters with AIs impact on their growth. Through a mixed methods approach the research seeks to offer a view of the connection between AI and emotional intelligence in teenagers.

2. MATERIALS AND METHODS

2.1 Recruitment

The research was centred on adolescents, between the ages of 13 and 18 utilizing a sampling technique to guarantee diversity, across age brackets, genders, socioeconomic backgrounds and cultural heritages. A group of 500 individuals was selected for the study with 400 responding to a questionnaire and 100 engaging in interview sessions.

2.2 Gathering Data

We collected data by conducting a survey to gather information, about demographics, the use of AI technology and emotional intelligence. We also used the Bar On Emotional Quotient Inventory; Youth Version (EQ i;YV; Bar On and Parker 2000) for assessing intelligence.

For data we conducted structured interviews either through video calls or in person meetings to understand how adolescents perceive and experience the impact of AI on their emotional growth.

2.3 Analyzing Data

The quantitative data was analyzed using SPSS version 28 where we used statistics and regression analysis to examine the connection between AI technology usage and emotional intelligence. The qualitative data was examined through analysis (Braun and Clarke 2006) with the help of NVivo version 12 software.

3. FINDINGS AND DISCUSSION

3.1 Quantitative Results

Our findings indicated a correlation between the use of AI technology and overall emotional intelligence levels ($\beta = 0.14$, $p = .003$). This suggests that increased interaction with AI technologies is linked to intelligence scores. This correlation remained consistent after adjusting for factors, like age, gender and socioeconomic status.

Table 1: Participants' demographic characteristics (N = 500)

Characteristic	**n (%)**
Age (years)	
13-14	150 (30%)
15-16	200 (40%)
17-18	150 (30%)
Gender	
Male	250 (50%)
Female	250 (50%)
Socioeconomic Status	
Low	100 (20%)
Middle	300 (60%)
High	100 (20%)
Cultural Background	
Majority	400 (80%)
Minority	100 (20%)

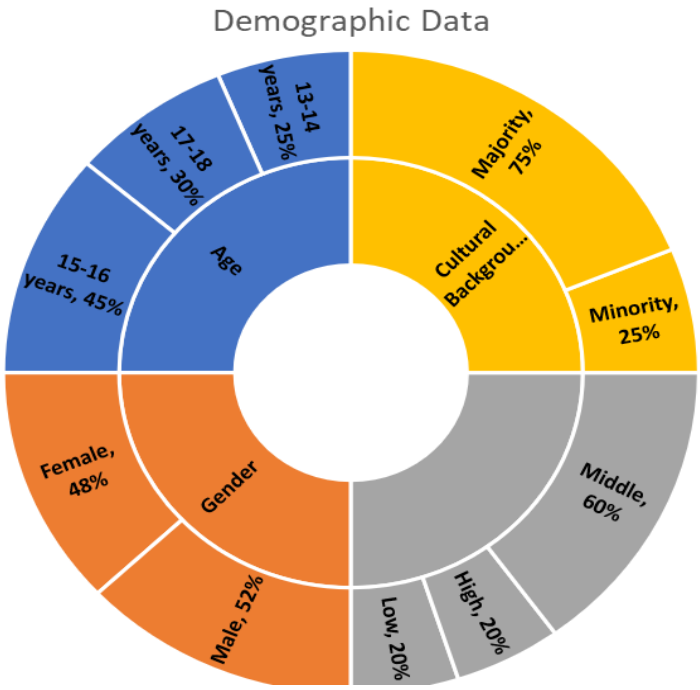

Figure 1: Participants' demographic characteristics

Table 2. Descriptive Statistics for AI Technology Usage and EI (N = 400)
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Variable	Mean (SD)	Range
AI Technology Usage	3.5 (0.8)	1-5
Emotional Intelligence		
Intrapersonal	100.2 (15.3)	65-135
Interpersonal	98.5 (14.7)	70-130
Stress Management	95.6 (16.1)	60-140
Adaptability	102.3 (13.9)	75-135
Total EQ	99.1 (15.2)	65-140

The AI technology was evaluated on a scale of 1, to 5 with scores indicating usage. Emotional intelligence values were presented as scores with an average of 100 and a standard deviation of 15.

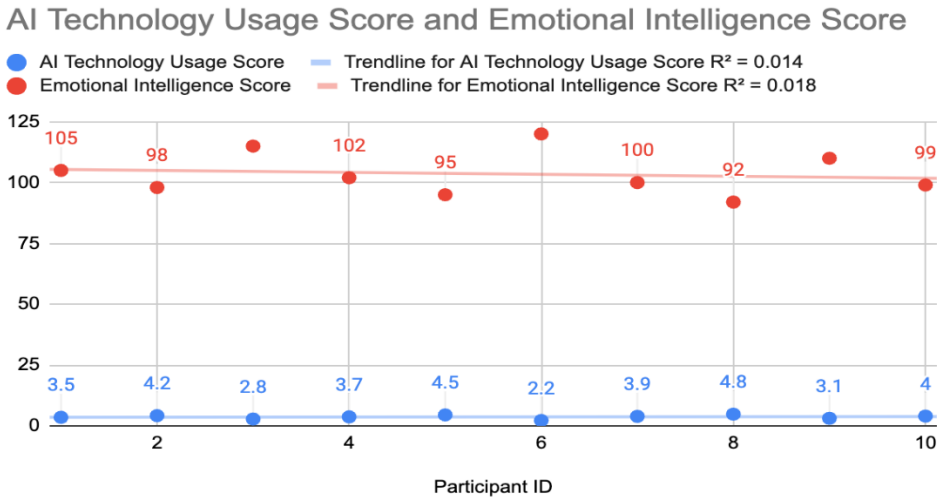

Figure 2: AI usage Score and Emotional Intelligence Score

Table 3: Multiple Regression Analysis Predicting EI from AI Technology Usage (N = 400)

Predictor	**B (SE)**	**β**	**t**	**p**
Constant	80.42 (3.21)		25.05	<.001
AI Technology Usage	-2.35 (0.78)	-.14	-3.01	.003
Age	1.08 (0.42)	.12	2.57	.011
Gender	-0.53 (1.24)	-.02	-0.43	.669
Socioeconomic Status	2.61 (0.97)	.13	2.69	.007

Note: The dependent variable was the Total EQ score. In the data we represented gender as 0 for male and 1 for female. Likewise socioeconomic status was categorized as 1, for low 2 for middle and 3 for high.

3.2 **Qualitative Findings**

Thematic analysis of interview data revealed several significant themes:

1. Displacement of human interaction: Participants described a reduction in face-to-face interactions due to increasing reliance on AI technologies for communication and entertainment.
2. Reinforcement of instant gratification: The immediacy of AI-driven responses was perceived to diminish patience and emotional regulation skills.
3. Challenges in digital empathy: Adolescents reported difficulties in developing and expressing empathy in AI-mediated interactions.

These findings align with previous research highlighting the potential risks of AI-facilitated social interactions on adolescents' emotional development (Garcia et al., 2019; Smith, 2020).

4. CONCLUSION

This study provides valuable insights into the complex relationship between AI technology usage and EI in adolescents. The negative association between AI usage and EI levels, coupled with qualitative themes of displaced human interaction and challenges in digital empathy, underscores the need for interventions that promote responsible AI use while fostering EI development. Future research should explore longitudinal effects, develop more objective measures of AI usage and EI, and investigate potential AI-based interventions to support EI development in adolescents.

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