Issues in Informing Science + Information Technology

An Official Publication of the Informing Science Institute
InformingScience.org

IISIT.org

Volume 22, 2025

LEVERAGING TECHNOLOGY-DRIVEN NUDGING FOR DECISION-MAKING IN CRIMINAL JUSTICE - EXPERT PERSPECTIVES

Hansinie Madushika Jayathilake*	University of Cincinnati, Cincinnati, OH, United States	jayathhm@mail.uc.edu
Amir Reza Asadi	University of Cincinnati, Cincinnati, OH, United States	asadiaa@mail.uc.edu
Taiwo Peter Akinremi	University of Cincinnati, Cincinnati, OH, United States	akinretp@mail.uc.edu
Joel Kwesi Appiah	University of Cincinnati, Cincinnati, OH, United States	appiahjk@mail.uc.edu
Opetunde Ibitoye	University of Cincinnati, Cincinnati, OH, United States	ibitoyoo@mail.uc.edu
Hazem Said	University of Cincinnati, Cincinnati, OH, United States	saidhm@ucmail.uc.edu

* Corresponding author

ABSTRACT

Aim/Purpose	This study investigates how technology-driven nudging can enhance decision-making quality and consistency in the U.S. criminal justice system, addressing declining public trust.
Background	In today's digital age, Information Technology (IT) plays a crucial role in improving decision-making in the criminal justice system, especially in the United States. Despite the technological adoption and advancements in the domain, trust in decision-making within the system is decreasing.
Methodology	The study employs qualitative research through focus groups and grounded theory analysis, as it is an exploratory study. Participants were chosen using a mix of convenience and purposive sampling in multidisciplinary domains such as criminal justice, human-computer interaction, artificial intelligence, law, and behavioral psychology. The participants were experts with more than ten years

Editor: Eli Cohen | Received: November 4, 2024 | Revised: March 25, 2025 | Accepted: April 25, 2025
Cite as: Jayathilake, H. M., Asadi, A. R., Akinremi, T. P., Appiah, J. K., Ibitoye, O., & Said, H. (2025). leveraging technology-driven nudging for decision-making in criminal justice - Expert perspectives. *Issues in Informing Science and Information Technology, 22,* Article 4. https://doi.org/10.28945/5508

	of experience in their respective domains. Further, grounded theory approach was utilized for data analysis.
Contribution	The study presented a conceptual framework derived from the insights of the focus group data that addresses fundamental factors which influence the implementation, adoption, and evaluation of the efficacy of technological interventions in the U.S. criminal justice system, by focusing on intervention, outcomes, and contextual factors in a practical and more realistic approach.
Findings	The study identified benefits of using technology driven nudges to support decision-making in the criminal justice system while identifying considerations for implementing technology-driven nudging interventions. In addition, the study found six contextual factors which affect interventions and outcomes, including voter influence, public perception, environment and resources, decision-making scenarios, and decision-makers' attitudes. Further, the study proposed a conceptual(theoretical) framework that can be utilized by practitioners and researchers to design, implement and evaluate the technological interventions in criminal justice decision making.
Recommendations for Practitioners	Practitioners can use the study's conceptual framework as a guide to design, implement, and evaluate nudging interventions tailored to the criminal justice context.
Recommendations for Researchers	Researchers can build on the proposed theoretical framework, to initiate research experiments and refining it through empirical testing and expanding it to accommodate a wider range of scenarios within criminal justice and beyond.
Impact on Society	The findings support the development of guidelines or regulations for the ethical and effective application of digital tools in decision-making within the criminal justice system. Additionally, this study can contribute to rebuilding trust in the criminal justice system by employing technology-driven nudging methods that enhance transparency and accountability.
Future Research	Future research should empirically validate the nudging framework by assessing long-term societal impacts and explore applications in other domains.
Keywords	technology-driven nudging; grounded theory; decision-making; information technology, criminal justice; qualitative research

INTRODUCTION

Trust is crucial for law-abiding behavior and a productive legal system (T. Tyler, 2001). In the United States, public trust in criminal justice is essential for effective law enforcement and reducing crime (Bradford & Jackson, 2009). Beyond the United States, trust for public institutions including justice system has been a prominent research area all over the world in many regions such as Europe (Hough et al., 2013), Africa (Boateng & Adjorlolo, 2019), Asia (Wu, 2014), Australia (Flynn & Freiberg, 2018), South America (Singer et al., 2019). Sherman (2002) points out that trust and confidence in the criminal justice system are necessary to maintain legitimacy and fairness (Sherman, 2002).

The professionalization and mechanization in the criminal justice system have eroded public trust, particularly along racial lines due to a disconnect from people's expectations (Rappaport, 2020). For instance, Berk et al. (2021) found that the use of actuarial risk assessments in the criminal justice system has come under intense scrutiny recently.

Criminal justice professionals often face complex choices under time pressure and with limited information, which can lead to suboptimal outcomes (Dhami & Ayton, 2001; Guthrie et al., 2007). Further public confidence in the system has been declining due to concerns about decision-making quality and consistency (Mazerolle et al., 2013; T. R. Tyler & Huo, 2002). Hence, building trust is crucial for promoting fairness and ensuring the justice system's perceived legitimacy (Gjoka & Xhuvani, 2023).

Both developed and developing countries with different cultural backgrounds actively engage in criminal justice reforms which are efforts to enhance the legal and justice system to be more responsive to the needs of a growing society (Hamid et al., 2024). Previous literature discusses the role of technology in criminal justice reforms and the need for human legal systems (Hamid et al., 2024). However, the potential of behavioral insights and their integration with technology-driven interventions in the context of decision-making environments explicitly in the criminal justice landscape remains largely unexplored (Bornstein et al., 2022). In addition, nudging, a behavioral economic concept that defines a choice-based environment to guide effective decision-making for favorable individual and social behaviors, offers a promising approach to improve decision-making within the system (Benartzi et al., 2017; Thaler & Sunstein, 2009).

Despite existing advancements targeting developing technological solutions for specific parts of the criminal justice system, there is a shortage of research aimed at understanding the fundamental factors that influence the implementation, adoption, and evaluation of the efficacy of technological interventions combined with behavioral interventions toward the creation of a fairer and humane criminal justice system. As nudging is a popular behavioral economic concept for guiding people in decision-making while preserving human autonomy, this study aims to investigate how the concept of technology-driven nudging can be leveraged to improve decision quality and consistency, thereby enhancing outcomes for all involved parties and restoring trust in the system. To explore this phenomenon, the study was based on the research question, "How can technology-driven nudging interventions in the criminal justice system facilitate effective decision-making?"

BACKGROUND

To better understand how technology-driven nudging can improve decision-making in criminal justice, we first review key challenges in decision-making in the criminal justice context, the role of behavioral insights, and the use of technology in criminal justice contexts.

GLOBAL PERSPECTIVES OF TRUST IN THE CRIMINAL JUSTICE SYSTEM

Trust is a cornerstone of the legitimacy and effectiveness of any criminal justice system. Over recent decades, public confidence in various aspects of the system has been declining in many jurisdictions (T. R. Tyler & Huo, 2002). For example, some studies (Hough et al., 2013) surveyed trust in the police across Europe and found that trust in police fairness is a crucial dimension in shaping people's sense of police legitimacy.

Worthy's (2010) research highlights how a lack of transparency fosters skepticism, and Surette's (2014) analysis emphasizes the media's role in shaping public perception of the justice system. When citizens lack confidence in the justice system, they are less likely to cooperate with law enforcement, report crimes, or participate in legal processes as witnesses or jurors (T. R. Tyler, 2005, 2011). This can create a cycle of reduced effectiveness and further erosion of public trust.

DECISION-MAKING CHALLENGES IN THE CRIMINAL JUSTICE SYSTEM

Further, trust in criminal justice decision-making is affected by the way these decisions are made. Criminal justice professionals, like all humans, can be influenced by cognitive biases that impact their judgment (Tversky & Kahneman, 1974). These biases include: confirmation bias, which is the tendency to seek out information that confirms pre-existing beliefs (Nickerson, 1998); anchoring effects, the tendency to rely too heavily on the first piece of information encountered when making decisions

(Tversky & Kahneman, 1974); and implicit racial or ethnic biases, which are unconscious attitudes or stereotypes that can affect decision-making (Greenwald & Krieger, 2006).

In the criminal justice system, decisions are often made quickly with incomplete information (Dhami & Ayton, 2001), leading to reliance on heuristics or "gut feelings"(Sah et al., 2015). In contrast, some decisions require processing vast amounts of complex information, which can overwhelm human cognitive capacities (Bornstein et al., 2022; Danziger et al., 2011). Additionally, the emotional stress of the work can impact decision-making (Chamberlain & Miller, 2009). These cognitive limitations challenge decision-making and contribute to skepticism of the trustworthiness and fairness of decision-making outcomes, especially in criminal justice systems.

Behavioral Economic Insights and Nudge Theory

Behavioral economic principles provide an empirically informed perspective to understand how people make decisions based on choice environments and identify the interventions to guide the decision-making behaviors with favorable societal outcomes (Matjasko et al., 2016; Thaler & Sunstein, 2009). Bounded rationality in behavioral economics describes how real-world decision-makers face constraints in their information, cognitive capacity, and time (Simon, 1990) and guides researchers to better align interventions to mitigate the adverse effects of human rationality by nudging. Nudging aims to guide behavior in line with goals and values, making desired behavior more accessible or appealing without limiting freedom of choice to guide the decision-making behaviors with favorable societal outcomes (Erdeniz et al., 2023; Matjasko et al., 2016; Thaler & Sunstein, 2009). These behavioral economic theories have contributed to various domains, such as public health (Matjasko et al., 2016) and public administration (Battaglio et al., 2019).

The judicial system, including the criminal justice domain, is integrated with public cooperation, and these reforms are in place to improve and enhance the judiciaries, courts, and their processes (Hamid et al., 2024). However, it is necessary to understand how these reforms can be implemented and adopted in different legal and cultural contexts (Hamid et al., 2024) by understanding nudging as a behavioral intervention that assists in decision-making. Choice architecture, default options, social norms, and feedback are key aspects of the nudge theory. (Johnson et al., 2012) define choice architecture as the way in which choices are presented and its influence on decision-making. Default options, as defined by (Jachimowicz et al., 2019), are preset choices that people tend to stick with, influencing behavior. According to Cialdini et al. (1990), social norms refer to how people are influenced by others' behavior. The feedback aspect is defined by Cappa et al. (2020) as the value of providing timely feedback on decisions to help improve future decision-making. Nudges have been successfully applied in public health, finance, and environmental policy (Benartzi et al., 2017; Thaler & Benartzi, 2004), but their potential in the criminal justice system remains largely unexplored.

Use of Technology in Criminal Justice Decision Making

Advancements in technology, particularly in artificial intelligence and data analytics, have opened new possibilities for supporting and augmenting human decision-making (Duan et al., 2019). These technologies can process vast amounts of data, identify patterns, and provide insights that might not be immediately apparent to decision-makers (Hyatt & Berk, 2015; Yeung, 2017). Artificial intelligence (AI) can assist in making better decisions using technology-driven nudges, offering insights and reducing negative influences through cognitive technologies (Mele et al., 2021).

The use of AI has grown rapidly and is now a constant presence in our lives. Many believe AI tools will eliminate biases and mental shortcuts in human judgment (Garrett & Rudin, 2023; Završnik, 2020). However, these AI-assisted tools are underutilized, raising serious questions regarding human rights (Berk et al., 2009; Gans-Combe, 2022). For instance, many countries such as, the United States, Germany, the Netherlands, and the United Kingdom, have adopted predictive policing integrated with modern technology in different levels while acknowledging that many challenges are

associated with mixed feelings of the effectiveness of technology in meeting objectives (Mugari & Obioha, 2021).

The use of black box AI or non-interpretable AI in the criminal justice system poses risks to public safety and human rights (Garrett & Rudin, 2023). It hinders transparency, impartiality, and fairness, leading to potential discrimination (Travaini et al., 2022). There are concerns about the accuracy of AI systems used in risk assessments (Garrett & Rudin, 2023).

Several researchers are exploring the potential of explainable AI systems in criminal justice decision-making (Chaudhary, 2024). These systems aim to enhance transparency, trust, and collaboration by providing actionable nudges (de Bruijn et al., 2022). It is important to investigate the design and impact factors driving decision-making with technological interventions and promote discourse on the topic.

Ethical and Social Implications of Artificial Intelligence (AI)

AI is a technology that is increasingly used in societies and economies around the globe amidst the debate around the adherence of AI to ethical standards (Daly et al., 2020). It argues that algorithms, which are often seen as neutral, can reinforce inequalities in society due to biased data, driving the discourse on ensuring ethical standards in algorithmic decision-making that benefit society (O'Neil, 2017). For instance the dataset used to train the risk and need assessment tool designed to predict recidivism in the COMPAS program (Correctional Offender Management Profiling for Alternative Sanctions), developed by Northpointe (now Equivalent) in 1998 has been largely criticized due to the existence of bias data and COMPAS has faced significant criticism due to racial discrimination in its decision making (Van Woerkom et al., 2024).

The complexities of fairness and bias in training data that build these AI models in justice applications argue the acceptance of AI model outputs in line with trust and other ethical considerations (Barocas & Selbst, 2016). Some studies argue that fairness, accountability, and transparency are concerns about existing algorithmic modes of decision-making in criminal justice when combined with machine learning and big data (Chiao, 2019). Further, Završnik (2021) argues the socio-political context of algorithmic justice, which emphasizes the fact that big data and algorithms change the knowledge production in criminal justice elements such as crimes. Moreover, some studies have found that fairness in criminal risk prediction tasks raises unfairness concerns by most of the stakeholders against the tools used in the domain (Grgic-Hlaca et al., 2018).

Thus, it is evident that ethical considerations need to be evaluated in the technological interventions that hope to nudge decision-making behaviors in the criminal justice context.

METHODOLOGY

To explore the understanding of the technology-driven nudging in augmenting decision-making in criminal justice, the study prioritizes gathering expert opinions via focus groups over other methods, such as one-on-one interviews or surveys due to group dynamics in focus group interviews can lead to deeper and richer data through social interaction with in-depth discussion (Then et al., 2014).

Further, focus groups, as a qualitative research method, facilitate gathering broad explanations from participants on a specific topic by providing experts with a platform to openly discuss and leads to spontaneous discussion (Kazancoglu et al., 2020; Suyatno et al., 2023). One of the unique aspects of a focus group is its capacity to generate data through group interaction synergy (Green et al., 2003).

Participants were selected based on their relevance to the topic, social characteristics, and comfort level during discussions (Richardson & Rabiee, 2001). This approach aims for 'applicability', selecting subjects for their knowledge of the study area. The three main types of focus group studies are traditional face-to-face, synchronous online, and asynchronous online (Stewart & Shamdasani, 2017). This study offered both face-to-face and synchronous online options for participants' convenience.

PARTICIPANTS

Participants were chosen using a mix of convenience and purposive sampling to ensure diverse representation and capture a wide range of perspectives, enriching discussions and gaining deeper insight from focus groups (Palinkas et al., 2015).

INCLUSION CRITERIA

The study aimed to explore the use of AI-powered nudges to support decision-making in the criminal justice system. Experts in criminal justice, human-computer interaction, artificial intelligence, law, and behavioral psychology were recruited for the study. Participants were selected based on their expertise and a minimum of ten years of experience in their respective fields. Table 1 outlines the demographics of the study participants.

Table 1. Participants' demographic information

Participant#	Area of Expertise	Position	Years of experience
A	Criminal Justice	Professor	10+ years
B	Law	Professor Emerita	10+ years
C	Human-Computer Interaction/ Psychology	Associate Professor	10+ years
D	Artificial Intelligence/Policing/ Crime analysis	Practitioner	10+ years

DATA COLLECTION PROCEDURE

Data was collected through a focus group study at the author's institution in May 2024. Six experts were invited, but only four attended, with one joining online. The discussion, led by the authors, lasted two hours and was recorded with participant consent. The study was approved by the Institutional Review Board. The moderator introduced the research objectives and outlined the agenda, consisting of three sessions detailed in Table 2.

After the session, the recorded transcript was shared with participants for validation. They reviewed and made any necessary changes before the finalized transcript was used for data analysis.

Table 2. Organization of the sessions

Session #	Discussed Questions
Session 1- Criminal Justice, Law & Behavioral Psychology	S1Q1: At what point of decision-making in the system could be more receptive to the use of behavioral nudges? S1Q2: What nudging strategies could enhance compliance with Criminal Law? S1Q3: Are there ethical concerns regarding the use of behavioral nudges in criminal justice, especially when dealing with vulnerable populations?
Session 2- Advanced Technologies	S2Q1: How can artificial intelligence (AI) and machine learning contribute to smarter decision-making within the criminal justice system? S2Q2: Are there potential biases or unintended consequences associated with using technology-driven nudges?

Session #	Discussed Questions
Session 3- Brainstorming & Conclusion	S3Q1: What innovative nudging interventions could improve decision-making at different points in criminal justice? S3Q2: Can collaborative efforts between criminal justice professionals, researchers, and technology experts lead to more effective nudging strategies?

DATA ANALYSIS

Qualitative research, especially focus-group interviews, yield substantial amounts of valuable data (Rabiee, 2004). The study used a qualitative data analysis approach, specifically an inductive approach due to its data-driven nature. Multiple approaches were employed for analyzing the finalized transcript, as illustrated in Table 3.

Table 3. Stages of data analysis

Stage #	Theory used
1. Coding the responses (i.e., open coding, axial coding, selective coding)	Constant comparison analysis which was initially used in the grounded theory research (Corbin & Strauss, 1990)
2. Assessing degree of consensus in focus group	Micro-interlocutor Analysis (Onwuegbuzie et al., 2009)

The analysis was performed by using MAXQDA24 software tool. The transcript was first coded using open coding, integrating in-vivo and descriptive codes into sub-themes. A selective coding process was then utilized based on the focus group study sessions (Corbin & Strauss, 1990). Thematic analysis finalized the study's findings. To assess participant agreement, the study used micro-interlocutor analysis as outlined by Onwuegbuzie et al (Onwuegbuzie et al., 2009). Codes were reviewed by all authors to finalize themes for organizing the study findings.

RESULTS

A word cloud of initial transcript was generated using MAXQDA software, as shown in Figure 1. The word cloud was created after removing stop words. It visually highlights prominent words such as "decision," "nudge," "system," "information," and "people" from the transcript. A word cloud visually represents text information for quick comprehension, conveying data without overwhelming.

While reviewing Table 4, authors performed a micro-interlocutor analysis for each question. We noticed that, apart from S1Q3 and S2Q2, all participants offered detailed perspectives and opinions based on their experiences and demonstrated enthusiasm.

In Table 4, "A" indicates participant agreement and "SE" indicates significant statements suggesting agreement. There were no signs of disagreement. Figure 2 displays the code cloud with 65 open or descriptive codes used for labeling the transcript. These were grouped into sub-themes during axial coding.

Figure 1. Word cloud based on the transcript

Table 4. Matrix for assessing degree of consensus in focus group

Question #	A-Participant	B-Participant	C-Participant	D-Participant
S1Q1	SE	SE	SE	SE
S1Q2	SE	SE	SE	SE
S1Q3	SE	SE	A	SE
S2Q1	SE	SE	SE	SE
S2Q2	SE	A	A	SE
S3Q1	SE	SE	SE	SE
S3Q2	SE	SE	SE	SE
A = Indicated agreement (i.e., verbal or nonverbal) SE = Provided significant statement or example suggesting agreement				

Figure 2. Code cloud

The figure in the Appendix displays the distribution of quotes in the transcript based on descriptive codes, with crime prevention being the most prominent. During the expert focus group discussion, participants shared insights on nudging interventions related to use cases, ethical aspects, challenges, and technology outlined in Table 2. A predominant theme was the emphasis on crime prevention" over crime detection. The analysis resulted in 15 themes, grouped into "benefits of using nudging for decision-making in the criminal justice system," "considerations for implementing technology-driven nudging," and "contextual factors." In the following subsections, themes are presented and supported by relevant quotations.

Benefits of Using Nudges to Support Decision-making

The focus group data analysis identified key benefits of using nudges in the criminal justice system, such as improving decision quality, managing cognitive biases, enhancing procedural efficiency, promoting fairness and equity, and driving systemic improvements. Participants emphasized the impact of using nudges to support decisions before a crime occurs. The analysis aims to reduce crime and enhance outcomes. Figure 3 depicts the open codes composition within the five sub-themes.

Quality of Decisions

The participants stressed the importance of making high-quality decisions by considering the broader context and multiple perspectives and ensuring alignment with societal goals. They also emphasized the need to create connections across differences during decision-making to enhance decision quality.

"B: I think if you could help prosecutors be aware of the big picture, consequences of the decisions that they're making, that could be a pretty big deal. If you could help them to see how charging patterns are playing out in the big picture."

"D: And if we can identify where those decisions are sort of a skew from what we would want."

"B: I think what we really should be about is meaningful prevention, meaningfully addressing what's required versus what people think is necessary in response to harm. We swing back and forth occasionally. You know, we hear nice words about rehabilitation, but never very serious."

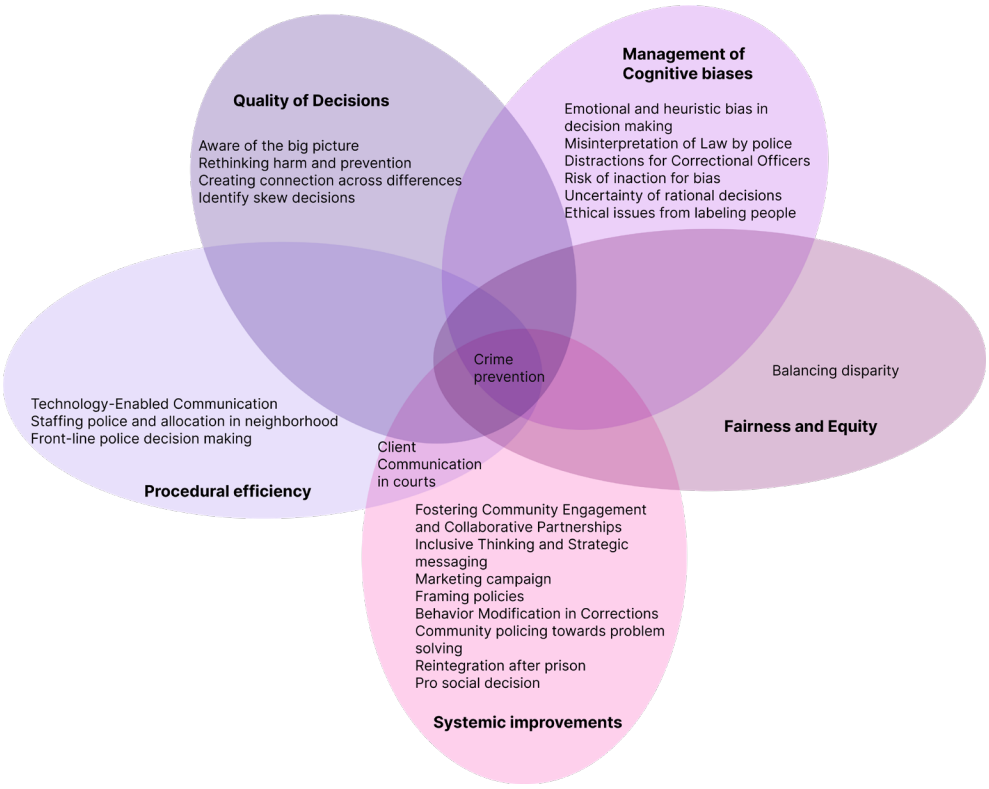


Figure 3. Benefits of using nudges to support decision-making in the criminal justice system

Management of Cognitive Biases

Participants discussed ethical concerns regarding the use of behavioral nudges in criminal justice and highlighted how nudging could help manage cognitive biases in decision-making. They also emphasized various cognitive biases impacting the criminal justice system, including emotional and heuristic bias, distractions, and misinterpretation of the law. They also talked about the risk of inaction on bias and the ethical implications of categorizing individuals based on human bias.

"C: I see, like the ethical concern, the bias being a problem."

"A: From the officer side of things, so there's a lot of distraction, probably the most distraction in the system, exists there. Because officers are given all they have to abide by and uphold the law, but they have a lot of room for interpretation."

"D: I think is important to focus on here is risk of inaction, right. Like if you have all of these tools and you don't use them, then there's also the potential for, you know, increasing bias in that way too."

"D: I think we do know that people make rational decisions most of the time that might not be rational to us, but they're rational to the person making the decision whatever elements are going on in their lives and what not."

"C: ethical concerns that if you believe in like labeling theory that if I label you as a problem, even if you don't know that it was a problem like I've created some kind of a bias."

Procedural Efficiency

Participants highlighted the potential of nudging to improve the efficiency of decision-making in the criminal justice system. They emphasized the importance of efficient processes and discussed using technology to enhance communication. Additionally, they highlighted the strategic use of nudging as

a technical intervention to allocate police resources and empower officers to make informed decisions, all aiming to enhance procedural efficiency within the system.

"B: So, pretty consistently, they were calling for including the use of technologies to enhance communication and connection"

"A: There's a whole lot of systemic decisions there. Things about staffing the police officer, so if you put police in this neighborhood and there's some others."

"B: In terms of courts and clients, you know communication and training around client communication is a huge problem and typically it has more to do with the lack of resources and a lack of time."

Fairness and Equity

Participants noted that technology driven nudging interventions ensure fairness and equity which is crucial for effective crime prevention, including addressing disparities and ensuring equitable treatment for all individuals involved in the criminal justice system.

"D: On the one hand, you want to put resources where they're needed, and on the other hand, you have a problem with communication and really explaining why you're doing that. And are you trying to essentially address the disparity by creating more disparity or creating another disparity and sometimes you may have to do that, and sometimes you have to like figure out what's the best way to communicate that is."

"B: And there are intense racial and class disparities,"

Systemic Improvements

Participants emphasized using technology-driven nudging for systemic changes to support crime prevention efforts and improve decision-making in the criminal justice system. They discussed enhancing community engagement, building strong relationships between the community and law enforcement, and promoting inclusive approaches through clear communication strategies.

"B: it relates to that idea of building connection and working in partnership as opposed to imposing oneself on the community from the outside."

"B: But really what we have are a set of interlocking, interrelated criminal legal systems that really are driven largely by policies, right. And therefore by voters."

"B: what does work in terms of messaging around these issues and creating connection across difference so that people can begin to see that that's not an Other, but could be my kid or whatever, right?"

The participants emphasized the importance of framing policies that encourage proactive crime prevention behavior to promote systemic improvements. Additionally, they talked about modifying correctional programs to implement initiatives aimed at altering offender behavior through effective decision-making such as marketing campaigns.

"A: Or proactively, not even maybe just policing, but like some like marketing, you know, to avoid bad behaviors. So there's the marketing campaign"

Further, the participants discussed the prevailing opportunities that require effective decision-making. They discussed community policing problem-solving, which shift towards a problem-solving approach to community policing, Supporting the reintegration of former prisoners into society, improving how courts interact with individuals to ensure clear understanding and compliance.

"A: But also, simple things like opening a banking account and finding your way to the Employment Office or finding your way to your PI or parole officer's office some things that we take for granted. But those are often some of those early first steps that people often, and then they all are not able to get back on the right. "

"A: We're going to nudge all of society to make you know better, you know, more pro social decisions."

Considerations for Implementing Technology-Driven Nudging Interventions

During the selective coding process, the considerations for implementing technology-driven nudging interventions were analyzed. The codes were organized in four sub-themes as shown in Figure 4 and explained in the next subsections.

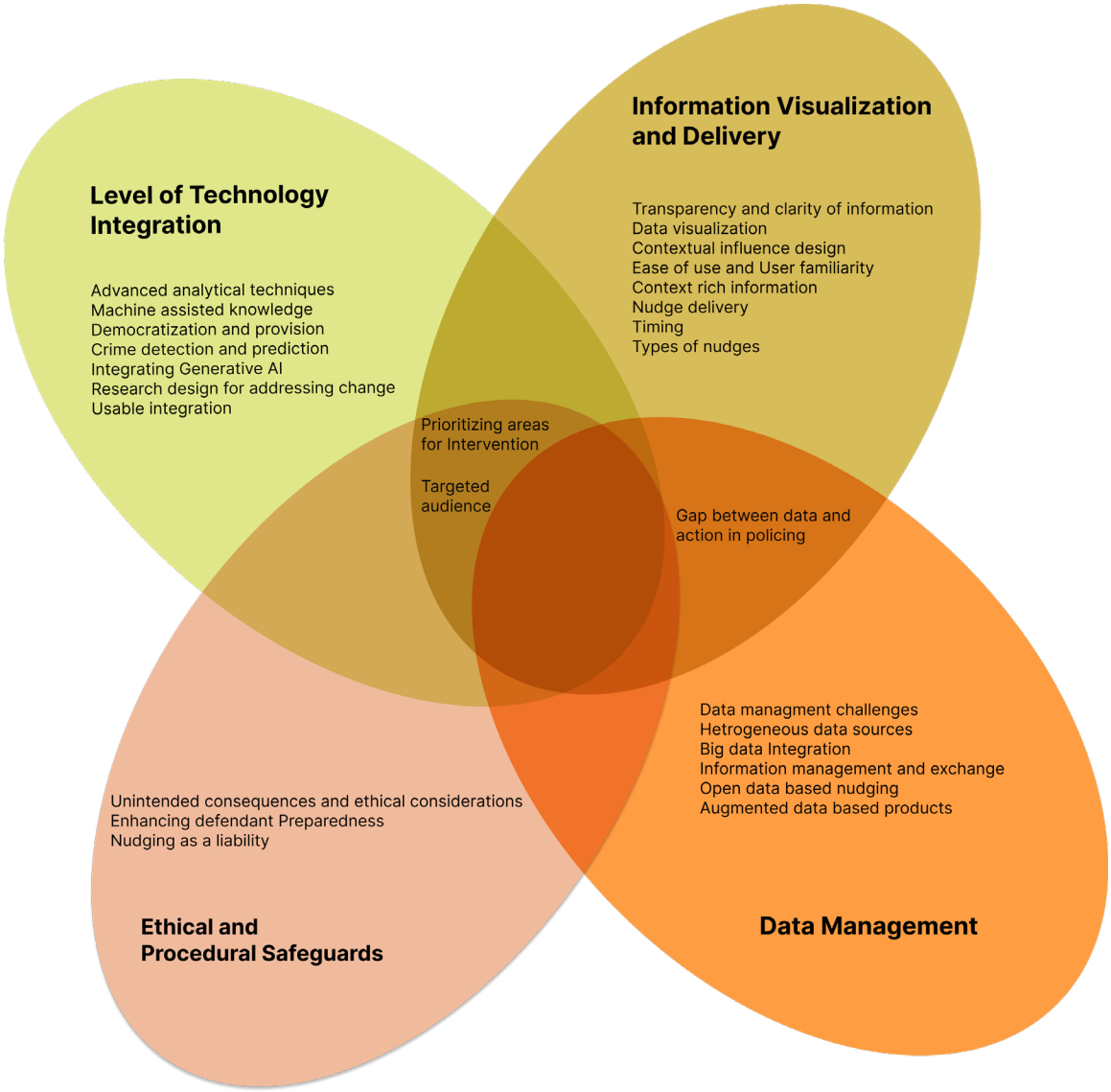


Figure 4. Considerations for implementing technology-driven nudging interventions

Level of Technology Integration

The participants discussed how artificial intelligence (AI) and machine learning could improve decision-making in the criminal justice system, including integrating generative AI, advanced analytical techniques, machine-assisted knowledge, democratization and provision, crime detection and prediction, and research design for incorporating technology into practice.

"D: you know a big project with lots of different data from lots of different systems and you can make some charts and graphs and maybe even do something like automated analysis where we're, you know, finding patterns and trends and hotspots"

"B: I think about that as the democratization of knowledge, right. And I think that machines can help with this, right?"

Information Visualization and Delivery

The participants emphasized that information visualization and delivery are considerations when designing innovative nudging interventions. They highlighted the importance of effectively communicating data, making decisions, and influencing behavior to innovative nudging interventions could improve decision-making at different points in criminal justice

"A: communicate the risks of different decisions to defendants in well, more transparent fashion so If we had data that we could do this with, you could say like kind of the Netflix recognition,"

"A: So, community, the court system, to those who have to engage with it, is a very big black box, and so we are trying to get people information."

Further, participants discussed how information is presented, visualized, and communicated effectively, considering factors like transparency, context, user experience, and the use of nudges

"A: if I'm going to try and nudge someone, the best thing I can do is make it easy for them to choose the thing I want them to do. So, and there's a lot of different ways."

"C: I'm thinking about like watch nudges. I'm thinking about mobile phone nudges and like,"

"D: sometimes you may have to do that, and sometimes you have to like figure out what's the best way to communicate that is."

"C: Talked about professional, you know, being the right nudge at the right time to avoid, you know problematic outcomes like to have somebody like you hope that the behavior is going to be to lead to avoiding the problem behavior,"

Ethical and Procedural Safeguards

Participants stressed the importance of ethical guidelines and procedures to ensure responsible use of nudging techniques. They discussed unintended consequences, ethical considerations, defendant preparedness, and nudging liability.

"D: you're going to nudge the police to sort of react faster and potentially save lives and stuff, but you're also disproportionately targeting one part of your community versus another."

"A: It's not been done everywhere, but just better information to for defendants about what it is expected of them, you know in court."

"A: Shot spotter, which we mentioned earlier to the extent we won't consider that in this nudge category has that amount of liability and that might be a case study to think about. The body on cameras we considered. You know, big nudge and there's a lot of different things that would affect and there's been certainly some legal implications there."

Data Management

The participants discussed the potential unintended consequences associated with data management in implementing technology-driven nudges. They raised concerns about data management challenges, heterogeneous data sources, big data integration, information management and exchange, open data-based nudging, and augmented data-based products.

"A: Actually, the challenge it would be we don't want to have that data"

"D: unstructured data like policies and laws and various, you know resources from community websites and all that stuff and actually, you know, pipe it into the into the workday of a practitioner and make them have access to these things in a way that's not sort of intrusive into the actual workflow is challenging."

"D: if you could leverage all of those different data sources and then, you know, give people the opportunity to augment into some sort of system as a like MVP for the broader idea"

"B: hat kind of change may be amenable then to use some big data, right? And to reflect on big data and to partnered analysis and use of big data"

"D:I see a lot of, like open data from police departments and not as much as I would like I think there should be a lot more open data"

"B: I see as kind of a massive information system, right, information provision, information exchange, information sharing,"

Contextual Factors

Based on participant responses, it was found that contextual factors could influence decision-making in the criminal justice system and technology-driven nudging interventions. Consideration of these factors is crucial for successful implementation and achieving desired outcomes (Suitner & Krisch, 2024). Six contextual factors were identified, including voter influence, public perception, environment and resources, decision-making scenarios, and decision-makers' attitudes (Figure 5). The factors could impact the sustainability of technology-driven nudging initiatives for effective decision-making in the criminal justice domain.

Figure 5. Contextual factors

The experts emphasized that changing voter attitudes on criminal justice policies and policing could foster a sustainable change in system and help reduce crime.

"A: how do we influence the society of voters to impact? What is normal verses what is not?"

Further, some experts brought attention to the public perception of police interaction and improving police and community interaction in a positive way is essential for effective decision-making.

"B: So something that encourages the police to get out and actually interact with their community members."

An intriguing proposition has been put forth, suggesting that the term "criminal justice system" should be reconsidered in favor of "criminal legal system." This proposal stems from the skepticism expressed by legal experts regarding the attainment of justice within the existing framework. While there are participants who have not refuted this assertion, there is a prevailing consensus and support for this perspective.

"B: I don't call it a criminal justice system. I call criminal legal systems, OK? I think what we really should be about is meaningful prevention, meaningfully addressing what's required versus what people think is necessary in response to harm."

The participant from the legal domain(B) raised the issue of changing the mindsets of voters and legislators who define what constitutes a crime before delving into the inner workings of the criminal justice system.

DISCUSSION

Following the analysis of the focus group data, a conceptual framework was developed to explore the utilization of technology-driven nudging in criminal justice decision-making. The study used conceptual framework analysis to provide a framework for the focus group discussion (Ramarapu et al., 1999). Figure 6 outlines the potential of technology-driven nudging and provides a roadmap for pilot implementation. Three key themes, "benefits of using nudges to support decision-making," "considerations for implementing technology-driven nudging interventions," and "contextual factors," were identified and used to develop the framework.

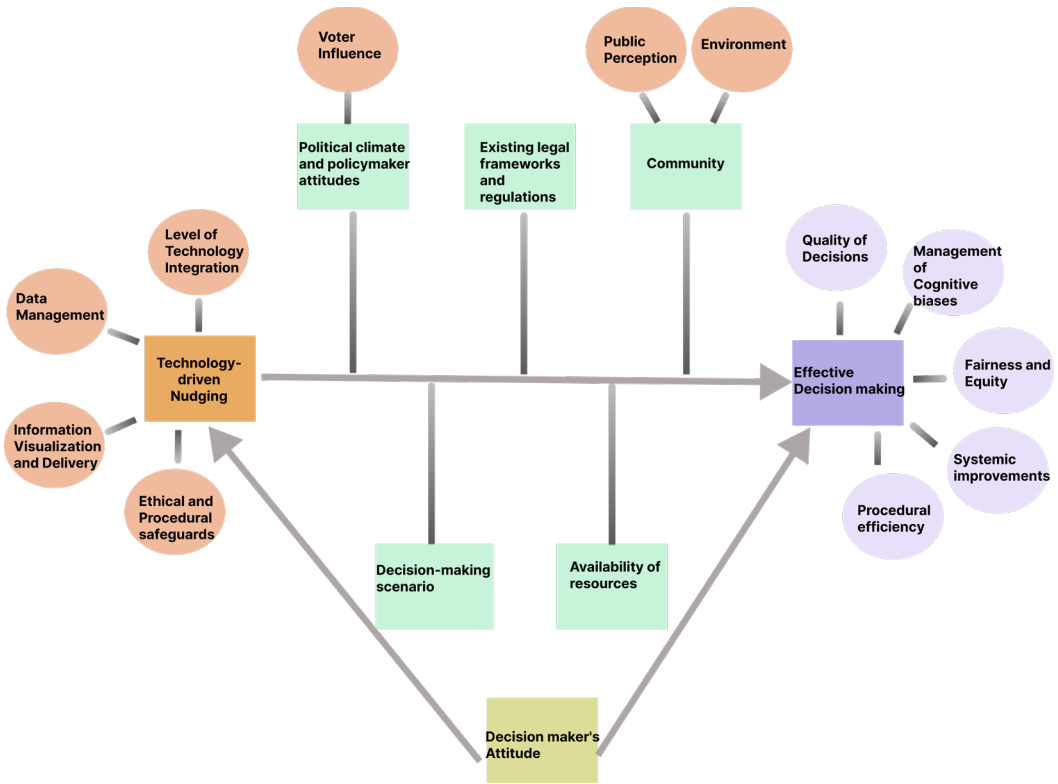


Figure 6. Conceptual framework of focus group opinion on the use of tech-driven nudges to support criminal justice decision-making

TECHNOLOGY-DRIVEN NUDGING AS A CENTRAL INTERVENTION

At the core of the framework is the concept of technology-driven nudging, which represents a promising approach to improving decision-making in the criminal justice system. As Thaler and Sunstein (2009) argue, nudges can influence behavior in predictable ways without restricting choice. In the context of criminal justice, this could involve using technology to present information or options in ways that encourage more fair, consistent, and effective decisions.

The framework highlights several crucial dimensions of technology-driven nudging. One key dimension "Data Management", relies on high-quality, relevant data to facilitate effective nudging. In criminal justice, this could involve integrating data from various sources to provide a more comprehensive picture for decision-makers. Integrating data-driven approaches can provide valuable insights into the impact of nudging interventions on decision-making processes, allowing for informed and evidence-based policy implementation. Further, the level of technology integration was the degree to which technology is integrated into existing processes will significantly impact its effectiveness.

Johnson et al. (2012) emphasize the importance of choice architecture, which in this context could involve designing interfaces that highlight key information or present options in ways that mitigate cognitive biases. Hence "Information Visualization and Delivery" describes how information is presented can significantly influence decision-making in the framework. Ethical and Procedural Safeguards: As the use of black box AI or non-interpretable AI systems in the criminal justice system poses risks to public safety and fundamental human and constitutional rights (Garrett & Rudin, 2023), implementing robust ethical guidelines and procedural safeguards is crucial to maintain transparency and accountability, indicating "Ethical and Procedural Safeguards."

It is recommended that researchers or practitioners consider these dimensions when trying to design tech-based nudge interventions to facilitate effective decision-making in the criminal legal system.

The framework posits several positive outcomes from the successful implementation of technology-driven nudging. By providing relevant information and mitigating cognitive biases, nudges can improve the overall quality of decisions (Greenwald & Krieger, 2006; Nickerson, 1998), suggesting that nudging interventions can enhance. These findings align with prior research on implicit bias in decision-making (Greenwald & Krieger, 2006), suggesting that technology-driven nudging could mitigate such biases. According to Greenwald and Krieger (2006), technology can help identify and mitigate cognitive biases in decision-making. Therefore, it is evident that a better outcome of managing cognitive biases would result if the nudging can be implemented in a precise way applying the technological considerations as mentioned in the framework. Further, fairness and equity can be achieved by standardizing decision processes and reducing human bias by promoting technology-driven nudges with more equitable outcomes. Moreover, automation and streamlined information delivery can increase the efficiency of decision-making processes, addressing issues of case backlog and resource constraints by promoting better decision-making outcomes of procedural efficiency. Over time, data gathered from technology-driven interventions can inform broader systemic improvements in the criminal justice system, suggesting that systemic improvements would result in better decision-making aid with technology-driven nudging interventions tailored to specific requirements of decision-makers. It is recommended that researchers or practitioners consider these decision-making outcomes and prioritize each outcome when designing tech-based nudge interventions.

The framework identifies five moderating contextual factors such as political climate and policy-maker attitude, existing legal frameworks regulations, community, decision-making scenario, and availability of resources. They shape the implementation and effectiveness of technology-driven nudging. The success of technological interventions depends heavily on political support and the attitudes of key decision-makers. As trust in the criminal justice and legal system is crucial (T. R. Tyler & Huo, 2002), policymakers must be convinced of the value and legitimacy of these interventions. Hence, political climate and policymaker attitudes are considered as contextual factors which could

act as a moderating variable in the process of implementing technology driven nudging in the decision-making.

Further, the existing legal frameworks and regulations contextual factor is a moderating factor in the framework since the implementation of technology-driven nudges must operate within existing legal constraints.

As Surette (2014) suggests, media portrayals of crime and the justice system play a crucial role in shaping public perception, potentially leading to misunderstandings about crime rates and the efficiency of the criminal justice system. It is more important to focus on community-related contextual factors, such as public perception and environment, when designing technological interventions for social decision making. Further, this would bring public confidence in the justice system as T. R. Tyler (2005) noted that confidence would enable the public to actively engage with law enforcement, report crimes, or participate in legal processes as witnesses or jurors by enabling criminal justice professionals to make quality decisions. Additionally, the decision-making scenario is considered a moderating factor in the framework, as it represents the specific context in which decisions are made (e.g., bail hearings, sentencing). The decision-making scenario will influence the design and implementation of nudges as different scenarios may require tailored approaches (Dhami & Ayton, 2001).

As demonstrated in the conceptual framework, the successful implementation of technology-driven nudges depends on adequate resources, including funding, technical infrastructure, and trained personnel.

Based on the data collected from the focus group, it was identified that the decision maker's attitude could be considered a mediating factor as it could directly affect the viability of using the nudging intervention for the decision-making process. This underscores the importance of addressing individual attitudes and biases in any intervention strategy. As Tversky and Kahneman (1974) mentioned, judgments and biases make humans make varied decisions, and they directly affect the adoption of technology-mediated interventions for enhancing the decision-making in the criminal justice processes by the people. Hence, it underscores the importance of addressing individual attitudes and biases in any intervention strategy.

It is recommended that researchers or practitioners consider these dimensions when trying to design tech-based nudge interventions to facilitate effective decision-making in the criminal legal system.

CONCLUSION

Many studies in different domains have developed conceptual frameworks based on applying behavioral economic insights. The study by Alemanno and Spina (2014) highlighted the importance of conceptual frameworks that put behavioral insights into practice in administrative law. They further mention that the conceptual frameworks incorporating behavioral insights into policymaking are essential in regulating government agencies. In addition, there are conceptual frameworks developed based on nudging such as supporting the preventive and corrective measures to decrease workplace sexual harassment (Bouzzine et al., 2024) and nudging judges towards using pretrial risk assessment instruments for reducing challenges in decision-making (DeMichele et al., 2021). However, there is no study related to incorporating nudging in designing technological interventions for addressing issues related to decision-making in criminal justice professionals with technology. Hence the main contribution of the study was the development of a conceptual framework that guides the researchers, practitioners, and policymakers on how to effectively design and implement technology-driven nudging interventions for criminal justice decision-making by focusing on the nuanced, contextual factors that were integrated into the framework. The proposed conceptual framework provides a comprehensive view of the factors influencing the implementation and effectiveness of technology-driven nudging in criminal justice decision-making. It highlights the potential for such interventions to improve the quality, fairness, and efficiency of decisions while also acknowledging the complex

interplay of contextual factors and potential challenges that contribute to the trustworthiness of the interventions. In addition, the dimensions in the framework could be used to identify which area of the intervention should be improved to guide effective and informed decision-making that ultimately preserves the trustworthiness of the decision outcomes while mitigating the decision-making challenges in criminal justice applications.

Limitations

Due to the use of convenience sampling and its limitations to enhance the reliability of the study's findings, experts with over 10 years of experience in the relevant field were selected. Thus, the seniority of the participants helped alleviate the challenges associated with data collection. However, it lacks the perspectives of practitioners, affected communities, or end-users of criminal justice systems who are non-experts. Further, the study is only limited to the United States, and generalizing the findings to other countries and different legal contexts will require more research. The small sample size may not reflect the rigor of the findings and can affect the internal validity of the study.

Focus groups used for collecting data can be unreliable because due to varying interactions and influences among participants. To improve reliability, a standard discussion guide was employed during the focus group sessions. However, to mitigate the impact of power dynamics among participants, further research needs to figure out how to avoid that issue in the discussions.

To minimize bias from researchers and increase internal validity, the data collected was shared with the participants for their feedback before any further analysis. After gathering input, the research team worked together to discuss and confirm the themes and codes identified from the data.

Future Work and Recommendations

The proposed conceptual framework has not been tested in a pilot study before moving it to the testing in a real-world setting. Hence, the practical application of the proposed conceptual framework should be validated through further empirical studies.

Future research should test specific nudging interventions in criminal justice and conduct longitudinal research to assess system-wide impacts and public trust in the long term by incorporating non-expert perspectives in the domain. Ethical considerations, including transparency, accountability, and the potential for technological interventions to exacerbate disparities, should be a priority.

To gain valuable insights and perspectives, arranging multiple focus group sessions with diverse practitioners in the criminal justice system would provide diverse viewpoints and input, allowing for a more comprehensive understanding of the issues and improve data saturation. Further to address the threats to external validation, future research can incorporate experts from different countries and legal systems to provide a global perspective beyond the United States to test the proposed framework in different legal systems around the world. This will enhance the external validity of the study by attempting to reach cross cultural generalization.

Participants were concerned that nudging interventions should consider users' familiarity for better effectiveness. When designing these nudges, it is important to find a suitable means of communication or interaction with the user. Hence, usability research in human-computer interaction (HCI) can be utilized to explore the design of nudges with technology, particularly with AI technologies in future studies and evaluate the efficacy of the interventions in real-world case studies.

There are also other opportunities to explore the contextual factors in the proposed framework. For instance, it is more important to understand how people communicate on social media in today's digital era and how it impacts their attitudes and influences societal goals in decision-making, particularly with regards to shaping voting decisions. Online social networks offer users unique opportunities to interact with a wide variety of viewpoints (Sikder et al., 2020).

Based on the study findings, Table 5 presents use cases and potential scenarios for future research within the criminal justice sector.

Table 5. Technology-driven nudging use cases in the criminal justice system

Law Enforcement	Courts	Corrections	Civic Engagement
Contextual influence design for police to interpret law accurately	Enhancing defendant preparedness for trials	Reintegration after prison	Reframing voter attitudes via tech-based nudging interventions
	Enhancing client communication	Strategic messaging	Framing policies
			Understanding the impact of digital nudging in social media on polarization and violence

Furthermore, the integration of generative AI and nudging for decision-making, along with augmented databases, could help align tech-based interventions. The proposed framework offers research opportunities for understanding civic engagement, such as analyzing the nudge effect of social media platforms on polarization and the impact of violence on defining crime.

Further, researchers can utilize this proposed framework as a guide or toolbox to evaluate both negative and positive effects or outcomes on decision-making with the technology-based nudging intervention. Since there is a negative perception that using AI will eliminate user autonomy and replace humans in decision-making tasks, Further, this proposed framework can be utilized as a roadmap to design and validate technological interventions in the domain of algorithmic decision-making (ADM) research, where researchers combine technology and human rationale to augment decision-making processes to assist various domains including business, healthcare, criminal justice, etc. (Steyvers & Kumar, 2023; Wang et al., 2023). ADM research seeks ways to augment or enhance human skills without replacing humans while retaining human autonomy, which is a critical debate in the mainstream (Jarrahi, 2018).

Further, the use of mixed methods research, which can be utilized to integrate the nuances of quantitative and qualitative research strengths in testing this frame, will be another future work in the realm of augmenting and nudging decision-makers with technology in the domain of criminal justice and other disciplines. According to the proposed framework, the attitude of the decision-maker is a key contextual factor affecting both the intervention and the outcomes. It presents a possible area of research to qualitatively investigate the perceptions of people through interviews and focus groups while quantifying the findings with surveys and randomized control trials (RCT). In addition, the triangulation can be applied to cross-check the findings of this study and evaluate the efficacy of the proposed framework.

Moreover, future research to measure and evaluate the ethical aspect of the proposed conceptual framework using ethical frameworks for AI that exist in the world, such as the EU AI Act or the U.S. NIST AI Risk Management Framework, is a promising area of focus to measure the credibility of the proposed framework as AI is in the mainstream as a technology. The practitioners can build and test the AI tools in pilot studies and eventually deploy them in real-world settings by focusing on the ethical dimensions in the proposed framework. In addition, policymakers must establish guidelines for ethical AI use in criminal justice decision-making.

Finally, this study highlights the potential of technology-driven nudges in improving criminal justice decision-making with expert opinions in the United States by demonstrating a framework that maps external influences, contextual factors, and internal mechanisms to enhance the trust in the criminal justice system. This will provide a robust foundation for empirical validation in criminal justice and even various decision-making areas. Interdisciplinary collaboration will be essential to refine and generalize this model to ensure technology catalyzes equitable outcomes such as trust in complex augmented decision-making environments in the modern world.

ETHICAL DECLARATION

This research has been reviewed and approved by the Institutional Review Board (IRB) of University of Cincinnati to ensure compliance with ethical guidelines and the protection of human subjects.

REFERENCES

Alemanno, A., & Spina, A. (2014). Nudging legally: On the checks and balances of behavioral regulation. *International Journal of Constitutional Law*, *12*(2), 429–456. https://doi.org/10.1093/icon/mou033

Barocas, S., & Selbst, A. D. (2016). Big data's disparate impact. *California Law Review*, *104*, 671.

Battaglio, R. P., Jr., Belardinelli, P., Bellé, N., & Cantarelli, P. (2019). Behavioral public administration *ad fontes*: A synthesis of research on bounded rationality, cognitive biases, and nudging in public organizations. *Public Administration Review*, *79*(3), 304–320. https://doi.org/10.1111/puar.12994

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., Tucker-Ray, W., Congdon, W. J., & Galing, S. (2017). Should governments invest more in nudging? *Psychological Science*, *28*(8), 1041–1055. https://doi.org/10.1177/0956797617702501

Berk, R., Heidari, H., Jabbari, S., Kearns, M., & Roth, A. (2021). Fairness in criminal justice risk assessments: The state of the art. *Sociological Methods & Research*, *50*(1), 3–44. https://doi.org/10.1177/0049124118782533

Berk, R., Sherman, L., Barnes, G., Kurtz, E., & Ahlman, L. (2009). Forecasting murder within a population of probationers and parolees: A high stakes application of statistical learning. *Journal of the Royal Statistical Society Series A: Statistics in Society*, *172*(1), 191–211. https://doi.org/10.1111/j.1467-985X.2008.00556.x

Boateng, F. D., & Adjorlolo, S. (2019). Judicial trustworthiness in Africa: Do macro-level conditions matter? *Crime & Delinquency*, *65*(12), 1689–1710. https://doi.org/10.1177/0011128718772100

Bornstein, B. H., Miller, M. K., & DeMatteo, D. (Eds.). (2022). *Advances in Psychology and Law* (Vol. 6). Springer International Publishing. https://doi.org/10.1007/978-3-031-13733-4

Bouzzine, Y. D., Tabiica, I., Galandi, N., & Lueg, R. (2024). What can nudging offer to reduce workplace sexual harassment? A conceptual review. *World Development Sustainability*, *4*, 100149. https://doi.org/10.1016/j.wds.2024.100149

Bradford, B., & Jackson, J. (2009). Public trust in criminal justice: A review of the research literature in the United States. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1369704

Cappa, F., Rosso, F., Giustiniano, L., & Porfiri, M. (2020). Nudging and citizen science: The effectiveness of feedback in energy-demand management. *Journal of Environmental Management*, *269*, 110759. https://doi.org/10.1016/j.jenvman.2020.110759

Chamberlain, J., & Miller, M. K. (2009). Evidence of secondary traumatic stress, safety concerns, and burnout among a homogeneous group of judges in a single jurisdiction. *The Journal of the American Academy of Psychiatry and the Law*, *37*(2), 214–224.

Chaudhary, G. (2024). Explainable artificial intelligence (xAI): Reflections on judicial system. *Kutafin Law Review*, *10*(4), Article 4. https://doi.org/10.17803/2713-0533.2023.4.26.872-889

Chiao, V. (2019). Fairness, accountability and transparency: Notes on algorithmic decision-making in criminal justice. *International Journal of Law in Context*, *15*(2), 126–139. https://doi.org/10.1017/S1744552319000077

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*(6), 1015. https://doi.org/10.1037//0022-3514.58.6.1015

Corbin, J., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, *13*(1), 3-21. https://doi.org/10.1007/BF00988593

Daly, A., Hagendorff, T., Li, H., Mann, M., Marda, V., Wagner, B., & Wang, W. W. (2020). *AI, governance and ethics: Global perspectives* (SSRN Scholarly Paper 3684406). Social Science Research Network. https://doi.org/10.2139/ssrn.3684406

Danziger, S., Levav, J., & Avnaim-Pesso, L. (2011). Extraneous factors in judicial decisions. *Proceedings of the National Academy of Sciences*, *108*(17), 6889–6892. https://doi.org/10.1073/pnas.1018033108

de Bruijn, H., Warnier, M., & Janssen, M. (2022). The perils and pitfalls of explainable AI: Strategies for explaining algorithmic decision-making. *Government Information Quarterly*, *39*(2), 101666. https://doi.org/10.1016/j.giq.2021.101666

DeMichele, M., Comfort, M., Barrick, K., & Baumgartner, P. (2021). The intuitive-override model: Nudging judges toward pretrial risk assessment instruments. *Fed. Probation*, *85*(22). https://doi.org/10.2139/ssrn.3168500

Dhami, M. K., & Ayton, P. (2001). Bailing and jailing the fast and frugal way. *Journal of Behavioral Decision Making*, *14*(2), 141–168. https://doi.org/10.1002/bdm.371

Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data – Evolution, challenges and research agenda. *International Journal of Information Management*, *48*, 63–71. https://doi.org/10.1016/j.ijinfomgt.2019.01.021

Erdeniz, S. P., Trang Tran, T. N., Felfernig, A., Lubos, S., Schrempf, M., Kramer, D., & Rainer, P. P. (2023). Employing nudge theory and persuasive principles with explainable ai in clinical decision support. In *2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)* (pp. 2983–2989). IEEE. https://doi.org/10.1109/BIBM58861.2023.10385315

Flynn, A., & Freiberg, A. (2018). Building trust and confidence in the criminal justice system. In A. Flynn & A. Freiberg (Eds.), *Plea negotiations: pragmatic justice in an imperfect world* (pp. 207–220). Springer International Publishing. https://doi.org/10.1007/978-3-319-92630-8_9

Gans-Combe, C. (2022). Automated justice: Issues, benefits and risks in the use of artificial intelligence and its algorithms in access to justice and law enforcement. In D. O'Mathúna & R. Iphofen (Eds.), *Ethics, integrity and policymaking: The value of the case study* (pp. 175-194). Springer.

Garrett, B. L., & Rudin, C. (2023). *The right to a glass box: Rethinking the use of artificial intelligence in criminal justice* (SSRN Scholarly Paper 4275661). Social Science Research Network. https://doi.org/10.2139/ssrn.4275661

Gjoka, A., & Xhuvani, E. (2023). The role of trust in the criminal procedure. *Academic Journal of Business, Administration, Law and Social Sciences*, *9*(3), 20–27. https://doi.org/10.2478/ajbals-2023-0006

Green, J., Draper, A., & Dowler, E. (2003). Short cuts to safety: Risk and "rules of thumb" in accounts of food choice. *Health, Risk & Society*, *5*(1), 33–52. https://doi.org/10.1080/1369857031000065998

Greenwald, A. G., & Krieger, L. H. (2006). Implicit bias: Scientific foundations. *California Law Review*, *94*(4), 945. https://doi.org/10.2307/20439056

Grgic-Hlaca, N., Redmiles, E. M., Gummadi, K. P., & Weller, A. (2018). Human perceptions of fairness in algorithmic decision making: A case study of criminal risk prediction. *Proceedings of the 2018 World Wide Web Conference (WWW '18)* (pp. 903–912). ACM. https://doi.org/10.1145/3178876.3186138

Guthrie, C., Rachlinski, J., & Wistrich, A. (2007). Blinking on the bench: How judges decide cases. *Cornell Law Faculty Publications*. https://scholarship.law.cornell.edu/facpub/917

Hamid, A., Julianto, A., Rasnoto, R., Abdurohim, A., & Ndun, I. (2024). Reforming criminal justice: A comparative analysis of modern legal frameworks. *The Journal of Academic Science*, *1*(8), Article 8. https://doi.org/10.59613/1qggt510

Hough, M., Jackson, J., & Bradford, B. (2013). Legitimacy, trust, and compliance: an empirical test of procedural justice theory using the European social survey. In J. Tankebe & A. Liebling (Eds.), *Legitimacy and criminal justice: An international exploration* (pp. 326-352). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198701996.003.0017

Hyatt, J., & Berk, R. (2015). Machine learning forecasts of risk to inform sentencing decisions. *Federal Sentencing Reporter*, *27*, 222–228. https://doi.org/10.1525/fsr.2015.27.4.222

Jachimowicz, J. M., Duncan, S., Weber, E. U., & Johnson, E. J. (2019). When and why defaults influence decisions: A meta-analysis of default effects. *Behavioural Public Policy*, *3*(02), 159–186. https://doi.org/10.1017/bpp.2018.43

Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, *61*(4), 577–586. https://doi.org/10.1016/j.bushor.2018.03.007

Johnson, E. J., Shu, S. B., Dellaert, B. G. C., Fox, C., Goldstein, D. G., Häubl, G., Larrick, R. P., Payne, J. W., Peters, E., Schkade, D., Wansink, B., & Weber, E. U. (2012). Beyond nudges: Tools of a choice architecture. *Marketing Letters*, *23*(2), 487–504. https://doi.org/10.1007/s11002-012-9186-1

Kazancoglu, I., Kazancoglu, Y., Yarimoglu, E., & Kahraman, A. (2020). A conceptual framework for barriers of circular supply chains for sustainability in the textile industry. *Sustainable Development*, *28*(5), 1477–1492. https://doi.org/10.1002/sd.2100

Matjasko, J. L., Cawley, J. H., Baker-Goering, M. M., & Yokum, D. V. (2016). Applying behavioral economics to public health policy. *American Journal of Preventive Medicine*, *50*(5 Suppl 1), S13–S19. https://doi.org/10.1016/j.amepre.2016.02.007

Mazerolle, L., Bennett, S., Davis, J., Sargeant, E., & Manning, M. (2013). Legitimacy in policing: A systematic review. *Campbell Systematic Reviews*, *9*. https://doi.org/10.4073/csr.2013.1

Mele, C., Russo Spena, T., Kaartemo, V., & Marzullo, M. L. (2021). Smart nudging: How cognitive technologies enable choice architectures for value co-creation. *Journal of Business Research*, *129*, 949–960. https://doi.org/10.1016/j.jbusres.2020.09.004

Mugari, I., & Obioha, E. E. (2021). Predictive policing and crime control in the United States of America and Europe: Trends in a decade of research and the future of predictive policing. *Social Sciences*, *10*(6), Article 6. https://doi.org/10.3390/socsci10060234

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*(2), 175-220. https://doi.org/10.1037//1089-2680.2.2.175

O'Neil, C. (2017). *Weapons of math destruction: How big data increases inequality and threatens democracy* (1st ed.). Crown.

Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods*, *8*(3), 1–21. https://doi.org/10.1177/160940690900800301

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

Rabiee, F. (2004). Focus-group interview and data analysis. *Proceedings of the Nutrition Society*, *63*(4), 655–660. https://doi.org/10.1079/PNS2004399

Ramarapu, N. K., Simkin, M. G., & Raisinghani, M. (1999). The analysis and study of the impact of technology on groups: A conceptual framework. *International Journal of Information Management*, *19*(2), 157–172. https://doi.org/10.1016/S0268-4012(99)00006-7

Rappaport, J. (2020). Some doubts about "democratizing" criminal justice. *The University of Chicago Law Review*, *87*(3), 711–814. https://doi.org/10.2139/ssrn.3418059

Richardson, C. A., & Rabiee, F. (2001). A question of access: An exploration of the factors that influence the health of young males aged 15 to 19 living in Corby and their use of health care services. *Health Education Journal*, *60*(1), 3–16. https://doi.org/10.1177/001789690106000102

Sah, S., Robertson, C. T., & Baughman, S. B. (2015). Blinding prosecutors to defendants' race: A policy proposal to reduce unconscious bias in the criminal justice system. *Behavioral Science & Policy, 1*(2), 69-76. https://doi.org/10.1177/237946151500100208

Sherman, L. W. (2002). *Trust and confidence in criminal justice: (527842006-004)* [Dataset]. https://doi.org/10.1037/e527842006-004

Sikder, O., Smith, R. E., Vivo, P., & Livan, G. (2020). A minimalistic model of bias, polarization and misinformation in social networks. *Scientific Reports*, *10*(1), 5493. https://doi.org/10.1038/s41598-020-62085-w

Simon, A. (1990). Invariants of human behavior. *Annual Review of Psychology*, *41*(1), 1-20. https://doi.org/10.1146/annurev.psych.41.1.1

Singer, A. J., Chouhy, C., Lehmann, P. S., Walzak, J. N., Gertz, M., & Biglin, S. (2019). Victimization, fear of crime, and trust in criminal justice institutions: A cross-national analysis. *Crime & Delinquency*, *65*(6), 822–844. https://doi.org/10.1177/0011128718787513

Stewart, D. W., & Shamdasani, P. (2017). Online focus groups. *Journal of Advertising*, *46*(1), 48–60. https://doi.org/10.1080/00913367.2016.1252288

Steyvers, M., & Kumar, A. (2023). Three challenges for AI-assisted decision-making. *Perspectives on Psychological Science*, *19*(5), 722-734. https://doi.org/10.1177/17456916231181102

Suitner, J., & Krisch, A. (2024). Navigating context in experiments: The "real," the roots, the rationale. *European Urban and Regional Studies, 31*(3), 302–316. https://doi.org/10.1177/09697764231205218

Surette, R. (2014). *Media, crime, and criminal justice* (5th ed.). Cengage Learning.

Suyatno, S., Sibawaihi, S., Wantini, W., Firdausi, D. K. A., & Patimah, L. (2023). Comparing the experience of pre-service teachers in the first and final semesters in online learning using a focus group study. *The Qualitative Report*. https://doi.org/10.46743/2160-3715/2023.5727

Thaler, R. H., & Benartzi, S. (2004). Save More Tomorrow™: Using behavioral economics to increase employee saving. *Journal of Political Economy*, *112*(S1), S164–S187. https://doi.org/10.1086/380085

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin.

Then, K. L., Rankin, J. A., & Ali, E. (2014). Focus group research: What is it and how can it be used? *Canadian Journal of Cardiovascular Nursing = Journal canadien en soins infirmiers cardio-vasculaires*, *24*(1), 16–22.

Travaini, G. V., Pacchioni, F., Bellumore, S., Bosia, M., & De Micco, F. (2022). Machine learning and criminal justice: A systematic review of advanced methodology for recidivism risk prediction. *International Journal of Environmental Research and Public Health*, *19*(17), Article 17. https://doi.org/10.3390/ijerph191710594

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and Biases. *Science, 185*(4157), 1124-1131. https://doi.org/10.1126/science.185.4157.1124

Tyler, T. (2001). Trust and law abidingness: A proactive model of social regulation. *Boston University Law Review*, *81*.

Tyler, T. R. (2005). Policing in black and white: Ethnic group differences in trust and confidence in the police. *Police Quarterly*, *8*(3), 322–342. https://doi.org/10.1177/1098611104271105

Tyler, T. R. (2011). Trust and legitimacy: Policing in the USA and Europe. *European Journal of Criminology*, *8*(4), 254–266. https://doi.org/10.1177/1477370811411462

Tyler, T. R., & Huo, Y. J. (2002). *Trust in the law: Encouraging public cooperation with the police and courts*. Russell Sage Foundation.

Van Woerkom, W., Grossi, D., Prakken, H., & Verheij, B. (2024). A case-based-reasoning analysis of the COMPAS Dataset. In J. Savelka, J. Harasta, T. Novotna, & J. Misek (Eds.), *Frontiers in artificial intelligence and applications*. (pp. 180-190). IOS Press. https://doi.org/10.3233/FAIA241244

Wang, G., Guo, Y., Zhang, W., Xie, S., & Chen, Q. (2023). What type of algorithm is perceived as fairer and more acceptable? A comparative analysis of rule-driven versus data-driven algorithmic decision-making in public affairs. *Government Information Quarterly*, *40*(2), 101803. https://doi.org/10.1016/j.giq.2023.101803

Worthy, B. (2010). More open but not more trusted? The effect of the Freedom of Information Act 2000 on the United Kingdom Central Government. *Governance*, *23*(4), 561–582. https://doi.org/10.1111/j.1468-0491.2010.01498.x

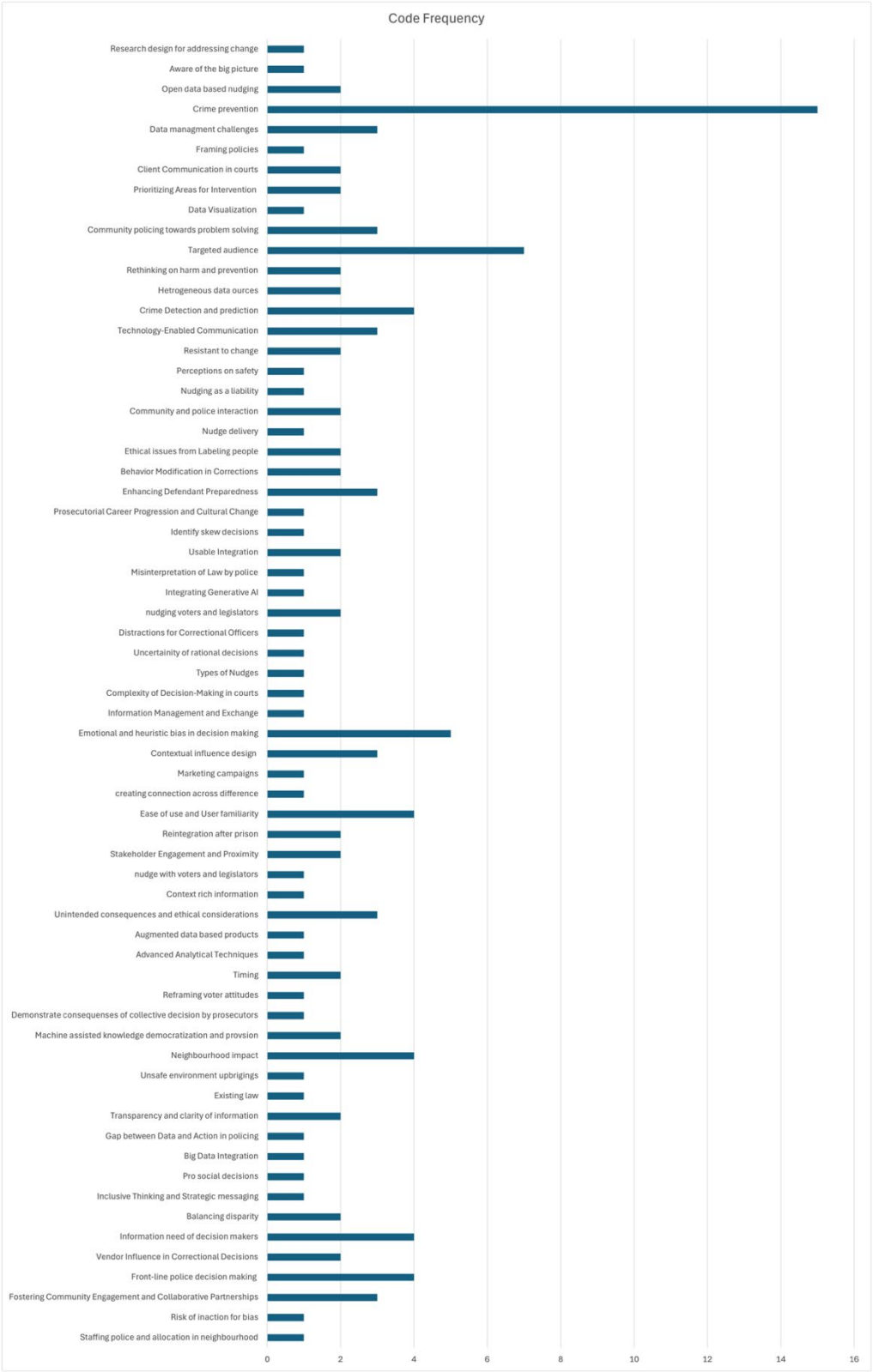
Wu, Y. (2014). The impact of media on public trust in legal authorities in China and Taiwan. *Asian Journal of Criminology*, *9*(2), 85–101. https://doi.org/10.1007/s11417-013-9177-z

Yeung, K. (2017). 'Hypernudge': Big Data as a mode of regulation by design. *Information, Communication & Society*, *20*(1), 118–136. https://doi.org/10.1080/1369118X.2016.1186713

Završnik, A. (2020). Criminal justice, artificial intelligence systems, and human rights. *ERA Forum*, *20*(4), 567–583. https://doi.org/10.1007/s12027-020-00602-0

Završnik, A. (2021). Algorithmic justice: Algorithms and big data in criminal justice settings. *European Journal of Criminology*, *18*(5), 623–642. https://doi.org/10.1177/1477370819876762

APPENDIX - DISTRIBUTION OF CODE SEGMENTS



AUTHORS

Hansinie Madushika Jayathilake is a PhD candidate in Information Technology at the University of Cincinnati, where she works as Graduate Research Assistant. She has experience working as an educator for undergraduate students in the field of computing. Her research interests focus on exploring human-AI interactions in augmented decision-making environments and applying information technology solutions to address socio-economic issues.

Amir Reza Asadi is a PhD candidate in Information Technology at the University of Cincinnati, investigating human-AI interaction and virtual human modeling using personas. With nearly a decade of industry experience in emerging technologies, his research extends to human-computer interaction in mixed reality and digital twins.

Taiwo Peter Akinremi is a Graduate Research Assistant at the University of Cincinnati studying as a full-time doctoral student in UC's Ph.D in Information Technology program. With over 10 years experience, Taiwo has provided IT advisory and compliance audit for many startup organizations. He is also an active contributor to internet governance policy discussions. With a keen interest in cybersecurity, Taiwo focuses on areas such as the Industrial Internet of Things (IIoT), cyber-physical systems, cybersecurity testbeds, internet governance, and risk management. He is driven by a steadfast commitment to promoting evidence-based practices and the applicability of information technology in society.

Joel Kwesi Appiah is a Graduate Research Assistant at the University of Cincinnati, where he is also pursuing his PhD in Information Technology. His research interests span cyber security, the Industrial Internet of Things (IIoT), systems administration, and vulnerability assessment.

Opetunde Ibitoye is a PhD Candidate in Information Technology (IT) at the University of Cincinnati and a Research Assistant. Her research delves into specific areas in IT, such as artificial intelligence, big data technologies, human-computer interaction and information security. Her current work focuses on enhancing resilience of supply chain operations through AI integration.

Dr. Hazem Said is a Professor of Information Technology and the director of the School of Information Technology (SoIT) at the University of Cincinnati (UC). He is a certified Project Management Professional (PMP). Dr. Said founded the UC Information Technology Solutions Center (ITSC) in 2012, where he consults with government, public and private organizations, and leads teams of professionals, as well as graduate, undergraduate, and high school students, to investigate, develop, and support a variety of information technology solutions. In addition, Dr. Said is a co-founder and co-director of the Ohio Cyber Range Institute and the Justice, Law, and Information Technology Institute. Dr. Said is the recipient of over 200 grants and contracts totaling over $30 million and has authored over 27 articles on topics related to information technology education.