

## The Relationship between Criminology and Auxiliary Criminal Sciences

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### ABSTRACT

This paper examines the relationship between criminology and its auxiliary criminal sciences, specifically focusing on forensic psychiatry, forensic medicine, forensic criminal investigation, and criminal policy science. The objective is to explore how these interdisciplinary connections contribute to a more comprehensive understanding of crime, criminal behavior, and effective justice practices. Forensic psychiatry provides insights into offenders' mental health, aiding in assessments for sentencing and rehabilitation. Forensic medicine offers biological evidence critical to understanding violent crime, while forensic criminal investigation supplies empirical data through evidence collection and crime scene analysis, enriching criminological research. Criminal policy science translates criminological findings into actionable policies, promoting crime prevention and public safety. Together, these fields enhance the precision and impact of criminology, enabling a multifaceted approach that addresses the psychological, biological, social, and policy related dimensions of crime. This interdisciplinary framework supports criminal justice systems in making informed, evidence based decisions, fostering a more adaptive and responsive approach to crime prevention, investigation, and rehabilitation. By highlighting the value of integrating criminology with auxiliary sciences, the paper underscores the importance of collaborative efforts to advance the effectiveness and fairness of the criminal justice system.

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### Introduction

As large and diverse subject of research, criminology seeks to understand why individuals engage in negative behavior and provide strategies for prevention [1]. Forensics, according to, is the science study of crime, its causes, and the operations of the criminal justice system [2]. Some views hold that it addresses crime and stops it using concepts from society, psychology, and biology, therefore enhancing its approach. Combining several points of view, criminology offers a whole picture by considering both the performance of the law system and unlawful activity [3]. For criminology in the connected world of today, working collaboratively with other criminal disciplines including forensic medicine, forensic psychology, forensic criminal investigation, and criminal policy science is becoming ever more important [4].

Sociological points of view stress how society shapes crime and argue that societal factors regularly result in violent behavior. According to Merton's strain theory, for example, crime stems from society's aspirations not matching the means of access to reach those goals [5]. According to the social learning theory, social interactions educate criminal behavior as well [6]. These ideas show how better attempts at community level crime prevention might be made possible by understanding social dynamics.

In criminology, psychological theories seek to explain how mental characteristics and approaches of thinking could inspire illicit activity. According to theories such as Eysenck's, some characteristics, such as extraversion and high degrees of

neuroticism, could make a person more prone to commit crimes [7]. Making tailored support programs and rehabilitation inmates both depend on psychological insights; biological points of view examine the physical and hereditary elements that could increase lawbreaking propensity. These theories which examine neurochemistry, brain anatomy, and genes say that specific biological features can make someone more prone to commit a crime [8]. Understanding differences among persons and customizing therapies for offenders depend on biological concepts.

### Problem Statement

Understanding and addressing crime effectively requires a multidisciplinary approach, where criminology and auxiliary criminal sciences, like forensic psychology, criminalistics, and forensic pathology, play integral roles. Criminology provides a theoretical foundation by studying the causes, prevention, and social impact of crime, while auxiliary criminal sciences offer practical tools and methods to solve and analyze criminal cases. However, the relationship between these disciplines is complex and evolving, as the boundaries between theory and application often overlap. This study seeks to explore the synergy between criminology and auxiliary criminal sciences and how this relationship can enhance the accuracy, efficiency, and overall effectiveness of crime analysis and criminal justice processes.

### Main Question

How does the relationship between criminology and auxiliary criminal sciences contribute to a more comprehensive understanding and practical handling of crime?

- How do auxiliary criminal sciences complement criminological theories in understanding the root causes of

criminal behavior?

- In what ways does the collaboration between criminologists and specialists in auxiliary criminal sciences enhance the effectiveness of crime-solving processes?
- What are the key challenges and opportunities in integrating criminology with auxiliary criminal sciences in practical criminal justice applications?

### Study Importance

This study's significance is in its capacity to connect theoretical ideas with practical applications in criminal justice. This study seeks to elucidate the link between criminology and ancillary criminal sciences to improve the comprehension of crime from both theoretical and practical viewpoints. The amalgamation of criminology with fields such as forensic psychology, criminalistics, and forensic pathology offers a comprehensive framework that elucidates criminal behavior and facilitates the precise and effective management of criminal cases. This integrated methodology can enhance the quality of criminal investigations, facilitate evidence-based policy formulation, and provide a basis for training initiatives within the criminal justice system. This study may provide a more sophisticated, evidence-based, and efficient framework for crime management and reduction, eventually helping society via a deeper comprehension of crime and justice.

### Objectives

- To analyze how auxiliary criminal sciences complement criminological theories, thereby deepening the understanding of criminal behavior and enhancing criminological research.
- To explore the ways in which collaboration between criminology and auxiliary criminal sciences can improve the effectiveness and accuracy of crime-solving processes within the criminal justice system.
- To identify and examine the challenges and potential benefits of integrating criminology with auxiliary criminal sciences in practical applications, aiming to develop recommendations for enhancing interdisciplinary cooperation in criminal justice settings.

### Methodology

This qualitative study uses topic literature review and document analysis to assess the relationship between criminology and auxiliary criminal sciences [9]. The study will look at scholarly articles, case studies, and professional recommendations to find how theoretical ideas in criminology support auxiliary criminal sciences such forensic psychology, criminalistics, and forensic pathology. Thematic study will highlight issues and trends including the advantages of interdisciplinary crime investigation and the difficulties including including combining several scientific points of view into the criminal justice system This approach will demonstrate how in crime prevention and research criminology and auxiliary sciences cooperate. Maintaining study integrity depends on crediting sources and safeguarding private information, therefore addressing ethical challenges. Notwithstanding its document-based approach, the study aims to show the importance of interdisciplinary approaches and create the foundation for next studies and field developments.

### Literature Review

An interdisciplinary discipline using ideas from sociology, psychology, biology, and auxiliary criminal sciences to examine crime and guide justice policies, criminology has grown progressively as such [10]. Particularly helping criminology with necessary methods and knowledge from auxiliary sciences

including forensic psychiatry, forensic medicine, forensic criminal investigation, and criminal policy science improves its theoretical frameworks and practical uses [11]. These disciplines help criminologists better understand criminal behavior, create crime prevention plans, and change justice system operations [12]. The literature on these crossroads emphasizes the benefits and complexity of combining several fields to enhance criminological study and application.

### Theoretical Frameworks in Criminology

Essential basis for understanding crime and developing answers are criminological ideas. Under the direction of classical criminology which believed that people act rationally suggested that deterrent punishment may help to reduce criminal activity [3,7,8,12]. But as criminology changed, academics such as Merton created sociological viewpoints such strain theory, which links crime to societal systems restricting access to reasonable means for achievement [13]. According to this hypothesis, social disparity causes pressure and dissatisfaction among people unable to reach society goals, therefore fostering crime.

Further diversifying criminological views were psychological and biological viewpoints. Eysenck suggested that extraversion and neuroticism among other personality qualities could make people more likely to engage in criminal activity [7]. Comparably, biological theories investigated genetic and neurophysiological factors and proposed that certain people could have biological inclinations toward crime [8]. These points of view underlined that good crime prevention calls for a multifarious strategy including several causative elements.

### Forensic Psychiatry and Criminology

Particularly with an eye on mental health, forensic psychiatry links criminology with psychological understanding of criminal behavior. Melton et al. stress how forensic psychiatrists offer essential evaluations of criminals' mental states, therefore establishing competency to stand trial and impacting sentence by means of insights into mental health-related criminal conduct [14]. For instance, people with untreated mental illnesses have a disproportionate share in the criminal justice system, and forensic psychology is rather important in spotting and treating these instances to advance justice and suitable treatment [15].

Forensics psychiatry has become more and more important to criminologists because of its insights into the psychological elements of crime, which helps to comprehend criminal motivations and supports rehabilitative methods instead of punitive ones [16]. Combining forensic psychiatry with criminology, as Garland points out, provides a comprehensive approach to crime that takes individual psychological elements into account as well as societal context [17].

### Forensic Medicine in Criminology

Legal medicine, also referred to as forensic medicine, uses medical expertise to examine crime sites and evaluate evidence. Through autopsies, toxicology, and damage analysis which are basic in determining causes of death and victim identification DiMaio and DiMaio stress that forensic medicine greatly advances criminology [18]. By means of physical evidence, forensic medicine gives criminologists the means to confirm their theoretical assumptions that example, by spotting trends in violent crime or connecting physical injuries to possible psychological profiles [19].

High-profile examples include the identification of serial criminals by consistent forensic evidence patterns clearly show the contributions this area makes to criminology [20]. Apart from helping criminal investigation, forensic medicine guides criminologists on behavioral patterns and provides empirical data improving criminological knowledge.

### **Forensic Criminal Investigation and Criminology**

Often referred to as forensic criminal investigation, police science is meticulous evidence collecting and crime scene analysis applied to recreate events and designate individuals [21]. Criminology and forensic investigation have a symbiotic relationship; usually, criminological concepts affect forensic investigators, who then provide empirical data either verifying or improving these theories [22]. For instance, rational choice theory and social learning theory direct researchers in analyzing crime scenes and profile suspects relying on behavior patterns [23,24].

Essential tool in forensic criminal investigation, criminal profiling projects offender characteristics and behavior using criminological ideas. Turvey shows how forensic investigators use profiling to narrow suspect pools and comprehend reasons, thereby directing the formulation of investigative strategies and so preventing future crimes [25].

### **Criminal Policy Science and Criminology**

Criminal policy science employs a framework to investigate the evolution and repercussions of laws, norms, and justice interventions, transforming criminological research into practical policies [26]. Criminal policy science helps criminologists to guarantee that their approaches align with factual realities and society desires [16]. Policies aimed at reducing recidivism, for example, are typically impacted by criminological insights into rehabilitation, recidivism predictors, and the effects of punitive policies on long-term crime patterns [27].

One of the obstacles in combining criminal policy science and criminology is implementing research-based suggestions in a variety of legal and social contexts. Nonetheless, as point out, encouraging collaboration among criminologists, parliamentarians, and law enforcement will assist research translate into successful laws and initiatives that improve judicial efficiency [28].

### **Criminology and Forensic Psychiatry**

The relationship between forensic psychiatry and criminology is both beneficial and intricate, as each discipline contributes to a more comprehensive understanding and treatment of criminal behavior. Criminology, which primarily examines criminal behavior and crime, offers theories and frameworks for interpreting the societal and individual factors that contribute to crime [29]. In contrast, forensic psychiatry concentrates on mental health concerns within the criminal justice system, offering a comprehensive understanding of the psychological and psychiatric issues that may influence an individual's involvement in criminal activity [14]. This collaboration is essential for enhancing the efficacy of criminal justice, as it facilitates a comprehensive understanding of the mental states and motivations of offenders [30].

### **The Intersection of Criminology and Forensic Psychiatry**

Criminology emphasizes the analysis of the fundamental reasons of criminal behavior from the perspectives of comprehensive sociological, psychological, and biological theories [28]. While these theories assist in understanding criminal conduct on a social scale, they may not offer a thorough elucidation of the

psychological traits of individual criminals. Forensic psychiatry mitigates this deficiency by providing specialist expertise on mental diseases, cognitive abilities, and personality characteristics that may predispose persons to criminal behavior, thereby affording essential insights into individual criminal motivations [19]. This partnership enables a multifaceted approach to crime investigation, assisting criminologists and justice professionals in acquiring a more thorough comprehension of the criminal psyche [25].

The role of forensic psychiatry enhances the criminal justice system through practical applications. Forensic psychiatrists assess persons' mental competency to stand trial, aid in identifying mitigating mental health issues, and provide expert testimony concerning the individual's psychological condition at the time of the offense [14]. These activities enhance the study of criminology's knowledge of criminal conduct by offering a more profound insight into criminal motivation and accountability [17].

### **Case Studies Illustrating the Role of Forensic Psychiatry in Criminal Investigations**

Emphasizing how important forensic psychology is to criminology, various case studies show its relevance in crime investigations. Well-known example of this is Andrea Yates, who during a severe psychotic episode killed her five children in 2001. Based on Yates' defense, she experienced postpartum psychosis—a rare mental illness distinguished by hallucinations and delusions [14]. Forensic psychologists looked at Yates' mental state both before and after the incident. This cleared things up for the court on how her illness affected her actions. This story highlights the significance of forensic psychiatry in identifying the type of mental conditions causing criminal behavior [17].

Another instance is Jared Lee Loughner, who was hunting U.S. Representative Gabrielle Giffords after killing several people in a mass shooting in 2011. Loughner was diagnosed with paranoid schizophrenia, which begged some to question his ability to stand trial [25]. Forensic physicians examined his mental state to see whether he could assist with his case and grasp the court system. The case highlights the need of forensic psychiatry for verifying criminal mental health and ensuring fair trials in major crime cases [18].

Dealing with recurrent criminals calls especially for forensic psychology. Examining Dennis Rader's mental state, forensic psychologists noted indicators of narcissism and sadistic tendencies [30]. Known as the "BTK Killer," Rader's case demonstrates the significance of forensic psychiatry in investigating cognitive flaws causing criminal activity. This clarifies for criminology the kinds of persons more prone to engage in violent crimes [15].

These narratives demonstrate how mental health problems can influence criminal conduct as well as how forensic psychiatry relates to criminology. Knowing the mental conditions of offenders is crucial, particularly in cases when mental illness impairs moral judgment or common-sense application. This corresponds with criminological theories about the causes of crime [17,29].

### **Relevance of Forensic Psychiatry in Criminological Research and Practice**

Apart from case studies, forensic psychiatry makes use of empirical data on the incidence of mental illnesses among criminals to guide criminological study and practice [15]. Forensic psychiatry studies indicate that those with untreated mental health problems are more likely to participate in criminal activity, particularly when treatment

is denied [19]. Diversion programs offering mental health therapy as an alternative to jail have helped to assist the criminological aim of lowering crime via preventative treatment and rehabilitation [16].

Reducing recidivism depends on diversion programs addressing mental health issues as they tackle the underlying causes of criminal behavior instead of concentrating just on punishment [26]. These programs complement criminology's objective of advancing public safety and social reintegration of criminals by treating fundamental mental health problems. Forensic psychiatry's findings so enhance the emphasis of criminology on evidence based prevention and rehabilitation.

Through analysis of the psychological elements of crime, forensic psychiatry ultimately greatly enhances criminology. By means of essential information on competency, accountability, and rehabilitation through mental health tests, forensic psychiatry directly impacts criminal justice results. The case studies show how crucial forensic psychiatry is for understanding criminal behavior motivated by mental illness, therefore supporting its relevance in criminological theory and practice. By realizing the major part mental health plays in criminal conduct, this cooperation shows an interdisciplinary approach that advances a more compassionate and efficient criminal justice system.

### **Criminology and Forensic Medicine**

Combining forensic medicine with criminology greatly helps to clarify and handle criminal situations. Legal medicine, another name for forensic medicine, is the use of medical expertise to legal investigations with an eye on evidence directly linked to crimes, like damage analysis, toxicology reports, and autopsy [18]. Forensic medicine often closes the theoretical and practical gap in criminal investigations by providing the biological and physical evidence supporting criminology's goal to investigate and understand criminal behavior from a sociological, psychological, and environmental perspective [28]. Working together, these professions improve the legal system's and law enforcement's ability to understand and handle crimes.

### **An Overview of Forensic Medicine and Its Relationship to Criminal Justice**

The core of forensic medicine is the application of medical knowledge to legal matters, especially in criminal investigations. Its primary objectives include identifying victims, documenting injuries, determining the reasons and manners of death, and connecting suspects to crime scenes utilizing biological evidence [19]. Forensic pathologists, for instance, can determine if a death was caused by natural causes, an accident, or foul play by thoroughly analyzing deceased individuals through autopsy [18]. This information is essential for criminologists because it offers empirical evidence that supports or contradicts theories on criminal behavior.

The relationship between criminology and forensic medicine can be explained by their complimentary goals. The goal of criminology, according to Garland, is to explain why crimes occur as well as how social, psychological, and economic factors affect criminal behavior [17]. However, forensic medicine provides the concrete, observable proof that either validates or invalidates these criminological ideas [22]. For example, criminology's theory that certain homicides are spontaneous or planned may be supported by forensic medical evidence of specific injuries or weapon use. The integration of the two disciplines provides a thorough approach to understanding crime, with the empirical findings of forensic medicine corroborating the theoretical frameworks of criminology.

### **The Advantages of Medical Forensic Evidence Criminological Research and Criminal Investigations**

Criminal investigations and criminological study depend critically on forensic medical evidence including autopsy and toxicology results. Examining body fluids, organ damage, and physical injuries, autopsy a subfield of forensic pathology helps to identify the cause and mode of death. An autopsy could find evidence of poisoning, blunt force trauma, or strangling, for example; each of these circumstances has different ramifications for criminal intent and behavior [18]. In a similar line, toxicological studies can identify drugs, alcohol, or poisons, therefore exposing whether or not substance usage influenced the illicit activity. These results enable police and criminologists to better grasp the background of the crime, particularly whether it was planned or motivated by outside events like drug usage [31].

By means of objective evidence derived from forensic medicine, criminologists investigate criminal conduct. For instance, forensic methods including rigor mortis and body decomposition can be applied depending on witness testimony and alibis to prove the time of death and link suspects to crime sites [20]. Reconstruction of crime scenes using forensic medicine helps investigators better understand the timing and motives behind the crime [28]. Combining historical data with criminological ideas allows criminologists to create hypotheses about the causes of certain crimes and the most likely offenders.

Major elements in criminal profiling include are forensic data like DNA, blood spatter patterns, and fingerprint analysis. By demonstrating or disproving a suspect's involvement in a crime, criminologists can employ DNA evidence, for instance, to support or deny behavioral assumptions [22]. Blood spatter patterns reveal the motions and locations of suspects and victims during violent crimes, therefore providing criminologists with insight into the offender's thoughts and actions and allows them to grasp the dynamics of the crime [25]. By use of such data, criminologists may distinguish between planned actions and acts of passion, therefore enabling hypotheses regarding the psychology and motives of criminals as well as helping to classify different forms of crime [17].

### **Examples of Forensic Medicine's Contribution to Criminology and Understanding Crime**

Several real world examples demonstrate how forensic medicine has improved criminology by providing in-depth understanding of criminal behavior. Dr. Harold Shipman, a British doctor who killed more than 200 people, is one well known example. Because toxicology studies found that Shipman's victims had deadly amounts of morphine, forensic pathology was essential in exposing his crimes [19]. This data supported criminological beliefs about the behavioral characteristics of serial murderers and showed the methodical way in which he killed. Thus, by supplying proof of Shipman's planned activities and aiding in the development of a profile compatible with systematic, organized serial murderers, forensic medicine validated criminologists' concerns regarding his tactics and goals.

The case of American serial murderer Ted Bundy serves as another illustration. Forensic analysis of tangible evidence helped to better understand his criminal practices. One of the main tools used to connect Bundy to his crimes was forensic odontology, a subspecialty of forensic medicine. Criminologists were able to determine that Bundy's actions were motivated by power and control in addition to violence when bite mark analysis linked his tooth imprints to wounds on one of his victims [20].

Because criminologists were able to link Bundy's behavioral characteristics with his preference for aggressive and intimate techniques, this case demonstrated the value of forensic medicine in creating criminal profiles and comprehending the psychological motivations underlying violent crimes.

Additionally, forensic medicine helps criminologists better comprehend crimes involving drugs. In situations like driving under the influence (DUI) events and substance-related killings, where substance misuse was a significant factor, toxicology results have proven crucial [18]. Toxicology results, for instance, can reveal blood alcohol content at the time of the incident in DUI cases, which aids criminologists in examining the relationship between alcohol use and impulsive or aggressive actions. In addition to aiding law enforcement in the prosecution of criminals, these reports give criminologists information to investigate trends in crimes involving substance misuse, therefore advancing the study of addiction and criminal conduct [17].

In conclusion, the way crimes are investigated and comprehended has changed as a result of the merging of forensic medicine with criminology. Toxicology, DNA analysis, autopsies, and injury reports all offer tangible, tangible proof that backs up criminological hypotheses on the causes and motivations of crime. By filling in the gaps between theory and practical reality, forensic medicine provides a scientific foundation that enhances criminology's theoretical and social insights. Criminal investigations are better able to uncover the motivations, psychological characteristics, and behavioral patterns of criminals when forensic evidence and criminological ideas are combined. Law enforcement and criminologists will be able to address complicated criminal situations with a more coordinated and knowledgeable approach as forensic technology continue to advance and contribute more to criminology.

### **Criminology and Forensic Criminal Investigation**

Together, criminology and forensic criminal investigation also known as police science help to explain, probe, and stop crime. Examining crime and criminal behavior helps one to understand the psychological, social, and biological elements influencing criminal activity [29]. Conversely, forensic criminal investigation painstakingly gathers and examines physical evidence to identify the offenders, hence simulating crimes. Using a variety of scientific techniques crime scene analysis, fingerprinting, DNA profiling, digital forensics all of which offer verifiable evidence to support criminal investigations Saferstein, 2011 notes Forensic criminal investigation and criminology are a great mix as one field enhances the approach of the other toward knowledge and handling of crime.

### **Collaboration The Meeting Point of Criminology and Forensic Criminal Investigation**

By offering theoretical analysis of criminal behavior and the means to transfer these insights into reality, the disciplines of criminology and forensic criminal investigation enhance one another. Forensic investigators search for the conditions, patterns of behavior, and causes of criminal activity using criminological theories include strain theory, social learning theory, and rational choice theory [32]. When forensic criminal investigators explore crime scenes for signs of opportunity or premeditation, the rational choice hypothesis which holds that people balance the benefits and drawbacks of committing crimes guides them [24].

By means of data analysis within the framework of more general behavioral patterns, these theoretical models enable forensic investigators to make better conclusions during investigations.

Forensic inquiry and criminology have a reciprocal relationship as forensic results influence and improve criminological opinions. Criminologists could examine trends in criminal activity using information gathered from crime scenes and suspect profiles, therefore supporting their hypotheses with actual facts. For instance, consistent results from crime scene investigations could either confirm or contradict accepted criminological theories, therefore providing fresh understanding of the causes and trends of criminal behavior. This dynamic link emphasizes the need of forensic investigators and criminologists working together as every area provides significant information that helps to have a more complete knowledge of crime.

### **Using Criminological Theories in Criminal Investigations**

Forensic criminal investigators get great direction from criminological ideas. These ideas offer structures for examining the data, identifying suspects, and working through the details of criminal events. Crime scene analysis, which consists of analyzing physical evidence to recreate the events preceding and surrounding a crime, is one of the main applications of criminological theories in forensic investigations [31]. When there is evidence of gang membership or patterns that fit learned criminal conduct, researchers could use the social learning theory which states that people acquire criminal behavior via their interactions with others for example [23].

Strain theory is another crucial concept used in criminal investigations as it believes that crime results from people believing their capacity to meet society demands does not equal those expectations [13]. Examining bank records or private letters that would indicate the offender was under a lot of stress helps forensic investigators determine the social and economic basis of a crime. Understanding the possible reasons of a crime helps forensic investigators to concentrate on obtaining evidence confirming these hypothetical conclusions. This increases the probability of the offender being discovered and their behavior will make sense.

Another crucial field in which criminological concepts immediately apply in forensic investigations is criminal profiling. Profiling, according to Turvey, is the process by which behavioral patterns and evidence from crime scenes help one to determine the traits of an offender [25]. Forensic criminal investigators utilize criminological theories to build profiles that serve to reduce the pool of potential suspects by spotting features and behaviors often linked to particular forms of crimes. Forensic investigators and criminologists, for example, routinely apply ideas involving obsessive behavior and personality disorders in situations of serial offenses to profile the psychological traits of the offender and forecast their next move [25]. Profiling helps future investigations by helping to identify suspects and extending criminological knowledge about repeating crime tendencies.

### **The Role of Forensic Criminal Investigators in Enhancing Criminological Understanding**

Forensic criminal investigators greatly help to progress criminological knowledge by providing real facts either supporting or contradicting criminological theories. Investigators utilize several forensic techniques including DNA analysis, fingerprinting, and blood spatter interpretation to compile evidence. These techniques all give criminologists looking at crime patterns pertinent data. DNA profiling, for example, has transformed criminal investigations by letting researchers match biological evidence at crime scenes to known suspects with formerly unheard-of accuracy [22]. Apart from helping in case resolution,

this information enables criminologists to investigate trends in criminal activity, including the types of crimes most usually connected to specific offender profiles.

Practically using criminological theories, forensic criminal investigators also help to avoid crime. Crime pattern analysis, a technique based on environmental criminology, for example, lets researchers estimate crime hotspots by looking at where and when crimes are expected to occur depending on past events [33]. Supported by regular activity theory, which says that crime occurs when a motivated criminal finds an adequate target without effective supervision, this approach enables law enforcement agencies better use resources to prevent crime [34]. Using forensic data to identify high-risk areas and times will help forensic criminal investigators create and implement preventative actions in line with criminological findings, hence improving community safety.

Moreover, by providing useful analysis of criminal investigations and forensic criminal investigators help to advance criminological ideas. For example, events involving cybercrime have challenged criminologists to rethink traditional wisdom as cybercrime usually involves many motives and strategies than physical crimes. Investigators with digital forensics experience compile data on cybercrime, which informs criminologists to new trends and drives the development of creative ideas considering the specificities of online crime [35]. Forensic investigators enable criminological concepts grow and remain relevant with changing criminal contexts by means of this cooperative feedback loop.

Thanks to the major developments in both criminology and forensic criminal investigation, a more complete method to understand, investigate, and avoid crime is now feasible. While criminology provides theoretical frameworks guiding the interpretation of evidence, analysis of crime scenes, and criminal profiling, forensic criminal investigation supplies real data informing and improving criminological ideas. This cooperation has enhanced understanding of criminal behavior and crime causes as well as methods of research.

Forensic criminal investigators significantly help to prevent crime by means of the pragmatic application of criminological theories including criminal profiling and crime pattern analysis. Supported by routine activity theory, social learning theory, and other criminological theories, these approaches help law enforcement agencies to forecast criminal behavior and allocate resources to prevent future crimes. Forensic investigators and criminologists working together create a dynamic feedback loop that over time raises knowledge of both fields. As forensic technology and investigative techniques keep developing, this relationship will undoubtedly become even more important to understand and prevent crime in modern society.

### **Challenges and Gaps in the Relationship Between Criminology and Auxiliary Sciences**

Understanding and solving crime has great benefits when criminology is integrated with auxiliary fields such forensic psychiatry, forensic medicine, forensic criminal investigation, and criminal policy research. Still, there are major roadblocks and shortcomings that limit the whole possibilities of these alliances. These problems which result from methodological differences, a lack of multidisciplinary training, and research gaps limit the progress of a cogent, multidisciplinary approach to criminal justice.

One of the biggest challenges to their integration is their different focus that of forensic psychiatry and criminology. Mostly from a social and psychological standpoint, criminology helps one to understand and stop criminal behavior [28]. Forensic psychiatry, on the other hand, emphasizes mental health assessments for legal purposes that is, to prove criminal guilt or ability to stand trial [14]. These different goals make cooperation difficult as forensic psychiatrists can give legal requirements more importance than criminological theories, which would lead to different opinions on criminal behavior.

Likewise, forensic medicine and criminology struggle to merge given their diverse approaches of research. Forensic medicine mostly deals with physical evidence, including toxicology and autopsy, therefore helping to determine the reason and manner of death [18]. Conversely, criminology seeks to position crime in relation to more general social, psychological, and financial factors. Forensic medicine depends so much on physical evidence. Thus, it might be challenging to apply more abstract criminological theories to investigations, therefore restricting interdisciplinary cooperation [19].

Including criminological concepts presents another difficulty for forensic criminal investigation, also referred to as police science, given practical restrictions. Constant pressure to solve crimes forces investigators to give obtaining evidence top priority over using criminological knowledge of offender behavior or social context [25]. This limitation creates a vacuum when the criminological background is neglected in favor of case resolution, therefore reducing opportunities to apply ideas that can drive crime prevention programs.

Adopting policies poses difficulties for interaction with criminal policy science. Though criminology offers evidence-based recommendations, turning these findings into policy usually requires tight cooperation among law enforcement, legislative agencies, and community organizations. The effect of criminological research on public policy may be hampered by fractured policy implementations induced by different institutional aims and a lack of cohesive communication channels [16].

Filling these gaps requires both improving interdisciplinary training and supporting cross-field interaction. Training courses introducing criminologists, forensic scientists, and policy makers to one another's approaches and aims might help to build cooperation and a common knowledge. Establishing interdisciplinary research initiatives and combined databases for criminological and evidential data would also help to foster a more united approach to crime prevention and criminal justice. A thorough and scientifically based approach to crime could help the criminal justice system by enhancing synergy between several spheres [36-42].

### **Conclusion**

This study has stressed how crucial each field is to grasp and manage crime and examined how criminology and related criminal sciences interact. Each topic advances criminology by offering specific information and methods that assist criminological theories, forensic psychiatry, forensic medicine, forensic criminal investigation, and criminal policy science. Understanding criminal mental health made possible by forensic psychiatry helps to improve fair punishment and efficient rehabilitation programs. Essential biological data from forensic medicine, including toxicological tests and autopsy results, allow to develop offender profiles and reproduce criminal events, therefore verifying

criminological notions on violent behavior. With its methods in evidence gathering and crime scene analysis, forensic criminal investigation enhances criminological research by offering empirical facts either supporting or contradicting beliefs on criminal behavior. By converting criminological findings into policies aimed to increase public safety and reduce recidivism, criminal policy science finally proves the power of research to inform pragmatic judgments inside the judicial system.

Understanding the subtleties of crime and improving criminal justice systems in criminology depend on a multidisciplinary attitude. Crime is impacted by various factors, biological, psychological, social, and environmental, not by one component. Forensic psychiatry, medical, criminal investigation, and policy science used together helps criminology to address crime from a whole perspective, therefore producing more effective methods for crime prevention, investigation, and rehabilitation. This comprehensive approach improves accuracy in case evaluation and offender profiling as well as helps to create policies based on factual data that satisfy society needs. Using criminological ideas and forensic evidence in policy allows authorities to implement preventative actions targeted at local areas, groups, or high-risk activities, therefore fostering safer communities.

To understand the nuances of crime and improve criminal justice systems, criminology must be approached holistically. Crime is affected by various factors, biological, psychological, social, and environmental; it is not the outcome of one component. Forensic psychiatry, medical, criminal investigation, and policy science used together allows criminology to address crime from a whole perspective, therefore producing more effective methods for crime prevention, investigation, and rehabilitation. This comprehensive approach improves accuracy in case evaluation and offender profiling as well as helps to create policies grounded on factual data that meet society needs. Authorities can implement preventative actions targeted at high-risk behaviors, local areas, or groups by using criminological ideas and forensic evidence in policy, therefore creating safer communities.

In conclusion, the joint endeavors of criminology and related disciplines are essential in developing a criminal justice system that is flexible, evidence-driven, and equitable. By cultivating stronger interrelations across these fields, the judicial system may more effectively address the changing requirements of crime prevention, investigation, and rehabilitation, therefore enhancing societal safety and justice.

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