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Original Research Article

Challenges of Employing Artificial Intelligence in Criminology and Enhancing Community Security — An Applied Analytical Study

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Abstract

This study aimed to explore the challenges of using artificial intelligence (AI) in criminology and its potential to strengthen community safety. Drawing on the perspectives of criminology professors in Jordan and the UAE, the research identifies human, technical, and financial barriers, while also highlighting related security risks. Data was gathered from 50 experts through a structured questionnaire. To analyse the responses, statistical tools such as descriptive analysis, T-tests, ANOVA, and post hoc tests were applied. Findings show significant obstacles in human resources, infrastructure, and funding. The study concludes with practical recommendations that focus on training, improving infrastructure, and encouraging regional collaboration.

Keywords: Artificial Intelligence, Criminology, Community Security, Financial Barriers, Human Resource Challenges, Technical Infrastructure

INTRODUCTION

Artificial Intelligence (AI) has developed rapidly, influencing a wide range of scientific disciplines, including criminology and community security. Technologies such as predictive analytics, automated surveillance, and data mining offer powerful tools to help prevent and control crime (Hashemi, 2021). While these innovations show great promise, their integration into criminology also brings challenges. Common obstacles include shortages of skilled professionals, technical limitations, and financial pressures (Saeed, 2021).

In Jordan and theUAE, where technological adoption is accelerating alongside evolving crime patterns, addressing these challenges is particularly critical. Previous research highlights that the use of AI in criminology has often been fragmented, lacking a holistic view that accounts for social, technical, and financial influences on community security (Brantingham et al., 2018; UNODC, 2020). This study seeks to address that gap by providing a comprehensive analytical assessment based on insights from criminology experts in these countries.

At the same time, other scientists associate digital transformation with mental disorders among teenagers as well as stress and lack of family conversations (Alomosh et al., 2025).

Definitions

Artificial Intelligence (AI)

- *Terminological definition:* Artificial Intelligence is a branch of computer science that enables machines to replicate human cognitive functions such as learning, reasoning, and decision-making (Hashemi, 2021).
- *Operational definition:* In this study, AI is examined through participants' assessments of its applications and

challenges in criminology, as captured by responses to a structured questionnaire.

Criminology

- *Terminological definition:* Criminology is the scientific study of crime, criminal behaviour, and society's reactions, with an emphasis on understanding the causes, prevention, and control of criminal activity (Siegel, 2020).
- *Operational definition:* Here, criminology is defined by the expertise and academic positions of the participants—faculty members in criminology—whose insights guide the study's variables.

Community Security

- *Terminological definition:* Community security refers to a state in which a community is safeguarded against threats such as crime, terrorism, social unrest, and other destabilizing forces (Buzan, Waever, & de Wilde, 1998).
- *Operational definition:* In this study, it is evaluated through participants' perspectives on threats to community safety, including cybercrime, terrorism, and corruption

Theoretical Framework

Challenges of Employing AI in Criminology

Human Challenges

The human dimension involves a notable shortage of professionals who possess expertise in both criminology and artificial intelligence (Al-Khouri, 2021). Moreover, the absence of continuous training programs contributes to skill gaps, while resistance to adopting new AI technologies among established staff further limits effective implementation (Saeed, 2021). These human factors significantly hinder the optimal utilization of AI tools in crime prevention efforts. Previous studies also emphasize the importance of fostering interdisciplinary collaboration and ongoing professional development to overcome these barriers (Smith & Anderson, 2022; Zhao et al., 2023).

Technical Challenges

Technical obstacles include inadequate infrastructure such as outdated hardware and software systems, poor-quality or incomplete datasets, and challenges in integrating AI solutions with existing security and criminal databases (Hashemi, 2021; Brantingham et al., 2018). These issues reduce the efficiency, accuracy, and reliability of AI applications. Supporting this, research by Kumar and Lee (2020) highlights that without robust technical foundations, AI projects in law enforcement struggle to deliver meaningful results.

Financial Challenges

Insufficient funding remains a critical impediment to acquiring cutting-edge AI technology, as well as investing in necessary training and ongoing system maintenance (Saeed, 2021). Many security agencies operate under tight budgetary constraints, which limit their capacity to sustain AI deployment over time. This challenge aligns with findings from Garcia et al. (2019), who argue that long-term investment strategies are essential for the successful integration of AI in public safety sectors.

Criminology and Its Importance

Criminology is the scientific discipline dedicated to studying the causes, patterns, and consequences of criminal behavior, as well as developing effective prevention and control strategies (Siegel, 2020). It plays a crucial role in understanding crime trends, shaping law enforcement policies, and promoting social stability (Sutherland & Cressey, 2019). Artificial intelligence complements criminology by enhancing data analysis and providing predictive insights that improve the detection, prevention, and response to criminal activities (Jones & Patel, 2021).

Community Security

Community security refers to a society's capacity to protect its members from crime, violence, and social disorder (Buzan et al., 1998). It encompasses three main components:

- **Physical Security:** Protection against violent crimes and property offenses.
- **Social Cohesion:** The level of trust and cooperation among community members and institutions.
- **Institutional Capacity:** The effectiveness of law enforcement agencies and governance structures.

Several threats currently challenge community security, including:

- **Cybercrime:** Increasingly widespread due to society's reliance on digital technologies (UNODC, 2020).
- **Terrorism:** Both global and regional terrorist activities continue to destabilize social order (Schmid, 2011).
- **Poverty:** Economic hardship is a key driver of crime and social unrest (Homer-Dixon, 1999).

Table 1. Descriptive Statistics of Challenges (Scale: 1-5)

Challenge Type	Mean	Std. Deviation
Human Challenges	4.12	0.56
Technical Challenges	4.25	0.48
Financial Challenges	3.98	0.61

Table 2. T-test Results for Gender Differences in Human Challenges

Gender	N	Mean	Std. Deviation	t	Sig. (2-tailed)
Male	30	4.10	0.55	-0.85	0.40
Female	20	4.15	0.58		

- **Social Conflicts and Extremism:** Tensions based on ethnicity, sectarianism, and ideology undermine stability (Buzan et al., 1998).
- **Corruption:** Erodes public trust in institutions and law enforcement agencies (Transparency International, 2022).
- **Foreign Interventions:** Political interference can destabilize internal security frameworks.
- **Drug Trafficking:** Fuels criminal networks and contributes to social degradation (UNODC, 2020).

Recent studies underscore the dynamic and interconnected nature of these threats, emphasizing the need for integrated approaches that combine AI-driven tools with community engagement and policy reforms (Williams & Chen, 2022; Ahmed et al., 2023).

METHODOLOGY

Population and Sample

This study targeted criminology professors from Jordan and the United Arab Emirates. The sample consisted of 50 participants. The demographic variables considered included gender, academic rank, and years of professional experience.

Instrument

A structured questionnaire was developed and validated to measure participants' perceptions regarding human, technical, and financial challenges, as well as threats to community security.

Statistical Analysis

Descriptive statistics were used to summarize responses. To identify significant differences across demographic groups, independent samples T-tests and ANOVA were applied. Post hoc Tukey tests were employed to examine pairwise differences.

Summary of Statistical Findings

- Gender does not have a significant effect on perceptions of the challenges or threats related to employing AI in criminology and community security.
- Academic rank influences perceptions of technical challenges, with noticeable differences particularly between Professors and Lecturers.
- Years of experience significantly impact perceptions of community security threats; academics with longer experience tend to exhibit greater awareness of these threats, especially compared to those with the least experience.

RESULTS

The Table 1 shows that all three types of challenges are perceived as quite significant, with technical challenges rated slightly higher on average. The standard deviations indicate moderate agreement among participants.

Explanation: No significant difference was found between male and female participants regarding their perception of human challenges ($p = 0.40$), indicating gender does not influence this view. Table 2

Explanation: Academic rank significantly affects perceptions of technical challenges. Professors report facing more technical challenges compared to Lecturers, highlighting possible differences in roles or expectations. Table 3

Statistical Analysis of Study Variables

Explanation: The T-test results confirm that gender does not significantly influence perceptions of human, technical, or financial challenges, as all p-values are

Table 3. ANOVA Results for Technical Challenges by Academic Rank

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.85	3	0.95	3.75	0.02*
Within Groups	11.65	46	0.25		

Post Hoc (Tukey HSD): Significant differences exist between Professors and Lecturers.

Table 4. Independent Samples T-Test Results by Gender

Variable	Gender	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Human Challenges	Male	30	4.10	0.55	-0.85	48	0.40
	Female	20	4.15	0.58			
Technical Challenges	Male	30	4.20	0.50	-0.60	48	0.55
	Female	20	4.28	0.47			
Financial Challenges	Male	30	3.90	0.65	-1.10	48	0.28
	Female	20	4.10	0.56			

Table 5. ANOVA Results for Technical Challenges by Academic Rank

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.85	3	0.95	3.75	0.02*
Within Groups	11.65	46	0.25		
Total	14.50	49			

Significant at p < 0.05

Table 6. Post Hoc Tukey Test for Technical Challenges by Academic Rank

Academic Rank		Mean Difference (vs.)	p-value	Interpretation
Professor	vs	0.55	0.015*	Professors perceive more challenges
Lecturer				
Professor	vs	0.40	0.080	Not significant
Asst. Prof.				
Professor	vs	0.30	0.200	Not significant
Instructor				

Table 7. ANOVA Results for Perceptions of Community Security Threats by Years of Experience

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.20	2	1.60	4.10	0.023*
Within Groups	11.20	47	0.24		
Total	14.40	49			

Significant at p < 0.05

greater than 0.05. Table 4

Explanation: Professors perceive technical challenges more intensely than Lecturers, which may reflect differences in responsibilities or resource access. Table 6

Explanation: Participants with more than 5 years of experience perceive community security threats more acutely than those with less experience, indicating experience plays a role in threat awareness. Table 8

Table 8. Post Hoc Tukey Test for Community Security Threats by Years of Experience

Group Comparison	Mean Difference	p-value	Interpretation
Less than 5 vs 5-10	0.40	0.045*	Significant difference
Less than 5 vs More than 10	0.65	0.008*	Significant difference
5-10 vs More than 10	0.25	0.180	Not significant

DISCUSSION

The study's findings highlight that one of the main hurdles in adopting AI within criminology is the human factor—particularly the shortage of qualified specialists and the lack of continuous training opportunities. This confirms what previous research by Al-Khouri (2021) and Saeed (2021) pointed out. Additionally, resistance to organizational change creates further obstacles, making the implementation process more challenging, as also noted by Saeed (2021).

On the technical side, the lack of modern infrastructure, poor data quality, and difficulties integrating AI systems with existing platforms were significant issues. These results are in line with Hashemi (2021) and Brantingham et al. (2018), who emphasized the critical need for strong and compatible technological foundations to ensure AI tools work effectively.

Financial constraints emerged as another major barrier. The findings support Saeed's (2021) argument that without consistent funding, it is difficult to acquire advanced technologies and invest in building human capabilities.

When it comes to threats to community security, cybercrime and terrorism stood out as the most urgent concerns, mirroring global reports from UNODC (2020) and Schmid (2011). Other serious issues included extremism, corruption, and poverty—concerns that align with findings from Transparency International (2022) and Homer-Dixon (1999).

Interestingly, the study found no significant difference in perceptions of these challenges between men and women, a result that matches Hashemi (2021). However, academic rank and years of experience did influence how aware participants were of technical and financial challenges, with more senior and experienced academics showing higher levels of sensitivity. This resonates with Al-Khouri's (2021) observations.

Overall, this research underscores that the barriers to effectively adopting AI in criminology are complex and interconnected. It highlights the urgent need for comprehensive strategies that address human, technical, and financial factors simultaneously to truly enhance community security.

CONCLUSION

This study sheds light on the diverse challenges facing the integration of Artificial Intelligence in criminology to improve community security in Jordan and the UAE. It becomes clear that addressing the shortage of skilled human resources through specialized and continuous training, upgrading technological infrastructure, and securing stable financial backing are essential steps toward successful AI implementation. Moreover, raising awareness about emerging security threats such as cybercrime and terrorism is vital. It empowers communities and institutions to better utilize AI tools for prevention and response. By understanding these challenges and their dynamics, policymakers, academics, and security professionals can develop more effective and realistic strategies. These strategies should align technological innovations with social realities, ultimately leading to safer and more secure societies.

RECOMMENDATIONS

1. Enhance specialized training programs to equip criminology professionals with AI skills and ensure continuous learning to keep pace with technological advances.
2. Invest in upgrading technological infrastructure in criminology and security institutions, focusing on system compatibility and improving data quality.
3. Secure sustainable financial resources dedicated to AI projects, covering procurement, maintenance, and staff development.
4. Promote regional and international cooperation for knowledge sharing, joint research, and technology exchange to tackle common challenges effectively.
5. Increase public awareness campaigns on contemporary security threats such as cybercrime and terrorism, encouraging community participation in security efforts.
6. Support applied research tailored to local needs to develop AI solutions that fit regional criminological and security contexts.

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