University of Abbes Laghrour Khenchela

Faculty of Human and Social Sciences

Department of Psychology

Psycho_Social Factors and Violent Behavior in Offenders

A Field Study in Khenchela City

العوامل النفس اجتماعية وسلوك العنف لدى المعتدين

دراسة ميدانية بولاية خنشلة

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Abstract

The current research aimed at predicting violent behavior through the analysis of psychosocial factors in the city of Khenchela and help law enforcement with a set of preferably evidence-based interventions for a better life with less violence. It used artificial intelligence, namely machine learning algorithms such as the Artificial Neural Network (ANN), Logistic Regression approach. Using a retrospective method, this study analyzed 110 case files of convicted offenders from Khenchela city and its surrounding regions.The results show that:

- Violent behavior cannot be attributed to a single factor; rather, it results from the interaction between psychological and social factors.
- Histrionic Personality Disorder is among the most influential psychological factors that are more prone into engaging in violent behavior.
- Educational level plays a role in predicting violence at various levels, with lower educational attainment being associated with a higher likelihood of weapon use.
- Weapon use is also considered an effective factor in the occurrence of violence against individuals. Knives were the most commonly used weapons during the commission of crimes, followed by firearms.
- Both Logistic Regression and Artificial Neural Networks demonstrated efficiency in predicting criminal violence. Logistic Regression was able to identify risk factors, particularly the impact of educational level and type of crime on weapon use.
- Meanwhile, the Artificial Neural Network model showed high predictive accuracy regarding the presence and use of weapons.
- The integration of both methods achieved a notable level of accuracy in predicting violent behavior and mitigating its risks.

Finally, this study serves as a starting point for future researchers and contributes to assisting security agencies in developing prevention strategies and early intervention programs to reduce and prevent violence.

Keywords: Psychosocial factors, Violent Behavior, Offenders, Machine Learning, Artificial Neural Networks, Logistic Regression.

مستخلص:

تهدف الدراسة الحالية إلى التنبؤ بسلوك العنف من خلال تحليل العوامل النفس إجتماعية، ومساعدة العاملين في مصالح الأمن للقيام بمجموعة من التدخلات المبنية على الأدلة من أجل حياة أفضل وعنف أقل. بإستخدام الذكاء الإصطناعي، وتحديدًا خوارزميات التعلم الآلي مثل الشبكة العصبية الإصطناعية ANN والانحدار اللوجستي. وكذلك باستخدام المنهج الإسترادادي لتحليل 110 ملفات قضايا للمعتدين تمت إدانتهم، بمدينة خنشلة وضواحيها. أظهرت النتائج أن

- لا يمكن ارجاع العنف الى عامل واحد فقط بل هو نتيجة لتفاعل بين العوامل النفسية والاجتماعية .
- إضطراب الشخصية الهستيرية من أكثر العوامل النفسية تأثيرا على سلوك العنف.
- المستوى التعليمي له دور في التنبؤ بالعنف في مختلف المستويات وقد ارتبط انخفاض المستوى التعليمي بزيادة احتمالية استعمال السلاح .
- كما يعد استعمال السلاح عاملا فعالا في حدوث العنف ضد الأشخاص إذ كان السكين هو السلاح الأكثر استخداما أثناء ارتكاب الجرائم، يليه السلاح الناري .
- أظهر كل من الإنحدار اللوجيستي والشبكات العصبية الإصطناعية كفاءة في التنبؤ بالعنف الاجرامي، حيث تمكن منهج الانحدار اللوجستي من تحديد عوامل الخطر خاصة تأثير المستوى التعليمي ونوع الجريمة على إستخدام الاسلحة .
- بينما نموذج الشبكات العصبية الاصطناعية أظهرت دقة تنبؤية عالية بوجود السلاح واستخدامه .وقد تم الجمع بينهما لتحقيق دقة واضحة في التنبؤ بسلوك العنف والحد من مخاطره .

وفي الأخير تشكل هذه الدراسة منطلقًا للباحثين في المستقبل، كما تُساهم في مساعدة الجهات الأمنية في تطوير استراتيجيات الوقاية وبرامج التدخل المبكر لتقليل العنف والحد منه.

الكلمات المفتاحية: العوامل النفس إجتماعية، سلوك العنف، المعتدين، تعلم الألة، الشبكات العصبية الإصطناعية،الإنحدار اللوجيستي.

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Our special thanks also go to the **members of the board of examiners** for their time, effort, and valuable contributions in evaluating this thesis. We are truly grateful for their commitment and constructive engagement.

List of Abreviations and Acronyms

AI Artificial intelligence
ANN Artificial neuron networks
ASPD Anti socialPersonality Disorder
AUC Area under the curve
BPD Borderline Personality Disorder

CC Cingulate cortex
CSF Cerebrospinal fluid
CTS2 Conflict tactics scale
DALYs Disability-Adjusted life years
DT Decision tree
EEG Electroencephalogram
GNB Gaussian naive bayes
HPD Histirionic Personality Disorder
INN Interpretable neural network
IPV Intimate partner violence
IPVP Intimate partner violence perpetration
K-NN k-nearest neighbors
LR Logistic regression
MANCOV Multivariate analysis of covariance
ML Machine learning
MLP Multi-layer perceptron
MRI Quantitative magnetic resonance imaging
NCD Neuro cognitive disorder
NNs Neural networks
NPD Narcissitic Personality Disorder
OFC Orbito frontal cortex
OI Offender index
OSHPD Office of statewide health planning and development
PD Personality Disorder
QoL Quality of life
SES Socioeconomic status
SLR Systematic literature review
SPSS Statistical package for the social sciences
SVM Support vector machine
ZCTA Zip code tabulation area

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Introduction

Violent behavior is one of the most complex and widespread social phenomena in the world, It has received wide attention from researchers due to its severity and negative impact on both the individual and society, this has led to the study of its causes and effects, and to understanding how it emerges and persists, with the aim of developing effective strategies to reduce it.

The term “violence” originates from the Latin word “violentia,” which means “intense force” or “violence,” referring to an uncontrolled and impulsive use of power. The term “violence” is sometimes mistaken for “violation,” since acts of excessive force often result in the breach of rules or the infringement of rights. However, linking the two concepts can lead to confusion, as a violation can occur without excessive force, such as in the case of drug-facilitated rape, or excessive force can occur without a violation. (Bufacchi, 2013).

In this context, the World Health Organization defines violence as the deliberate use of physical force or power whether it’s a threat or an actual act directed at oneself, another person, or a group or community, those result in or has a high likelihood of resulting in injury, death, psychological harm, developmental issues, or deprivation.” (World Health Organization, 2002).

Violence is typically divided into three main categories, depending on who commits the act. The first category is self-directed violence, which includes various forms of suicidal behavior, such as suicidal thoughts, planning, or attempts, as well as deliberate self-harm, such as self-mutilation. It’s important to note that these actions do not necessarily follow a sequential pattern. The second category is interpersonal violence, which includes family or intimate partner violence, such as child abuse, domestic violence, and elder neglect, as well as community violence between unrelated individuals, including violence in public spaces or institutions like schools or workplaces. The third category is collective violence, which involves organized groups targeting individuals or other groups for political, social, or economic goals. This form of violence includes armed conflicts, terrorism, genocide, or organized crime. This classification also differentiates between types of violence based on the nature of the act (physical, psychological, sexual, or neglect), the relationship between the perpetrator and the victim, and the motivations behind the violent act. (World Health Organization, 2002).

According to global estimates from the year 2000, around 1.6 million people lost their lives to violence an average of about 28.8 deaths for every 100,000 individuals. Suicides accounted for about half of these deaths, homicides for about one-third, and about one-

fifth of the victims died as a result of armed conflicts. Homicide rates among males were more than three times higher than those among females. The highest homicide rate 19.4 per 100,000 was recorded among males aged 15 to 29. Homicide rates tend to decrease with age among males, while for females; the rates remain stable at around 4 per 100,000 across most age groups, except for the 5–14 age groups, where it drops to around 2 per 100,000. As for suicide rates, they tend to increase with age for both sexes. The highest suicide rate 44.9 per 100,000 was found among men over 60, more than double the rate for women in the same age group (22.1 per 100,000).Among individuals aged 15 to 29, the suicide rate was estimated at 15.6 per 100,000 for males and 12.2 per 100,000 for females. Violent death the rates are more than twice as high in low- and middle-income countries compared to high-income countries, with 32.1 cases per 100,000 people versus just 14.4 in wealthier nations. (World Health Organization, 2002).

In Algeria, national statistics indicate a rise in violence against women and children in recent years. In 2020, a total of 12,511 cases of violence against women were recorded, marking a 10% increase compared to 2019. In the first nine months of 2021, 12,331 cases were documented. As for children, 6,293 cases of violence were reported in 2020, including 4,395 confirmed cases, which represent a 4% increase compared to the previous year. (Agence Algeria News, 2021).

Accordingly, violence arises from and is influenced by a set of psychological and social factors that interact with one another in a complex manner. Among the most prominent of these factors are psychological disorders and personality disorders especially antisocial personality disorder in addition to schizophrenia, epilepsy, and behavioral deviance. As for demographic variables, they include gender, educational level, and income level… Numerous studies have shown that the interaction of these factors increases the likelihood of the emergence and spread of violent behavior.

A study by Swanson et al. Found that positive psychotic symptoms, such as persecutory delusions, significantly contribute to an increased likelihood of violent behavior in individuals with schizophrenia, whereas negative symptoms are associated with a reduction in such behavior. (Swanson et al., 2006).

Meanwhile, a study by Shahbahram and Dokanehifard confirmed that the prevalence of personality disorders among prisoners convicted of violent crimes was high, with significant differences in patterns of criminal thinking between males and females, reflecting the combined influence of psychological and social factors in shaping patterns of violent behavior. (Shahbahram & Dokanehifard, 2019).

The context of social factors, Ehrlichs' study revealed a positive relationship between years of education and incidents of theft in the United States. It indicated that the impact

of education varies depending on the integration between education and the training used to achieve both legitimate and illegitimate returns. The study also demonstrated a correlation between income inequality and the rate of property crimes across different states. (Ehrlich, 1975).

Meanwhile, Hipps' study provided an important examination of class and racial disparities in neighborhoods and their impact on crime across 19 U.S. cities. It found that racial and social disparities in neighborhoods increase crime rates, particularly violent crimes. The study also showed that income inequality is more strongly associated with crime rates than poverty alone, and that homeownership contributes more to crime reduction than residential stability. (Hipp, 2007).

It becomes necessary to address the psychological and social characteristics of offenders in order to understand how these factors interact and contribute to shaping their violent behavior.

According to the Revised and Concise Webster's Dictionary, a criminal is defined as a person who wrongs and violates any law, whether divine or human. (Ignou, 2017).

On the other hand, behavioral disorders appear in childhood and worsen during adolescence, and are a common cause of repeated delinquency in minors. If this behavior persists beyond the age of 18, it may develop into Antisocial Personality Disorder, increasing the likelihood of the minor turning into a serious criminal. Both disorders are linked to aggressive and repetitive behavior, and individuals affected by them often become professional criminals who continue committing crimes as they age.(Ignou, 2017).

Studies indicate that family factors play an important role in the emergence of criminal behavior in children and adolescents. These factors include the level of parental supervision, disciplinary methods, the presence of family conflicts or separations, and parental or sibling involvement in crime. Additionally, poor parental supervision is one of the most significant factors affecting children's behavior, especially when parents are unaware of where their children are or whom they are associating with, increasing the likelihood of school truancy and involvement in deviant relationships. Moreover, fragmented communities suffering from poverty, violence, or the absence of law provide a fertile environment for the development of criminal behaviors in children raised in such environments. (Ignou, 2017).

Modern sciences aim to integrate artificial intelligence as a fundamental measure across various disciplines, benefiting from its advanced technologies in data analysis. Its importance has recently increased, as it is used to analyze and predict behaviors, such as violent behavior, and to understand the psychological and social factors contributing to its emergence. This is done through advanced techniques such as machine learning, logistic

regression, and artificial neural networks, which provide a high ability to process large data, understand behaviors and their risks, and predict them accurately and effectively.

Based on the above and our review of the theoretical side and previous studies on our topic, the psychological and social factors and violent behavior among offenders, we found that the subject has not been addressed using a sample of offenders themselves with artificial intelligence techniques. The study included both the theoretical and field aspects as follows:

Theoretical Section

Chapter One: The general framework of the study, which includes the research problem, hypotheses, reasons for choosing the topic, objectives and importance of the study, previous studies, and operational definitions.

Chapter Two: Psychological and social factors divided into two parts:

Psychological factors: including Antisocial Personality Disorder, Narcissistic personality disorder, Histirionic Personality Disorder, Schizophrenia, Deviance, Delusions, Epilepsy, and Hypomania. And machine learning and human behavior analysis.

Social factors: including gender, social status, educational level, income level, and weapon use.

Chapter Three: Violent Behavior, which includes the definition, types, forms, causes, explanatory theories, and characteristics of violent offenders.

Field Study:

Chapter Four: Methodological procedures of the study, including the research methodology, sample, and study tools.

Chapter Five: Presentation and interpretations of the main findings as well as the implications.

Chapter One: The General Framework of the Study

1- Statement of the problem
2- Study Hypotheses
3- Reasons for Choosing the Topic
4- Aims of the study
5- Significance of the Study
6- Prior Studies
7- Operational definitions

1. Statement of the Problem

The human being is a social creature, who belongs to and interacts with their environment to meet their psychological and social needs. These factors interact with each other to shape the individual's personality and behaviors, leading to the development of a balanced or violent individual depending on their environment.

Psychosocial factors significantly influence mental health, as they contribute either positively or negatively to an individual's ability to achieve psychological balance. These factors are considered a set of interconnected and interacting aspects that affect an individual's psychological and behavioral state. Psychological factors include internal motives and reasons that drive a person toward violent behavior, such as riots, vandalism, and other forms of aggression. In contrast, social factors are related to environmental and social conditions that shape such behavior, including actions like insult, destruction, or property damage. (Hamza, 2020).

According to various theories, psychological factors play a significant role in the rise of violent behavior. This behavior often originates from personal characteristics such as an individual's mental and emotional traits, personality, and physical condition, all of which differ from one person to another. In general, human behavior- whether socially acceptable or not- is shaped by the individual's interactions with their environment and those within it. Moreover, differences between individuals and variations in their environments lead to unique interactions that can increase the risk of violent behavior in some more than others. Additionally, the roots, forms, and expressions of violence are wide-ranging and complex, with different sources, triggers, and consequences. (Al-Nayrab, 2008).

The study of Mohamedamin and Fatahi sought to explore the relationship between the « Big Five » personality traits and involvement in violent behavior among high school students in northern Iraq. The results indicate that boys a more prone to violent behavior than girls. Personality traits namely; neuroticism, extraversion, agreeableness, openness, and conscientiousness have also been identified as significant predictors of violent behavior in various psychological studies.(Mohamedamin & Fatahi, 2022).

Furthermore, study of Chang asserts that the symptoms linked to various personality disorders seem to make those diagnosed with these conditions more prone to engage in criminal activities than individuals without such orders. Nevertheless, the survey of the pre mentioned studies was extensively and merely focused on three (03) personality disorders

such as: Antisocial Personality Disorder, Borderline and Narcissistic Personality Disorder. Not taking into account other mental illnesses for instance: Psychoses or other Personality Disorders namely; Schizoid personality disorder, Schizotypal, paranoid or others. (Chang, 2023).

Violent behavior arises either from internal motivations, which are influenced by complex psychological factors such as mental disorders, personality disorders, emotions, and others that vary between individuals, or from external motivations stemming from social conditions and factors like education, economic status, and social circumstances. Violence has gained significant attention, becoming a widely discussed issue across various fields such as psychology, sociology, and criminology. It is regarded as a harmful global social phenomenon that has spread throughout societies, posing a threat to the security and stability of communities. This is due to differences in individuals' psychological traits, social upbringing, and economic and social conditions. Violent behavior is viewed as a learned deviant behavior originating from the individual, which contradicts social and moral values. Yahya defined it as behavior expressed through any action intended to cause harm or pain to oneself or others, or to damage one's own or others' property. Thus, violence is seen as a behavior rather than an emotion, a need, or a drive. (Yahya, 2000).

Violence can take several forms, including violence directed toward oneself, others, or property, as well as verbal, physical, and symbolic violence, among others.

Various theories and perspectives have attempted to explain violence and link it to different factors. Some of these theories have associated violence with genetic and biological explanations, while others have interpreted it based on psychological theories such as psychoanalysis, social learning theory, and the frustration-aggression theory. Others have linked it to the analysis of personality traits, while some have explained it from a social perspective, such as the social interaction theory, which suggests that violence is a learned behavior. (Aït et al., 2011).

Thus, violent behavior is a result of complex and intertwined set of psychological and social factors that cannot be separated, nor it can be identified as a single factor. The interaction and influence of these factors contribute to the emergence and spread of violent behavior, especially among offenders or delinquents, Offenders are individuals who engage in violent behavior towards others, whether physically or verbally, with the intention of causing harm to people or property. The motivations for violence among

offenders can vary and include psychological factors such as emotions and mental disorders, in addition to social factors, social upbringing, and exposure to trauma and events that influence the emergence and repetition of violent behaviors.

Individuals with Antisocial Personality Disorder (ASPD) or Borderline Personality Disorder (BPD) were more likely than others to have convictions for violent offenses and to have received custodial sentences. They exhibited higher levels of trait anger, impulsivity, and a greater history of aggression, along with significantly higher scores on an overarching "psychopathy" factor. Similarly, one way to validate these findings is by examining the prevalence of these disorders within prison populations. Existing review studies indicate a clear link between personality disorders and criminal behavior. Within prison populations, Antisocial Personality Disorder is notably prevalent, affecting approximately 21% of inmates. This contrasts with lower rates observed for other serious mental health conditions, such as psychotic disorders (around 4%) and severe depression (approximately 12%).(Howard et al., 2008).

The connections between ASPD, Psychopathy, Sadism, Narcissism, and Machiavellianism with re-offending and violent crimes have been explored. The findings from various studies indicate that individuals with ASPD. (Fazel & Danesh, 2002); (Coolidge et al., 2011);(Mandiwana, 2021).

And Dark Tetrad traits often struggle to adhere to societal norms, making them more likely to engage in repeated criminal behavior.

A research suggests a correlation between mental illness and Criminal behavior, particularly evident in high incarceration rates. The association of Specific conditions, such as schizophrenia and substance abuse, with criminality is a Recurring theme in the literature. There is substantial evidence on the impact of mental Illness, especially severe mental disorders, on criminal offending. Mental disorders are the primary cause of disability (lost productive years) in North America, Europe, and increasingly worldwide, often affecting individuals at the peak of their lives. Even More concerning is the rising number of mentally ill individuals within the U.S. Prison system. In a study by Apostolopoulos, Michopoulos, Zachos, and their team, Personality disorders were identified in 89% of 308 randomly selected individuals from two Greek prisons.(Tully, 2017).

Similarly, research by Flórez et al involving 204 inmates at a prison in Ourense, Spain, revealed that 50.5% of the inmates had a Personality disorder, with an additional 24.01% diagnosed with two or more Personality disorders. Furthermore, the second study indicated that international Reviews report an average prevalence of 47%, while the rates in Spain range from 30% to 76.7%. (Athanasioset al., 2018).

To further explore the relationship between psychosocial factors and violent behavior advanced analytical methods such as machine learning and Artificial Neural Networks.

Machine learning is a process where computers are trained to enhance a specific measure of performance through examples or past experiences. A model is created with specific parameters, and learning is the process of executing a program that modifies these parameters according to the training data or past experiences. The model can be used to predict future results, explain data, or fulfill both functions. When machine learning methods are applied to large sets of data, this process is referred to as data mining. In data mining, large volumes of data are examined to build a simple model that is practical, such as one that has high accuracy in predictions. (Malla Reddy College of Engineering and Technology, 2020).

Algorithms have been utilized. These techniques provide valuable tools for identifying patterns, predicting behaviors, and gaining deeper insights into the data collected. Among these methods, logistic regression is Logistic regression, also known as the logistic or logit model, is a statistical tool used to analyze the relationship between a set of independent variables and a categorical dependent variable. Its purpose is to estimate the probability of a specific event occurring by fitting the data to a logistic curve.(Park, 2013).

Additionally, the term Artificial Neural Network (ANN) is derived from Biological neural networks that develop the structure of a human brain. Similar to the human brain that has neurons interconnected to one another; artificial neural networks also have neurons that are interconnected to one another in various layers of the networks. These neurons are known as nodes. An Artificial Neural Network in the field of Artificial intelligence where it attempts to mimic the network of neurons makes up a human brain so that computers will have an option to understand things and make decisions in a human-like manner. The artificial neural network is designed by programming computers to behave simply like interconnected brain cells.(Malla Reddy College of Engineering and Technology, 2020).

Based on this study, it becomes essential to study the psychosocial factors to understand the emergence and development of violent behavior at both the individual and group levels among offenders. Therefore, the question arises:

-What are the psychosocial factors that have the most impact on predicting violent behavior using both the logistic regression approach and artificial neural networks?

2. Study Hypotheses

-Psychological and social factors have the most impact on predicting violent behavior using both the logistic regression approach and artificial neural networks.

3. Reasons for Choosing the Topic

-The importance of the phenomenon of violence, which is considered one of the most dangerous, negative, and widespread social and psychological phenomena in the world, which calls for studying it to understand and limit its spread.

-Predicting violent behavior before it occurs provides an opportunity for early intervention in order to reduce its risks.

-Focusing on the role of psychological and social factors in the emergence and escalation of violent behavior in order to understand the phenomenon.

-The use of artificial intelligence techniques as machine learning, logistic regression as a statistical method. Artificial neural networks in data analysis and accurate prediction of violent behavior which adds a modern scientific dimension to the study.

4. Aims of the Study

-To identify the psychological and social factors that have the most impact on predicting violent behavior using both the logistic regression approach and artificial neural networks.

5. Significance of the Study

Theoretical Significance

The importance of this study lies in the fact that violence is a global social phenomenon that has attracted significant attention from researchers, making it a subject of discussion in various fields such as sociology, criminology, and psychology, with numerous books

and articles published on the topic. This study contributes to the existing body of knowledge by focusing on understanding the psychological and social factors influencing this phenomenon and opening new avenues for scientific research in this area.

Practical Significance

This study aims to predict violent behavior by analyzing psychological and social factors using accurate predictive tools such as machine learning, artificial neural networks, and logistic regression. These tools help in developing effective models for early identification of individuals most likely to engage in violence, reducing its prevalence, and preventing its risks thus; contributing to the promotion of safety and stability in society.

6. Prior Studies

6.1. Studies about Predicting Violent Behavior:

1. ● An article by (Petering et al., 2018) titled **"Artificial Intelligence to Predict Intimate Partner Violence Perpetration (IPV)".** Aimed to design a predictive model and a triage tool to identify individuals most at risk of committing violence, with the goal of prevention and avoiding violent incidents before they occur, rather than labeling them as perpetrators. As part of a longitudinal study on homeless youth in the Los Angeles area, individuals who sought drop-in services were invited to complete a self-administered questionnaire to gather information on their experiences and needs. The presented results are from the third panel of data collection (sample size; N=452). The Revised Conflict Tactics Scale (CTS2) was used to assess physical IPV perpetration. The sample was limited to youth who answered the questions related to IPV (99 youth either did not answer the corresponding questions or were never in a relationship which narrows down the data to 353).

   This study employs statistical methods like p-values and LASSO for feature selection, alongside AI algorithms such as Support Vector Machines (SVM) and Random Forests to enhance predictive accuracy. The results showed the importance of early detection and providing preventive interventions before violence occurs. The most influential factors contributing to violence were identified using statistical methods and were compared with initial expectations from a social work perspective.(Petering et al., 2018).

2. ● In an article by (Goin et al., 2018) titled **"Predictors of Firearm Violence in Urban Communities: A Machine-Learning Approach"**. The objective of their research was to use Machine learning to identify factors linked to firearm violence in urban areas, aiming to offer insights that can support the analysis of violence and public health. They geographically link population-based firearm violence data to more than 300 community characteristics that are publicly available through the Census and other sources. Rates were calculated of community-level interpersonal firearm violence by Zip Code Tabulation Area (ZCTA) using emergency department, hospitalization, and mortality data from California's Office of Statewide Health Planning and Development (OSHPD) and Vital Statistics. The study identified 18 predictive variables that accounted for 77.8% of the variation in firearm violence rates. These variables included factors such as levels of social isolation, education rates, and economic indicators related to wealth and poverty, among others. The results showed that:
   - Spatial restrictions on where minority groups were permitted to live can compound multiple disadvantages into one environment, multiplying risk factors for violence
   - Marriage status variables were also important predictors. This aligns with theoretical perspectives that view family structure as a key indicator of social cohesion, socioeconomic status, and social capital factors that have long been recognized as influential in shaping levels of community violence.
   - Other important predictors of community violence included education and related aspects of socioeconomic status. Education can influence violence rates both directly and across generations by expanding economic opportunities and improving long-term social and economic outcomes.
   - The high ranking of variables describing poverty and use of food stamps further affirm the degree to which violence is linked to economic characteristics of communities. The percentage of employed individuals commuting by car can reflect limited local economic opportunities, suggesting that residents may need to travel longer distances to access employment.
   - Historical patterns of economic opportunity or exclusion have implications for community violence rates.(Goin et al., 2018).

3. ●The study of (Wang et al., 2020) titled **"Prediction of Physical Violence in Schizophrenia with Machine Learning Algorithms**". Aimed to develop predictive models of physical violence among individuals diagnosed with schizophrenia through the use of machine learning classification algorithms. The study relied on clinical, demographic, and social data extracted from the medical records of 275 patients with schizophrenia, 103 of whom had a history of violent behavior. Seven classification algorithms were applied to assess predictive accuracy and help prevent incidents of physical violence. The results showed that 103 (37%) of the patients had a history of violence, while 172 (63%) had no violent tendencies. The « Random Forest » model demonstrated the highest accuracy at 62%, with an area under the ROC curve of 0.63.(Wang et al., 2020).
4. ●According to (Yu et al., 2022) titled **"The Prediction and Influential Factors of Violence in Male Schizophrenia Patients with Machine Learning Algorithms"**. They combined machine learning (ML) algorithms with routine data to predict violent behavior among male schizophrenia patients. The study involved analyzing data from 397 patients using a set of machine learning algorithms, including the LASSO algorithm and logistic regression, to identify the key factors associated with violence. The results of the study showed that the prevalence of violent behavior among male patients with schizophrenia was 36.8%. Among the most prominent factors contributing to the likelihood of such behavior were low educational level, smoking, and certain social factors, according to the analysis using LASSO and logistic regression algorithms. The researchers also found that the artificial neural network demonstrated better predictive performance compared to the other algorithms. (Yu et al., 2022).
5. ●Another study by (Sonnweber et al., 2021) titled "**Violent and Non-Violent Offending in Patients with Schizophrenia: Exploring Influences and Differences via Machine Learning"**. Aimed to identify the factors that distinguish between violent and non-violent offenders with schizophrenia spectrum disorder, by employing machine learning algorithms and a wide range of variables. The study was based on a unique sample of 370 forensic patients who had committed crimes and were diagnosed with schizophrenia spectrum disorder, where machine learning algorithms and a set of variables were used to analyze the distinguishing factors between violent and non-violent offenders. The findings highlighted ten key factors spanning criminal and psychiatric history, as well as clinical, developmental, and

social domains as the most significant in distinguishing violent offenders from non-violent ones. Additionally, correct classification of violent and non-violent offenses was achieved in nearly three quarters of the cases. (Sonnweber et al., 2021).

6. ●A Study by (Shah et al., 2021) titled **"Crime forecasting: a machine learning and computer vision approach to crime prediction and prevention"**. Explored how the integration of machine learning (ML) and computer vision can assist law enforcement agencies in detecting, preventing, and solving crimes with greater accuracy and speed. It also can be used to predict the nature of a crime and, potentially, identify a suspect. In their paper, they presented case studies where these technologies have already been applied successfully, to further explore their potential. The observed statistical differences before and after the adoption of these technologies by law enforcement agencies highlight their effectiveness in crime detection and prevention. A common belief is that every criminal has a motive. By analyzing motives, we might be able to classify crimes effectively. In this study, we propose a model where ML algorithms serve as a database for recorded crimes categorized by type while computer vision provides real-time analysis of environments. By combining these two sources of data, we suggest that it is possible to predict crimes before they occur.(Shah et al., 2021).
7. ●The study of (Chen et al.,2022)titled "**INN: An Interpretable Neural Network for AI Incubation in Manufacturing"** the researchers explored how expert human knowledge can be transferred to supervised learning models by integrating interpretable rules and features into systems based on specialized knowledge, with the goal of supporting decision-making in the manufacturing sector. The study employed an Interpretable Neural Network (INN) model that uses a center-adjustable sigmoid activation function, benefiting from existing rule-based systems. The data used was drawn from manufacturing environments and included information related to product quality and process modeling, relying on expert knowledge and predefined rules. The study concluded that incorporating human knowledge into the (INN) model improved prediction accuracy while maintaining the interpretability of results. It also showed that combining rule-based systems with machine learning techniques provides a balanced performance between accuracy and clarity, making such models suitable for sensitive tasks that require decisions to be understandable and interpretable. (Chen et al., 2022).

8. ●An article by (Dakalbab et al., 2022) titled **"Artificial intelligence & crime prediction: A systematic literature review"**. The study investigated AI strategies in crime prediction through a systematic literature review (SLR). Their review evaluated the crime analysis type, crimes studied, prediction technique, performance metrics and evaluations and others. With a review of 120 research papers published between 2008 and 2021 that cover AI approaches for crime prediction. The analysis of the data indicates that the most applied approach in crime prediction is the supervised learning approach. (Dakalbab et al., 2022).
9. ●A research by (Ensari et al., 2022) Titled: "**Violence Detection with Machine Learning: A Socio demographic Approach"** Indicates that applying machine learning techniques to socio demographic datasets can be effective in preventing domestic violence. This method is valuable for identifying high-risk factors associated with potential offenders and supports the provision of interventions such as treatment, financial assistance, or mental health services to help prevent abuse. There was no data set in the literature for this kind detection system. Therefore, they created a new synthetic data set to use in the prediction and early detection analysis. The data set contains socio demographic information of the individuals. Such as: mental health, income, drug use, and education level in the dataset. With a rate of mental health from 0 to 5, income from 0 to 5, drug use from 0 to 2, and education level from 1 to 5.Higher values indicate more favorable conditions for the individuals. The study utilized several machine learning algorithms for predictive analysis, including k-nearest neighbors (K-NN), support vector machine (SVM), decision tree (DT), and Gaussian Naive Bayes (GNB). Among these, the decision tree (DT) algorithm demonstrated the highest accuracy in performance SVM gives the second best, GNB gives the third best, and KNN gives the worst accuracy values in their analysis. (Ensari et al., 2022).
10. ●Also, the study of(Cheng et al., 2023) titled **"Application of MachineLearning inPredicting Aggressive Behaviors from Hospitalized Patients with Schizophrenia"**. Established a predictive model of aggressive behaviors from hospitalized patients with schizophrenia through applying multiple machine learning algorithms, to provide a reference for accurately predicting and preventing of the occurrence of aggressive behaviors, a total of 2,037 patients with schizophrenia were selected from a hospital in China between July 2019 and August 2021. They were divided into two groups: the aggressive behavior group (611 cases)

and the non-aggressive behavior group (1,426 cases). The study used multiple questionnaires to assess general condition, insight, social support, family burden, and treatment adherence. Four machine learning algorithms were applied: Multi-Layer Perceptron (MLP), Lasso regression, Support Vector Machine (SVM), and Random Forest. The study showed that the Random Forest algorithm achieved the best predictive performance with an average AUC of 0.955, followed by the MLP algorithm with 0.904, then SVM with 0.902, and finally Lasso with 0.901.The study also identified eight key factors influencing the likelihood of aggressive behavior in patients, including : assessment of family relationship quality (APGAR), insight and attitude toward treatment (ITAQ), duration of illness, history of previous aggressive episodes, social support (SSRS), treatment adherence, age, and family burden (FBS).(Cheng et al., 2023).

11. ●A study by (Salehi et al., 2023) titled: **"Domestic Violence Risk Prediction in Iran Using a Machine Learning Approach by Analyzing Persian Textual Content in Social Media"**. Was conducted to examine and classify Persian-language social media content related to domestic violence (DV) against women. The goal was also to apply machine learning techniques to predict the risk of such violence. Researchers collected a total of 53,105 Persian-language tweets and Instagram captions posted between April 2020 and April 2021; the latter were randomly selected and categorized based on expert-defined criteria. Machine learning algorithms were then applied to the labeled data for modeling and evaluation. Among the tested models, the Naïve Bayes algorithm achieved the highest accuracy, reaching 86.77%.(Salehi et al., 2023).

6.2. Studies about the Variable of Psychological Factors and Violent Behavior:

1. ●Study by (Elst et al., 2000) titled:**"Affective Aggression in Patients with Temporal Lobe Epilepsy: A Quantitative MRI Study of the Amygdale".** The study aimed to examine the relationship between affective aggression and changes in the Amygdala in patients with temporal lobe epilepsy, using quantitative magnetic resonance imaging (MRI) techniques. The study included 50 patients with temporal lobe epilepsy: 25 of them had a history of affective aggression.25 had no history of aggression Clinical, electrophysiological, neuropsychological, and psychometric data were collected, along with MRI assessments to evaluate potential pathology in the Amygdala. The results

indicated that there was no significant increase in Amygdala volume among patients exhibiting affective aggression when compared to those in the non-aggressive or differently aggressive group.20% of the aggressive patients showed atrophy in the Amygdala, suggesting a possible effect of previous injury or neurological changes. Lesions in the left temporal lobe, particularly involving the Amygdala and surrounding areas were identified in 28% of patients with a documented history of aggressive behavior. Affective aggression was associated with abnormal findings in electroencephalogram (EEG) tests, as well as cognitive impairment and increased levels of depression and anxiety. (Elst et al., 2000).

2. ●Study by (Swanson et al., 2006) titled: "**A National Study of Violent Behavior in Persons with Schizophrenia Arch Gen Psychiatry".**This study examined the prevalence and determinants of violence among individuals with schizophrenia residing in the community by employing multivariable statistical models to assess the independent contributions of psychotic symptoms and other relevant factors, symptoms and other contributing factors, risk factors associated with minor and severe violence. The study included 1,410 patients diagnosed with schizophrenia that were clinically assessed and interviewed about their violent behavior during the past six months. The data were drawn from the initial Evaluations were based on data from patients enrolled in clinical trials conducted by U.S. research institutions, providing a structured assessment of clinical and behavioral outcomes.

   National Institute of Mental Health, which aimed to assess the effectiveness of antipsychotic interventions. The results showed that violence was classified into two levels of severity:

   Minor violence: This included physical assaults that did not result in injury or involve the use of a weapon. It was reported by 19.1% of the patients.

   Severe violence: This included assaults that caused injuries, involved the use or threat of a deadly weapon, or involved sexual assault. It was reported by 3.6% of participants. A composite measure that included all forms of violence was also analyzed. The study indicated that there were different but overlapping sets of risk factors associated with both types of violence.

   Positive psychotic symptoms (such as persecutory delusions) increased the likelihood of both minor and severe violence. Conversely, negative psychotic symptoms such as social withdrawal and emotional blunting were linked to a

decreased likelihood of engaging in severe violent behavior. Instances of minor violence, however, were more commonly linked to substance abuse and a range of social and interpersonal factors. Severe violence was associated with psychotic and depressive symptoms, childhood conduct problems, and previous exposure to victimization.(Swanson et al., 2006).

3. ●A study of (Howard et al., 2008) titled "**Exploring the link Between Personality Disorders and Criminality in a Community Sample"**. Using a sample of 224 community-dwelling individuals diagnosed with a DSM-defined personality disorder (PD), the study identified specific personality traits and criminal history characteristics associated with the co-occurrence of antisocial and borderline personality disorders (APD/BPD).After identifying first- and higher- order factors through factor analysis of IPDE item scores, forensic history and personality correlates of the identified higher-order factors were identified using regression analysis. Results showed that individuals with Antisocial Personality Disorder (ASPD) or Borderline Personality Disorder (BPD) were more likely than others to have convictions for violent offenses and to have received custodial sentences. They exhibited higher levels of trait anger, impulsivity, and a greater history of aggression, along with significantly higher scores on an overarching "psychopathy" factor. (Howard et al., 2008).
4. ●The study of (Haddouck et al., 2013) titled**: "Psychotic Symptoms, Self-harm and Violence in Individuals with Schizophrenia and Substance Misuse Problems".** The study explored the associations between specific psychotic symptoms, substance misuse, and violent behavior in individuals dually diagnosed with schizophrenia and substance use disorders. It also examined the relationship between the distress caused by psychotic symptoms and the occurrence of both violence and self-harm. The sample included 327 patients diagnosed with schizophrenia in addition to substance use problems, and they were followed for a period of 24 months. Using clinical interviews and psychological scales to assess the severity of psychotic symptoms and the level of substance use, the results showed that 32.3% of participants engaged in violent behavior toward others, while 28.6% engaged in self-harm or suicide attempts. It was also found that command hallucinations and threat/control-override symptoms were not associated with violence toward others, but were clearly linked to self-harm. The severity of symptoms and the psychological

distress resulting from them were key predictors of this behavior. The results also indicate that certain specific psychotic symptoms are associated with different outcomes, particularly in relation to self-harm, and that these effects persist even after controlling for substance use. This carries important implications for the assessment and treatment of this patient group.(Haddouck et al., 2013).

5. ●A review by (Tully, 2017) titled**: "The Relationship between Mental Illness and Criminality: A Review"**. Suggests a correlation between mental illness and criminal behavior, particularly evident in high incarceration rates. The association of specific conditions, such as schizophrenia and substance abuse, with criminality is a recurring theme in the literature. There is substantial evidence on the impact of mental illness, especially severe mental disorders, on criminal offending. Mental disorders are the primary cause of disability (lost productive years) in North America, Europe, and increasingly worldwide, often affecting individuals at the peak of their lives. Even more concerning is the rising number of mentally ill individuals within the U.S. prison system. (Tully, 2017).
6. ●A study by (Shahbahrami & Dokanehifard, 2019) titled **"Comparing Personality Disorders and Criminal Thinking Styles in Male and Female Prisoners Convicted of Violent Crimes,"** examined the differences in personality disorders and patterns of criminal thinking among incarcerated individuals. The research specifically compared male and female prisoners sentenced for violent offenses; highlighting gender-based distinctions in psychological profiles and cognitive styles related to criminal behavior. The sample in this study included 996 prisoners convicted of violent crimes. Data were collected using three tools: A demographic data questionnaire. The Texas Christine Criminal Thinking Style Questionnaire, The Million Personality Disorder Questionnaire, The results were analyzed using the Independent Samples t-test and Multivariate Analysis of Covariance (MANCOVA) via SPSS software. The results showed that the prevalence of all mental disorders was higher than the cutoff point in prisoners. Additionally, results from the MANCOVA analysis revealed a significant gender difference in criminal thinking styles among prisoners convicted of violent crimes.(Shahbahrami & Dokanehifard, 2019).

7. ●A mini dissertation by(Mandiwana,2021) titled: "**Antisocial Personality Disorder and Dark Tetrad Personality Traits, Violent Crime, and Recidivism : A systematic review"** investigated the connections between ASPD, psychopathy, sadism, narcissism, and Machiavellianism with re-offending and violent crimes were explored. Through analysis of Electronic literature databases such as SAGE Journals, Clinical Key, Google Scholar, EBSCOhost, Science Direct, Criminology Collection, APA Psych Info, Academic Search Complete, APA Psych Articles, Criminal Justice Abstracts, MEDLINE, and Wiley Online Library to identify the correlation between them. The findings from various studies indicate that recidivism was positively linked with emotional dysregulation .individuals with ASPD and Dark Tetrad traits often struggle to adhere to societal norms, making them more prone to engaging in repeated criminal behavior. (Mandiwana, 2021).

6.3. Studies about Social Factors and Violent Behavior:

1. ●Study by (Ehrlich, 1975) titled: **"On the Relation Between Education and Crime"** examined the relationship between years of education and incidents or thefts. The information on the rate of specific offenses across states in the United States were brought from three decennial censuses to test the basic propositions of the model via a cross state regression analysis employing ordinary least squares and simultaneous equation estimation technique. The data revealed a positive relationship between years of education and incidents of theft. The analysis suggests that education does not have a uniform effect on both illegitimate and legitimate opportunities. Instead, its effect varies depending on the complimentarily between schooling and the types of training or inputs used to generate either legitimate or illegitimate returns. Furthermore, the study highlights an association between the extent of income inequality and the rate of specific property crimes across different states, observed over three census years.(Ehrlich, 1975).
2. ●A paper by (Wilkinson, 2001) titled: **"Violent Events and Social Identity: Specifying the Relationship between Respect and Masculinity in Inner-City youth violence".** The study examined the reported rules regarding respect, identity, and violence among 125 violent youth in New York and the micro level dynamics of violent events that these individuals had been involved in. The paper underscored the complex interplay between violence, masculinity, and social identity among

inner-city youth. It suggests that violent encounters are not merely acts of aggression but are deeply embedded in the social fabric of these communities, serving as pivotal moments for identity formation and the negotiation of respect. Specify the emergence of a "street code" that shapes perceptions of grievances and norms on their resolution; and an "ecology of danger" in which social interactions are perceived as threatening or lethal, and individuals are seen as harboring hostile intent and the willingness to inflict harm. And the need to examine the broader social contexts of weapon use, such as street codes, which influence decision-making in potentially violent situations. They also point out that many street-oriented youths lack effective methods or « scripts » for conflict resolution, suggesting that addressing these gaps could create opportunities for changing weapon-related behaviors. The key findings of the study showed**:**

Violence as a Tool for Identity Formation: Young males often use violence to acquire or maintain a respected social identity.

Hierarchy of Masculine Identities: The study identified a hierarchy of identities among the youth:

"Punk" or "Herb": Individuals who are perceived as weak or submissive.

"Holding Your Own": Individuals who can defend themselves and are respected for their ability to handle conflict.

"Crazy," "Wild," or "Killer": Individuals who engage in extreme acts of violence and are feared and highly respected.

Role of Guns in Identity and Respect: Guns were seen as tools for demonstrating toughness and gaining respect.

Socialization and Peer Influence: Peer groups and older adolescents exert significant influence on identity formation, especially on younger individuals.

Developmental Aspects: The study highlighted that the need for social approval and status becomes more pronounced during adolescence, making violent behavior a more prominent tool for identity negotiation during this period.(Wilkinson, 2001).

3. ●study of (Wells and Horney, 2002) titled **"Weapon Effects and Individual Intent to Do Harm: Influences on the Escalation of Violence".** In order to assess the roles of weapons and offender intentions in the outcomes of potentially violent events, they analyzed more than 2,000 incidents described by offenders; through a within-person analysis that permits control for all time-stable characteristics of the offenders. Thus, they addressed that relationships between type of weapon and

incident outcome may be spurious because individuals with a greater propensity to do harm are more likely to use guns. Research findings suggest that weapons exert distinct and independent effects depending on the specific stage of an event.(Wells &Horney, 2002).

4. ●Study by (Hipp, 2007) titled: **"Income Inequality, Race, and Place: Does the Distribution of Race and Class within Neighborhood Affect Crime Rates"**. Tested the effects of neighborhood inequality and heterogeneity on crime rates, by using a large sample of census tracts in 19 cities in 2000, provide strong evidence of the Racial and ethnic heterogeneity plays a significant role in influencing the overall levels of crimes typically committed by strangers, even when accounting for the impact of income inequality. Consistent with predictions across several theories, higher overall inequality within a neighborhood has consistently been linked to increased crime rates especially when it comes to violent crimes. Strong evidence revealed that within racial/ethnic group inequality increases crime rates: Also, the effect of tract poverty on robbery and murder becomes non-significant when the level of income inequality when income inequality is taken into account, the findings suggest that earlier studies may have mistakenly attributed causal significance to poverty. Additionally, evidence from this large sample indicates that it is the presence of homeowners rather than residential stability measured by average length of residence that plays a more critical role in reducing crime. The level of crime in neighborhoods is influenced by various factors, but research shows that income inequality at the census tract level has a stronger link to violent crime than poverty alone. This underscores the role of inequality not just deprivation in shaping crime patterns as a more potent predictor of violence in local communities.(Hipp, 2007).
5. ●An article by (Brownridge, 2008) titled: **"The Elevated Risk for Non-Lethal Post-Separation Violence in Canada: A Comparison of Separated, Divorced, and Married Women"**. A nationally representative sample of 7,369 heterosexual women from Cycle 13 of Statistics Canada's General Social Survey was used to explore the differing dynamics of violence experienced by separated and divorced women compared to married women. Findings revealed that separated women were nine times more likely, and divorced women four times more likely, to report experiences of violence than their married counterparts. While factors like patriarchal control, sexual jealousy, and possessiveness were strong predictors of violence within marriage, they did not significantly predict post-separation violence.

This highlights the complexity of violence after separation, suggesting it is driven by more than just issues of domination and control.(Brownridge, 2008).

7. Operational Definitions

-**Psychological Factors:** are those related to an individual's mental state, including psychological disorders and emotional states, which are reflected in the person's way of thinking and behavior.

-**Social Factors:** These are a set of external conditions surrounding the individual, including social status, age, educational level, etc. They affect the individual's life and play an important role in their social interactions.

-**Violent Behavior:** is an aggressive behavior, either verbal or physical, resulting from a loss of control and an inability to manage emotions. It is directed towards oneself, others, or property.

-**Machine Learning (ML):** is a branch of artificial intelligence that focuses on analyzing and simulating input data using specific tools, with the goal of predicting future outcomes based on that data.

-**Artificial Neural Networks (ANN):** Is machine learning model used to analyze complex data and extract complex relationships between psycho-social factors to improve the accuracy of predicting violent behavior.

-**Logistic Regression (LR):** It is a statistical technique used to predict the occurrence of a certain event (such as violent behavior) based on the influence of a set of independent variables such as age, gender, or psychological disorders.

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Introduction

Psychological and social factors play an important role in the emergence and of violent behavior, through the continuous interaction of psychological and social factors. This chapter is divided into two sections; the first one explores the most frequent psychological factors that contribute with violent behavior. And the second section discusses social factors.

Psychological factors include; personality disorders and other psychological disturbances that affect the individual's emotions, perceptions, and behaviors, leading to illogical, unexpected, and violent behaviors, as well as a desire to control others and violate social laws. This is combined with social factors such as poverty, unemployment, gender differences, and education level, which influence the individuals and push them to meet their needs in unethical ways, such as: theft and assault using weapons. And that Results in different forms of violence and the wide spread of these behaviors among society.

1. Psychological Factors

1.1. Antisocial Personality Disorder

1.1.1. Definition

Antisocial Personality Disorder (ASPD), also called Dissocial Personality Disorder (DPD), is a DSM-5 diagnosis given to people who consistently violate others' rights without remorse. They may repeatedly commit crimes leading to arrest, or harm others in non-criminal but socially unacceptable and irresponsible ways.(Arteaga, 2016).

The core characteristic of Antisocial Personality Disorder is a persistent pattern of deceit and manipulation, marked by a disregard for and violation of the rights of others. This behavior typically starts in childhood or early adolescence and persists into adulthood. It is often also described using terms like psychopathy, sociopathy, or dissocial personality disorder.(American Psychiatric Association, 2022).

1.1.2. Diagnostic Criteria

A. A pervasive pattern of disregard for and violation of the rights of others, occurring since age 15 years, as indicated by three (or more) of the following:

1. Failure to conform to social norms with respect to lawful behaviors, as indicated by repeatedly performing acts that are grounds for arrest.

2. Deceitfulness, as indicated by repeated lying, use of aliases, or conning others for personal profit or pleasure.

3. Impulsivity or failure to plan ahead.

4. Irritability and aggressiveness, as indicated by repeated physical fights or assaults.

5. Reckless disregard for safety of self or others.

6. Consistent irresponsibility, as indicated by repeated failure to sustain consistent work behavior or honor financial obligations.

7. Lack of remorse, as indicated by being indifferent to or rationalizing having hurt, mistreated, or stolen from another.

B. The individual is at least age 18 years.

C. There is evidence of conduct disorder with onset before age 15 years.

D. The occurrence of antisocial behavior is not exclusively during the course of schizophrenia or bipolar disorder. (Apa, 2022, p. 748).

1.2. Histrionic Personality Disorder

1.2.1. Definition

Histrionic Personality Disorder (HPD) is a psychiatric condition recognized in the DSM-5(American Psychiatric Association, 2013).Individuals with HPD are characterized by engaging in dramatic, seductive, or attention-seeking behaviors, along with exaggerated emotional expressions that often appear theatrical. They tend to adopt an impressionistic or reactionary approach to understanding their surroundings and display heightened suggestibility and susceptibility to influence by others. (Lewis & Mastico, 2017).

Histrionic Personality Disorder (HPD) is marked by a pervasive pattern of excessive emotionality and attention-seeking behavior, beginning in early adulthood and present across various contexts. Although it typically emerges in late adolescence or early adulthood, it tends to persist throughout life. Individuals with Histrionic Personality Disorder are typically described as excessively extroverted, emotionally expressive, flirtatious, and attention-seeking, often displaying theatricality, seductiveness, and self-centeredness in their interactions. When they are not the focal point of attention, they may feel ignored or undervalued. They may display flamboyant, captivating, or overly sensual and sexual behaviors. Those with HPD often exhibit erratic and transient emotions, which others may perceive as insincere.(Ashra & Mishra, 2024).

1.2.2. Diagnostic Criteria

A pervasive pattern of excessive emotionality and attention seeking, beginning by early adulthood and present in a variety of contexts, as indicated by five (or more) of the following:

1- Is uncomfortable in situations in which he or she is not the center of attention.

2- Interaction with others is often characterized by inappropriate sexually seductive or provocative behavior.

3- Displays rapidly shifting and shallow expression of emotions.

4- Consistently uses physical appearance to draw attention to self.

5- Has a style of speech that is excessively impressionistic and lacking in detail.

6- Shows self-dramatization, theatricality, and exaggerated expression of emotion.

7- Is suggestible (i.e., easily influenced by others or circumstances).

8- Considers relationships to be more intimate than they actually are.(Apa,2022, p. 758).

1.3. Narcissistic Personality Disorder

1.3.1. Definition

Narcissistic Personality Disorder (NPD) is a complex condition marked by pervasive patterns of grandiosity, an intense need for admiration, and a notable lack of empathy. These traits often result in difficult interpersonal relationships, strained professional roles, and significant functional impairments. Early identification of narcissistic traits is crucial for effective intervention and management, especially in clinical settings where precise diagnosis is essential. (Puri et al., 2024).

The core characteristic of Narcissistic Personality Disorder is a pervasive pattern of grandiosity, a strong need for admiration, and a lack of empathy, which emerges in early adulthood and manifests in various contexts. (Apa, 2022).

1.3.2. Diagnostic Criteria

A pervasive pattern of grandiosity (in fantasy or behavior), need for admiration, and lack of empathy, beginning by early adulthood and present in a variety of contexts, as indicated by five (or more) of the following:

1-Has a grandiose sense of self-importance (e.g., exaggerates achievements and talents, expects to be recognized as superior without commensurate achievements).

2-Is preoccupied with fantasies of unlimited success, power, brilliance, beauty, or ideal love.

3-Believes that he or she is “special” and unique and can only be understood by, or should associate with, other special or high-status people (or institutions).

4-Requires excessive admiration.

5-Has a sense of entitlement (i.e. unreasonable expectations of especially favorable treatment or automatic compliance with his or her expectations).

6-Is interpersonally exploitative (i.e., takes advantage of others to achieve his or her own ends).

7-Lacks empathy: is unwilling to recognize or identify with the feelings and needs of others.

8-Is often envious of others or believes that others are envious of him or her.

9-Shows arrogant, haughty behaviors or attitudes.(Apa, 2022, p. 761).

1.4. Schizophrenia

1.4.1. Definition

Schizophrenia is a severe mental disorder marked by abnormal thinking, perceptual disturbances, and altered emotional expression. It affects an estimated 24 million people globally, with twice as many indirectly impacted, such as caregivers. Typically diagnosed in adolescence or early adulthood, schizophrenia can affect a person's well-being throughout life. With proper care and support, up to 50% of individuals can recover and live within the community. The disorder significantly impacts thoughts, emotions, mood, and behavior, with symptoms varying widely across individuals and cultural contexts.(Galderisi et al., 2024).

1.4.2. Diagnostic Criteria

A. Two (or more) of the following, each present for a significant portion of time during a 1-month period (or less if successfully treated). At least one of these must be (1), (2), or (3):

1- Delusions.

2- Hallucinations.

3- Disorganized speech (e.g., frequent derailment or incoherence).

4- Grossly disorganized or catatonic behavior.

5-Negative symptoms (i.e., diminished emotional expression or avolition).

B. For a significant portion of the time since the onset of the disturbance, level of functioning in one or more major areas, such as work, interpersonal relations, or self-care, is markedly below the level achieved prior to the onset (or when the onset is in childhood

or adolescence, there is failure to achieve expected level of interpersonal, academic, or occupational functioning).

C. Continuous signs of the disturbance persist for at least 6 months. This 6-month period must include at least 1 month of symptoms (or less if successfully treated) At meet Criterion A (i.e., active-phase symptoms) and may include periods of prodromal or residual symptoms. During these prodromal or residual periods, the signs of the disturbance may be manifested by only negative symptoms or by two or more symptoms listed in Criterion a present in an attenuated form (e.g.Odd lives, unusual perceptual experiences).

D. Schizoaffective disorder and depressive or bipolar disorder with psychotic features have been ruled out because either 1) no major depressive or manic Episode have occurred concurrently with the active-phase symptoms, or 2) if Mood episodes have occurred during active-phase symptoms, they have been Present for a minority of the total duration of the active and residual periods of The illness.

E. The disturbance is not attributable to the physiological effects of a substance (e.g., a drug of abuse, a medication) or another medical condition.

F. If there is a history of autism spectrum disorder or a communication disorder of childhood onset, the additional diagnosis of schizophrenia is made only if prominent delusions or hallucinations, in addition to the other required symptoms of schizophrenia, are also present for at least 1 month (or less if successfully tr ted). (Apa, 2022, p. 114).

1.5. Delirium

1.5.1. Definition

Delirium, also known as an acute confusional state, is a serious clinical condition marked by sudden changes in consciousness, cognition, and perception, with symptoms that typically develop over a few days and fluctuate in severity. It commonly affects older adults, individuals with dementia, and those undergoing hip surgery. Delirium is linked to increased mortality, prolonged hospital stays, and significant distress for patients and caregivers. However, with proper care, it can be effectively prevented, identified, and managed. (Enwere et al., 2024).

The core characteristic of delirium is a sudden disruption in consciousness, primarily marked by impaired attention and decreased awareness of the surrounding environment.

This altered mental state affects higher-level brain functions and is typically accompanied by changes in cognitive abilities that are not explained by an existing or developing neurocognitive disorder. The attention disturbance includes difficulty in directing, maintaining, or shifting focus. (Apa, 2022).

1.5.2. Diagnostic Criteria

A- A disturbance in attention (i.e., reduced ability to direct, focus, sustain, and shiftattention) accompanied by reduced awareness of the environment.

B- The disturbance develops over a short period of time (usually hours to a few days), represents a change from baseline attention and awareness, and tends to fluctuate in severity during the course of a day.

C- An additional disturbance in cognition (e.g. memory deficit, disorientation, Language, visuospatial ability, or perception).

D- The disturbances in Criteria A and C are not better explained by another Pre-existing, established, or evolving neurocognitive disorder and do not occur in the content of a severely reduced level of arousal, such as coma.

E- There is evidence from the history, physical examination, or laboratory findings that the disturbance is a direct physiological consequence of another medical condition, substance intoxication or withdrawal (i.e., due to a drug of abuse or to a medication or exposure to a toxin, or is due to multiple etiologies.(Apa,2022, p. 672).

1.6. Epilepsy

1.6.1. Definition

Epilepsy is a neurological condition characterized by recurrent disturbances in mental, motor, or sensory functions. These episodes begin and end abruptly, often accompanied by impaired consciousness, and involve changes in brain electrical activity detectable through an electroencephalogram (EEG). (Kadouri, 2021).

Epilepsy is caused by underlying physiological abnormalities, where seizures occur as an infrequent symptom. The symptoms vary based on the affected brain region, as the same abnormality can lead to different experiences for individuals depending on its location. The mechanisms behind the onset and termination of seizures are still not fully understood.(Varsavsky et al., 2011).

1.6.2. Types of Epileptic Seizures

1- Primary Epilepsy (Idiopathic):

● Seizures typically start during childhood or adolescence.

● Genetic factors play a role.

● Generally responds well to treatment.

● No underlying brain injury or damage.

● Significant improvement is often seen, with minimal deterioration.

2- Secondary Epilepsy (Due to Nervous System Issues):

● Can develop at any age.

● Caused by various organic factors.

● Treatment response can vary.

● Associated with brain injury or damage.

● Deterioration is possible, with inconsistent treatment responses. (Perez, 2014).

1.7. Hypomania

1.7.1. Definition

Hypomania is a chronic mood disorder, often linked to bipolar disorder, characterized by episodes of elevated mood lasting a few days. Symptoms include euphoria, agitation, irritability, and increased energy. Diagnosis can be difficult because the symptoms are subtle and the patient may find the episode pleasant, leading to delayed detection. Treatment usually involves mood-stabilizing medications or psychotherapy. Hypomania is considered a milder form of bipolar disorder and involves hyperactivity, along with behavioral and cognitive disturbances, which may be followed by depression.(Charline, 2022).

1.7.2. Diagnostic Criteria

A-A distinct period of abnormally and persistently elevated, expansive, or irritable mood and abnormally and persistently increased activity or energy, lasting at least 4 consecutive days and present most of the day, nearly every day.

B-During the period of mood disturbance and increased energy and activity, three(or more) of the following symptoms (four if the mood is only irritable) have persisted, represent a noticeable change from usual behavior, and have been present to a significant degree:

1- Inflated self-esteem or grandiosity.

2- Decreased need for sleep (e.g., feels rested after only 3 hours of sleep).

3- More talkative than usual or pressure to keep talking.

4- Flight of ideas or subjective experience that thoughts are racing.

5- Distractibility (i.e., attention too easily drawn to unimportant or irrelevant external stimuli), as reported or observed.

6- Increase in goal-directed activity (either socially, at work or school, or sexually) or psychomotor agitation.

7- Excessive involvement in activities that have a high potential for painful consequence (e.g., engaging in unrestrained buying sprees, sexual indiscretion or foolish business investments).

C-The episode is associated with an unequivocal change in functioning that is Uncharacteristic of the individual when not symptomatic.

D-The disturbance in mood and the change in functioning are observable by others.

E-The episode is not severe enough to cause marked impairment in social or occupational functioning or to necessitate hospitalization. If there are psychotic Features, the episode is, by definition, manic.

F-The episode is not attributable to the physiological effects of a substance (e.g., a drug of abuse, a medication, and other treatment) or other medical condition.(Apa,2022, p. 150-151).

1.**8. Perversion**

1.8.1. Definition

Deviant behavior refers to actions that deviate from the prevailing social and cultural norms, such as crimes, substance abuse, alcohol addiction, and involvement with street

environments. These behaviors disrupt social stability and are considered deviant when they violate established standards of conduct. (Bouranan, 2024).

1.8.2. Types of Pervesion

1.8.2.1. Social Pervesion

Social perversion refers to widespread violations of accepted societal norms, often seen in behaviors like crime, bureaucracy, and drug use. It involves actions that conflict with a society's values, standards, and traditions, which define acceptable behavior. Theoretical studies focus on these behaviors as dysfunctional and abnormal, disrupting social cohesion and group norms. (Bouranan, 2024).

1.8.2.2. Juvenile Pervesion

Juvenile perversion refers to the violation of social rules and failure to follow societal standards by minors. Bert defined it as behaviors in juveniles that deviate dangerously from societal norms, leading to official intervention. It emphasizes the social factors that influence the development of delinquent behavior in juveniles and shape their deviant tendencies. (Bouranan, 2024).

9. Machine Learning and Human Behavior Modeling

One of the key contributions of artificial intelligence in social sciences lies in its ability to efficiently analyze large volumes of data. Machine learning algorithms enable the discovery of patterns and trends within the data, providing valuable insights into human behavior, social changes, and cultural shifts. (Manyika et al., 2011).

These technologies also contribute to the development of models that simulate human behavior in various contexts, which helps in understanding the dynamics of interactions between individuals and their impact on relationships and social communication, with the ability to predict future trends and behaviors based on available data. (Alkhuzamy, 2023).

2. Social Factors

2.1. Definition of Social Factors

They encompass the components that influence human interactions and the structure of society, such as cultural norms, values, population demographics, and social institutions. These factors are integral to shaping how communities grow and operate, affecting both individual actions and larger societal patterns. Analyzing social factors is essential for

understanding trends in behavior, migration, and political developments. (Giddens et al., 2017).

2.2. Gender

2.2.1. Definition of Gender

Gender is a social and cultural construct that highlights the distinctions in traits, roles, and responsibilities associated with men and women, as well as boys and girls. These roles and attributes are shaped by cultural contexts and evolve over time. The concept of gender encompasses the expectations surrounding the characteristics, abilities, and behaviors typically associated with femininity and masculinity. It serves as a valuable tool for examining how shared societal norms reinforce inequalities between the sexes. (UNICEF, n.d.).

2.2.2. Relationship between Gender and Violent Behavior

The societal culture plays a significant role in fostering such violence, with religion and patriarchy closely tied to social oppression.

Patriarchy is a prominent form of oppression in Algerian society, deeply embedded in all aspects of social life. It operates through a system of rules that structure social relations based on gender, age, and kinship, granting fathers, brothers, and husbands' distinct privileges. This familial patriarchy lays the foundation for the subjugation of women, as the male-dominated perspective normalizes and perpetuates women's subservience, leaving little room for the recognition of their rights.(Hamitouche, 2020).

Furthermore, Algeria also contends with public patriarchy, which systematically denies women the full enjoyment of their human rights. This public form of patriarchy is characterized by certain societal attitudes, including a collective mindset that perceives violence against women as acceptable and less severe compared to other forms of social violence. (Hamitouche,2020).A study in Algeria explored the reality of violence against married women diagnosed with breast cancer, in terms of its forms, contributing factors, involved parties, and its resulting effects. The study found that there are various forms of violence practiced against women with breast cancer. Psychological violence was the most prevalent, occurring in 73% of cases, with its main manifestations being insults, threats, and bullying. This was followed by physical violence, reported in 38% of cases, including pushing, slapping, and hitting. Sexual violence was reported in 10% of cases. The study also found diversity in the parties involved in perpetrating the violence against women

with breast cancer. The husband emerged as the primary perpetrator, accounting for 100% of cases, followed by the husband's family at 36%.(Yaish et al., 2025)

In the general population, men are estimated to commit violent acts at a rate nearly ten times higher than women (Tardiff & Sweillam, 1980).This gender gap in violent behavior is also evident among individuals with psychiatric disorders, although it appears less pronounced (Staniloiu & Markowitsch, in press). The differences in violent behavior may stem from a combination of biological and socio-cultural factors. Several neurobiological explanations for these gender differences have been proposed, including the role of genetic and hormonal influences.(Strüberet al., 2008).

Research supports the biological basis of these differences. For instance, women exhibit greater activation of the mirror neuron system during empathy-related tasks compared to men (Schulte-Rüther et al., 2008). Additionally, women tend to have a larger relative total gray matter volume, which has been linked to higher levels of cooperativeness and altruistic behavior.(Yamasue et al., 2009).

Cognition and behavior are influenced by environmental factors and life experiences, which can impact brain function and structure due to the brain’s plasticity. Boys and girls are often raised differently, especially across cultures. Girls are typically socialized to care for others, and mothers tend to engage in more emotional discussions with their daughters, which may enhance women’s abilities in memory and understanding others' emotions. Additionally, women are more likely to adopt a ruminative coping style, while men often use distraction strategies. This difference may contribute to women being more likely to direct aggression inward, such as through self-harm or internalized distress, whereas men are more inclined to express aggression outwardly toward others. (Nolen-Hoeksema, 2000).

2.3.1. Marital Status

2.3.1.1. Definition of Marital Status

Marital status typically refers to an individual's legal or customary relationship to marriage within a given country. It is commonly reported as a percentage distribution across different age groups for both men and women. According to the Principles and Recommendations for Population and Housing Censuses, Revision 2 (United Nations, 2013), the standard categories of marital status include: (1) single (never married), (2) married, (3) widowed and not remarried, (4) divorced and not remarried, and (5) married but separated. The last category includes individuals who are legally separated as well as

those in informal or de facto separations, although some sources may list these as separate categories.(United Nations, 2013).

2.3.1.2. Relationship of Marital Status and Violent Behavior

Marital status can influence the risk of experiencing physical aggression and related harms (Brownridge, 2008). Additionally, marriage often comes with a set of socially constructed roles and identities that can reshape one's self-perception through cognitive transformation (Giordano et al., 2002). For some, marriage symbolizes "getting serious" or entering adulthood. While this perspective may seem outdated, for many men of earlier generations, marriage was associated with "taking responsibility," which involved both caring for a spouse and being cared for, particularly in the context of patriarchal marriage norms.(Brownridge, 2008); (Giordano et al., 2002).

(Ali & Shoukry, 2017) studied the Quality of Life (QoL), aggression, and self-esteem among 120 employed, never-married women aged 30 and above at Fayoum University. They found that most participants had low QoL (61.7%) and self-esteem (55.0%), with 22.5% exhibiting aggressive behaviors. A strong positive correlation was observed between aggression and self-esteem.(Ali & Shoukry, 2017).

2.4.1. Educational Level

2.4.1.1. Definition of Educational Level

According to (Supriadi,1990) the level of education refers to the stages of learning defined by the developmental progress of students, the goals to be achieved, and the skills to be developed.(Supriadi, 1990).

2.4.1.2. Relationship between Educational Level and Violent Behavior

(Lochner & Moretti, 2001) estimate that, in the United States, completing secondary education reduces the likelihood of incarceration by 0.76 percentage points for white individuals and by 3.4 percentage points for Black individuals. They further calculate that the societal benefits of education, specifically through its impact on reducing crime, account for 14% to 26% of the private returns to education. This indicates that the reduction in criminal activity significantly contributes to the overall social value of education in the U.S. However, some studies challenge the assumption by showing no clear negative correlation between education and criminal behavior. Similarly, using aggregated time-series data from developed and developing countries between 1970 and 1994; found that the average

level of education in a country did not have a statistically significant impact on homicide and robbery rates.(Fajnzylber et al., 2002).

A study invested that education can significantly reduce the social costs of crime, as higher education levels lower the likelihood of crimes like shoplifting, vandalism, and assault.(Groot et al., 2010).

2.5.1. Income Level

2.5.1.1. Definition of Income Level

The level of income refers to the total amount of earnings, wages, or other sources of revenue received by an individual, household, or economy over a specified period, often used as a reflection of economic well-being and general living standards. (Todaro & Smith, 2020).

2.5.1.2. Relationship between Income level and Violent Behavior

The lack of economic opportunities and rising unemployment, along with conflict and tension within marital relationships, are key factors contributing to violence against women in Algeria. (Hamitouche, 2020).

Domestic violence is often linked to family poverty, as well as factors such as the aggressor's alcoholism and illiteracy. Combined with other elements, such as substance addictions within the family, serious health issues, or prolonged unemployment, poverty emerges as one of the primary factors contributing to domestic violence. Frustrations arising from limited access to basic necessities such as food, adequate heating or cooling during extreme weather, and other essential services frequently lead to conflicts within families, neighborhoods, or communities. Additionally, severe financial dependence of women on their male partners, common in many cases of abuse, can foster long-term intolerance and tension, eventually escalating into acts of violence.(Dhungel et al., 2017).

Socioeconomic and political conditions have been linked to increases in different types of violence. For instance, greater income inequality at the county level has been connected to higher rates of child abuse and neglect, even when accounting for child poverty (Eckenrode et al, 2014). Similarly, income inequality at the census tract level has been found to correlate with increased rates of violent crime, with this relationship proving stronger than the link between poverty and violent crime. (Hipp, 2007).

2.6.1. Weapon use

2.6.1.1. Definition of Weapon Use

Weapon use refers to the act of employing tools or devices designed to inflict harm, defend, or assert power in a conflict or combat situation, whether by individuals, groups, or states. (Bauman, 2013).

2.6.1.2. Relationship between Weapon use and Violent Behavior

In situations with potential violence, the presence of a weapon such as a knife or gun may decrease the likelihood of actual violence by serving as a coercive tool, enabling the carrier to exert control through the heightened threat of harm.(Kleck & McElrath, 1991).

(Wilkinson & Fagan, 2001) highlight the need to examine the broader social contexts of weapon use, such as street codes, which influence decision-making in potentially violent situations. They also point out that many street-oriented youths lack effective methods or "scripts" for conflict resolution, suggesting that addressing these gaps could create opportunities for changing weapon-related behaviors.(Wilkinson & Fagan, 2001).

A study by (Pickett et al., 2005) on adolescent fighting and weapon carrying found that males more frequently carried weapons associated with "proactive aggression" (e.g., guns, clubs, brass knuckles), whereas females carried weapons for defensive purposes (e.g., mace, pepper spray).(Pickett et al., 2005).

(Wells & Horney, 2002),(Phillips & Maume, 2007). Argue that the presence of a weapon can escalate violence specifically; (Wells & Horney, 2002). Claim that guns, more than other weapons; increase the likelihood of attacks by empowering individuals to act without directly endangering themselves. This allows those who may lack the physical ability or psychological inclination to attack without a weapon to cause harm from a distance.(Wells & Horney, 2002);(Phillips&Maume, 2007).

Conclusion

As a sum to the chapter, psychological and social factors play a pivotal role in shaping human behavior, experiences, and outcomes across various domains of life and understanding these factors which contribute to violent behavior is crucial for addressing the root causes and preventing harm within communities. Psychological factors included; personality disorders, psychotic disorders, and other mental disorders. On the other hand, social factors include gender differences, marital status, income level, educational levels and other factors. The interplay between these factors highlights the complexity of violent behavior and underscores the need for a multidimensional approach to prevention and intervention

Chapter Three: Violent Behavior

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Chapter Three: Violent Behavior

Introduction

This chapter gives an account of the definitions attributed to violent behavior and its various types were outlined (such as self-directed violence, interpersonal violence, and collective violence), highlighting the multiple contexts in which it emerges. Subsequently, the forms of violence were addressed (such as physical, emotional, gender-based, etc.), along with a discussion of its causes, which may stem from individual, biological, or environmental factors.

The chapter also included a presentation of the most prominent theories explaining violent behavior, such as the social learning theory, control theory, and others. Finally, it examined the characteristics of offenders, focusing on recurring patterns such as biological factors, substance abuse, educational level, and antisocial tendencies.

1. Definition of Violent Behavior

Violence is defined by the World Health Organization as ‘‘the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, mal development or deprivation’’. (Krug et al., 2002).

2. Types of Violent Behavior

2.1. Self-directed Violence

Self-directed violence refers to a wide range of behaviors that include suicidal thoughts and actions, as well as different forms of self-harm. It highlights the complex and often deeply personal nature of harm inflicted by individuals on themselves, whether as a cry for help, a way of coping, or a manifestation of mental health struggles. The term "fatal suicidal behavior" refers to suicidal actions that lead to death, while "non-fatal suicidal behavior," "attempted suicide," "para-suicide," and "self-harm" describe suicidal actions that do not result in death. "Suicidal ideation" is used to refer to thoughts about intentionally ending one's own life. On the other hand, "self-mutilation" involves the deliberate destruction or alteration of body parts without the intention of suicide. (Rutherford et al., 2007).

2.2. Interpersonal Violence

2.2.1. Domestic Violence

The violence which occurs between individuals who are or have been in a close relationship. Domestic violence can be directed toward a current or former partner, child, close family member, or another individual with a close personal connection.(Rutherford et al., 2007).

2.2.2. Family Violence

Domestic violence involving members of the same family. In cases of family violence, harm directed at any family member impacts everyone in the household, exposing them to the violence and its consequences.(Rutherford et al., 2007).

2.2.3. Intimate Partner Violence

Domestic violence aimed at a person’s partner or current/former spouse.(Rutherford et al., 2007).

2.3. Collective Violence

Violence involving large groups or communities, often aimed at achieving social, political, or economic objectives. Collective violence is categorized into social, political, and economic forms, reflecting the potential motivations of the groups or states involved. Such acts often stem from multiple intertwined motives.(Bildjuschkin et al., 2021).

2.3.1. Collective Social Violence

Collective violence committed to advance a specific social goal. Examples include crimes driven by organized hatred, terrorism, and harassment.(Bildjuschkin et al., 2021).

2.3.2. Collective Political Violence

Collective violence carried out to achieve a political objective. This includes wars, violent conflicts, state-led violence, and similar actions by large groups.(Bildjuschkin et al., 2021).

2.3.3. Collective Economic Violence

Collective violence aimed at disrupting economic activities, limiting access to essential services, or creating economic inequalities among societal groups. Examples include attacks by organized groups seeking financial benefits. (Bildjuschkin et al., 2021).

3. Forms of Violent Behavior

3.1. Emotional Violence

According to a 2010 report by the Bureau for Analysis and Documentation at the Senate Chancellery, emotional or psychological violence encompasses actions intended to strip the victim of self-confidence, leaving them isolated and dependent on the perpetrator. Examples of psychological violence include coercion, threats, humiliation, intimidation, emotional blackmail, insults, blame, accusations of mental illness, isolation, manipulation, withholding affection, denying sexual relations, ridicule, embarrassment, control over or prevention of social interactions, restricting phone or car use, imposing one’s beliefs, forbidding the victim from leaving home, ignoring them, constant criticism, accusing them of provoking violence, demanding complete obedience, depriving them of sleep or food, and destroying objects of personal value. This form of violence can lead to low self-esteem, heightened alertness, mood swings, nervous tics, and difficulties managing emotions. (Mikołajczuk, 2020).

Czerkawska and Markiewicz emphasize that emotional violence, particularly against children; can include threats of abandonment, being placed in foster care, or being forced

to leave home. Unlike physical abuse, emotional abuse leaves no visible marks, but it causes significant psychological effects such as fear, anxiety, feelings of injustice, and a sense of being unloved. Victims may experience persistent mental suffering, moral distress, and physical symptoms like headaches, dizziness, muscle pain, stomach issues, diarrhea, trembling, excessive sweating, and other psychosomatic illnesses. Emotional abuse also has long-term effects, including low self-esteem, feelings of guilt, emotional dependency, and identity disturbances. Victims often develop perfectionist tendencies, depression, anxiety, and social withdrawal, and they struggle to maintain relationships.(Czerkawska & Markiewicz, 2020).

Gaslighting, a common tactic in emotional abuse, has gained attention as a form of manipulation where the abuser causes the victim to doubt their sanity, emotional stability, and self-trust, leaving them entirely dependent on the abuser. This cruel and calculated form of abuse is often carried out by individuals typically men with psychopathic traits. Gaslighters aim to dominate their partners by gradually eroding their independence and gaining complete control. These perpetrators often misuse substances and have conflicts with the law. While they seek to maintain their relationships, they fail to show respect toward their partners.(Czerkawska & Markiewicz, 2020).

3.2. Physical Violence

Physical violence refers to the deliberate violation of another persons' physical integrity through intentional actions that cause injury, pain, or the threat of harm It frequently results in noticeable bodily harm, including lacerations, contusions, burns, or broken bones. Aggressors inflict harm through acts like kicking, choking, pushing, slapping, and using firearms or sharp objects. Physical violence frequently occurs in familial or domestic settings. (Mikołajczuk, 2020).

3.3. Sexual Violence

It includes any non-consensual sexual contact or non-contact sexual acts, such as voyeurism and sexual harassment. Such acts are considered sexual violence if they are perpetrated against someone who cannot provide consent or refuse, due to factors like age, disability, abuse of authority, or the presence of violence or threats. (Jewkeset al., 2002).

Sexual coercion, on the other hand, involves using violence, threats, persistent pressure, deception, cultural norms, or financial circumstances to force or attempt to force someone into unwanted sexual activity. (Krantzet al., 2005).

3.4. Gender-based Violence

Gender-based violence encompasses acts of violence against women within families, culturally or geographically specific abuses like female genital mutilation, "honor killings," and dowry-related violence, as well as forms of sexual violence such as wartime rape, trafficking of women, and forced prostitution. (Krantzet al., 2005).

3.5. Child Abuse Violence

the WHO Consultation on Child Abuse Prevention defines child abuse or maltreatment as "all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment, or commercial or other exploitation that result in actual or potential harm to a child's health, survival, development, or dignity within the context of a relationship of responsibility, trust, or power." (World Health Organization, 1999).

Since cultural norms heavily influence parenting practices, what is considered child maltreatment varies widely across cultures. For example, corporal punishment is socially and legally acceptable in many countries, while it is prohibited in others. As cultures evolve, harmful practices that are culturally accepted may change over time.(Runyan et al., 2002).

3.6. Workplace Violence

Definitions vary in their focus on physical versus psychological violence, with recent research emphasizing the harmful effects of both. The International Labour Organization, drawing from the European Commission, defines workplace violence as "incidents where staff are abused, threatened, or assaulted in circumstances related to their work, including commuting to and from work, involving an explicit or implicit challenge to their safety, well-being, or International Labour Office/International Council of Nurses/World Health. (Organization/Public Services International, 2002).

Workplace bullying may include threats to professional status, personal standing, social isolation, overwork, and destabilization. Professions with significant face-to-face interaction, such as healthcare workers, nurses, and ambulance workers, are particularly vulnerable.(Mayhew & Chappell, 2005).

Workplace harassment involves any unreciprocated and unwanted conduct based on factors such as age, disability, HIV status, sex, or sexual orientation that undermines the dignity of individuals at work. (International Labour Office, 2002).

4. Causes of Violent Behavior

4.1. Biological Factors

4.1.1. Brain pathways

Neuro anatomical models of aggression and violence identify a network of regions, including the frontal lobes and amygdala. Dysfunction in the dorsolateral prefrontal cortex (DLPFC) is linked to executive dysfunction, which may hinder occupational, social, or academic success, potentially leading to violent behavior. (Giancola, 1995);(Blair, 2001).

Blair's PET scan study on 13 male participants found that stronger angry facial expressions were associated with increased activity in the orbito frontal cortex (OFC) and anterior cingulate cortex (ACC). (Blair et al., 2006).

Neuroimaging studies of aggressive or antisocial individuals reveal four key patterns: prefrontal and temporal lobe dysfunction (especially in the left medial-temporal region), imbalances between prefrontal and subcortical activity, and disrupted emotion regulation circuitry. Additionally, male youths with conduct disorder show reduced gray matter in the left amygdala and anterior insula, linked to aggression. (Sterzer et al., 2007).

4.1.2. Neurotransmitters

The deficiency in serotonin is believed to play a key role in impulsivity and aggression. Although two longitudinal studies support a connection between lower serotonin precursors in the cerebrospinal fluid (CSF) and higher aggression, the relationship is not strictly in reverse.(Clarkeet al., 1999).

Reduced serotonin activity may contribute to a heightened susceptibility to impulsivity and aggression, potentially through its interaction with other neurochemical pathways. These include dopamine systems, which are typically related to reward-driven motivation and attention across multiple levels of processing. Norepinephrine (noradrenaline) may also impact aggression directly or indirectly via the hormonal system, the sympathetic nervous system, or the brain itself. Its influence seems to vary depending on the nature of the provocation for instance, social hierarchy and isolation versus physical shocks or chemical stimuli and does not follow a consistent pattern. Likewise, GABA, despite its general role in inhibiting neural activity within the central nervous system, may sometimes be positively associated with aggression, particularly when its effects are intensified by alcohol.(Pihl & Benkelfat, 2005).

4.1.3. Hormones

4.1.3.1. Testosterone

Research on gender differences in aggression has often focused on the role of androgens, particularly testosterone, in the development of violence. Numerous studies have found a link between higher testosterone levels and increased physical aggression in boys (Scerebo & Kolko, 1994).Additionally, studies on testosterone and aggression have explored the involvement of the orbito frontal cortex (OFC), a brain area crucial for impulse control, self-regulation, and integrating emotion, motivation, and cognition to guide appropriate behavior. (Mehta & Beer, 2009).

4.1.3.2. Cortisol

Cortisol is believed to influence aggression by inhibiting hormones that contribute to it. McBurnett's study, which followed 38 boys aged (7-12) over four years, found that boys with lower cortisol levels exhibited three times as many aggressive behaviors and were identified as the most aggressive by their peers.16 Hormones from the hypothalamic-pituitary-adrenal axis, which regulate the stress response, also play a significant and complex role in aggression. (Barzmanet al., 2010).

4.2.Genetics

A 1997 study involving 182 monozygotic and 111 dizygotic male twin pairs concluded that genetics could account for 40% of the differences in aggression, while the environment explained Half of the variation in physical aggression and around 70% of the variation in verbal aggression can be attributed to individual differences.(Coccaroet al., 2013).

Some studies have identified gender differences in the inheritance of aggressive behavior. For instance, a study by Button and colleagues on 258 twin pairs aged 11-18 found that the inheritance of antisocial aggressive behavior was higher in females than in males. (Button et al., 2004).

4.3. Environmental Causes

4.3.1 .Family

Research on exposure to violence has shown that both direct and indirect experiences of domestic violence are linked to violent behavior in children. Additionally, studies have indicated that girls are more often subjected to maltreatment, while boys are more commonly exposed to gender-based violence (Carrasco, 2014). Moreover, witnessing

violence within the family environment appears to be a stronger predictor of developing violent behaviors than experiencing violence firsthand.(Calvete & Orue, 2013).

Additionally, recent findings suggest that sibling aggression has similar severe mental health impacts as peer bullying. (Tucker et al., 2013).

Children experience in their early years, there are consequences of child maltreatment that appear in adulthood. For example, research shows that maltreated children who enter adulthood are at increased risk for physical, mental, and behavioral health problems such as (a) causing or being a victim of violence, (b) depression, (c) obesity, (d) smoking, (e) risky sex behaviors, (f) alcohol and drug misuse, and (g) unintended pregnancies (CDC, 2014); (DHHS, 2011); (Fang et al., 2012); (Langsford et al., 2007).

4.3.2. Role of Teacher

A positive relationship between teachers and students can help mitigate the link between temperament and disruptive play or risky behavior.(Rudasill et al., 2010).

A supportive and positive social environment within schools has been shown to decrease students' participation in violent behaviors.(Cerezo et al., 2015); (Varela et al., 2015).

4.3.3. Peers and Gangs

At the same time, the rise of modern digital media has shifted some forms of violence from physical settings to online platforms, giving rise to a new type of aggression known as electronic violence or "cyberbullying," which has become increasingly common among school-aged children.(Smith et al., 2008); (Corcoran et al., 2015).

As for the phenomenon of peer violence the problem arises from various translations of the term "bullying" as the most frequently used term in this field. The second problem is children's perception of violence. (Smith et al., 2002).

A study conducted in the USA results indicated a statistically significant correlation between delinquent behavior, expressed as peer violence, and parents' control. (Henneberger et al., 2013).

5. Theories of Violent Behavior

5.1. The Social Learning Theory

The social learning theory of violence suggests that violent behaviors are acquired through imitation and reinforced when individuals observe others being rewarded for such actions. (National Institute of Justice, 2002).While it incorporates elements from other theories, such as social structures, it is distinguished by its unique components: differential association, reinforcement, definitions, and modeling. These components interact in complex ways to predict violent behavior. For instance, the likelihood of an individual committing a violent act depends on several factors, including associating with others who engage in violence, adopting beliefs that justify violence, being exposed to violent role models, perceiving violence as acceptable in certain situations, and experiencing reinforcement from past rewards or anticipating benefits that outweigh potential punishments. (Zahn et al., 2015).

5.2. Strain Theory of Violence

Strain theory of violence asserts that certain stressors increase the likelihood of violent behavior (Agnew, 2007). According to Agnew, the strains most likely to lead to violence include the inability to achieve important goals, exposure to negative stimuli such as interpersonal violence or child maltreatment, and the loss of valued stimuli, such as the death of a loved one, job loss, or a romantic breakup. Whether these strains result in violent actions depend on various individual factors, including personal disposition and the perceived cost of engaging in violence.(Silver et al., 2019).

5.3. Violent Structure Theory

Violent structure theory explores how the social distance between a perpetrator and a victim influences the lethality of violence. (Black, 2004).For instance, research on perpetrators found that decreased intimacy and cultural similarity were associated with an increased likelihood of using lethal weapons.(Rennison et al., 2011).

Similarly, a study on victim responses indicated that as social distance grew, the likelihood of employing aggressive self-defense diminished.(Jacques & Rennison, 2013).

This theory proposes that every conflict operates within a "social geometry" that transcends factors such as gender, race, culture, and socioeconomics. The theory is built on two fundamental components; conflict and social life.(Black, 2004).

5.4. Routine Activity Theory of Violence

According to this theory, certain routine activities increase the likelihood of individuals becoming acceptable targets for victimization. It looks at crime from the offender’s

perspective. Routine Activity Theory suggests that crime occurs as part of everyday life and requires three elements: a motivated offender, a suitable target, and the absence of a capable guardian to prevent the crime.(Felson & Cohen, 1980).When applied to vulnerable adults, the theory indicates that offenders tend to select victims who are easily accessible and lack protection.(DeLima, 2018); (Payne & Gainey, 2006).For example, if an offender wants to steal property to sell for drug money, it is easier to steal from family while visiting than to steal from a jewelry store. Therefore, the offender will choose to steal from family as opposed to the jewelry story simply because it is easier, and there is better access during routine daily activities. This framework is relevant to both violent and property-related crimes.(Crime Research Group, 2018).

5.5. Control Balance Theory of Violence

The theory is built around control ratios, which indicate whether an individual experiences a balanced level of control, a control surplus, or a control deficit. According to the theory, violent behaviors arise from imbalances in control when three key conditions are met: (1) predisposition, (2) motivation, and (3) opportunity.

Initially, the theory posited that control deficits led to feelings of societal marginalization (repressive) and resulted in crimes like vandalism or property damage, while control surpluses were associated with white-collar or financial crimes (autonomous).(Tittle, 1995). However, subsequent research did not support this distinction between repressive and autonomous motivations. In response, Tittle revised the theory in 2004, replacing these categories with the concept of control balance desirability, which represents the effectiveness of a violent act in improving ones' control balance. Although interest in control balance theory declined between its development in 1995 and its revision in 2004, recent years have seen renewed attention, particularly in studies of stalking and intimate partner violence.(Curry, 2018). Additionally, research has demonstrated support for the theory in specific contexts, such as the relationship between poverty and violent behavior among homeless youth.(Baron & Forde, 2007).

6. Characteristics of Violent Offenders

A review was conducted of 23 individuals convicted of homicide or attempted murder/manslaughter, along with details of their crimes, to identify shared traits. Court records revealed that many of the offenders were single, the majority had no diagnosed psychiatric conditions, and knives or other sharp weapons were the most commonly used

method. The typical types of homicide involved domestic conflicts or altercations between friends or acquaintances. (Khoshnood & Väfors-Fritz, 2017).

(Messner & Rosenfeld, 1999) identify sex, age, race, and social class as key factors strongly correlated with homicide. Additionally, marital status is often studied when discussing offender characteristics.

An offender's mental health, both prior to and at the time of the crime, is another significant area of interest. Research highlights a strong link between certain psychiatric disorders and violent crimes (Howitt, 2009); (Langevin & Handy, 1987); (Teplin, 1984); (Torrey, 2011).For instance, (Fazel & Danesh, 2002). Found that a majority of the 20,000 prisoners analyzed across 12 prisons in various countries suffered from severe psychiatric disorders. Education level is also frequently discussed as a potential risk factor for violent behavior. Educational institutions play a key role in shaping individuals' routine activities and serve as a major crime-prevention mechanism. (Gottfredson et al., 2006).

Additionally, a significant body of research has found a strong link between low socioeconomic status (SES) and increased crime rates.(Gottlieb et al., 1990); (Meier & Miethe, 1993); (Savage, 2009).

Conclusion

To conclude with the third chapter, which begins by defining violent behavior and outlines various types (I.e. Self-directed, Interpersonal violence and Collective violence) highlighting the diverse contexts in which violence manifests. As for the forms (e.g., Physical, Emotional, Gender based… etc. The discussion delves into causes, which may stem from individual, biological, or environmental factors. As for the theories it included, the social learning theory, control theory and others.

Finally, the chapter examines the characteristics of offenders, noting patterns such as biological, substance abuse, educational level, or antisocial tendencies.

Chapter Four: Research Methodology

Introduction

1. Research Method
1.1. Retrospective Method
1.2. Data Collection
1.3. Study Population
2. Statistical and Computing Analysis
2.1. Artificial Neural Network (ANN)
2.2. Logistic Regression (LR)

Conclusion

Chapter Four: Research Methodology

Introduction

This chapter contains the procedures adopted for the study. These are as follows: Research design, area of the study, population for the study, instrument for data collection, method of data collection, and statistical and computing analysis.

1. Research Method

A research typically follows several interconnected stages that shape the research design. As a result, the research design outlines the overall framework for the process of gathering data. The current research aims to predict violent behavior in a large sample of offenders; it was crucial to implement ANN and Logistic Regressive model for more precised outcomes. It also utilized a retrospective method in order to collect the data.

1.1. Retrospective Method

Retrospective research typically involves analyzing data that was initially gathered for purposes other than research.(Hess, 2004); (Jansen et al., 2005).

Several psychiatric studies have effectively gathered pertinent data through systematic chart reviews.(Baldassano et al., 2004); (Barzman et al., 2004); (Bloch et al., 2005); (Dworkin, 1987); (Goldstein & Schwebach, 2004); (Grant, 2005); (Henderson et al., 2004); (Marchand et al., 2004); (Staller, 2004).

In order to effectively and systematically extracting data from historical records involves several distinct steps. The first methodological steps involve conceptualizing the retrospective research, which helps inform the literature review and the creation of the research proposal. The next phase focuses on creating a data abstraction tool and establishing the necessary protocols and guidelines to efficiently guide data retrieval. The final steps address key elements of retrospective research, such as data abstraction, sampling considerations, obtaining ethics approval, and emphasize the importance of conducting a pilot study.(Gearing et al., 2006).

1.2. Data Collection

The data consisted of demographic data, and psycho criminological factors were used after signing informed consent. The demographics form consisted of questions related to age, marital status, gender, and social integration. Psycho social factors included seven questions about the factors related to violent behavior, divided into five categories (No pathology, Hypomania, Schizophrenia, Antisocial personality disorder, Histrionic personality disorder, Narcisistic personality disorder, Psychosis, Delirium and Perversion).

1.3. Study Population

The Data was collected in the period between 2012 and 2020. A sample of 110 person’s files of cases accused of violence with ages between 15 to 65 years old

were described using random sampling from different regions of Khenchela city in Algeria. Moreover, the files were assessed by Dr. ZEROUALI Boubaker in the psychiatric unit of legal medical service of Khenchela, Algeria **(**Expert Psychiatrist, Ministerial Decision under number N 6761/10).

The study analyzed 110 cases with the following key characteristics:

- Gender distribution: 91.8% male (n=101) and 8.2% female (n=9)
- Meanage: 33.05 years (SD=10.227)
- Weapon usage: 63.6% (n=70) involved weapons
- Crime type: 72.7% crimes against persons, 27.3% property crimes

Factors	N	%
Gender : -Male	101	91.8
-Female	9	8.2
Age	Meanage: 33.05 years	SD = 10.227
Marital status: -Single	83	75.5
-Married	22	20.0
-Divorced	5	4.5
Socioeconomic status: -Poor	17	15.5
-Median	76	69.1
-High	16	14.5

Psychological Pathology:		
No pathology	65	59.1
Hypomania	13	11.8
Schizophrenia	13	11.8
Histrionic personality disorder	5	4.5
Delirium	5	4.5
Narcissistic personality disorder	4	3.6
Epileptic	3	2.7
Antisocial personality disorder	1	0.9
Perversion	1	0.9
Crime type: -Against persons	80	72.7
-Against property	30	27.3
Weapon usage : -Yes	70	63.6
-No	40	36.4

Table 01: Sample Characteristics

2. Statistical and Computing Analysis

The primary reason for the shift in crime detection and prevention is the statistical analysis conducted before and after the implementation of these techniques by authorities. The study aimed to explore how the integration of machine learning (ML), Artificial Neuron Network (ANN) and Logistic Regression (LR) along with computer vision can assist law enforcement agencies in detecting, preventing, and solving crimes with greater accuracy and speed. In essence, ML and computer vision can revolutionize law enforcement operations. Two predictive models were employed:

1. Artificial Neural Network (ANN)
2. Logistic Regression (LR)

The dataset was partitioned with 68.2% (n=75) for training and 31.8% (n=35) for testing in the ANN model.

2.1. Artificial Neural Network (ANN)

Artificial neural network (ANN) as a machine learning program in artificial intelligence which is; a model inspired by biological neurons, designed to mimic the human brains' decision-making process. It comprises numerous interconnected processing units that collaborate to address complex problems. (Kumar & Narain, 2013).The ANN model operates by intelligently analyzing trends within extensive historical datasets to make predictions. (Caulkinset al., 1996).

The key innovation of neural networks lies in their nonlinear model structures, offering two significant advancements in pattern recognition. Neural network models are highly flexible, as much of their structure is derived empirically from the patterns identified within the data. This flexibility proves valuable in scenarios where theoretical frameworks for complete model specification are lacking, where there are extensive independent variables with intricate interactions, subtle nonlinear relationships, or distinct sub models capturing unique behaviors. (Caulkins et al., 1996).

2.2. Logistic Regression (LR)

Logistic regression is used to calculate the odds ratio when multiple explanatory variables are present. The process is similar to multiple linear regressions, except that the response variable is binomial. The result indicates how each variable influences the likelihood (odds ratio) of the event occurring.

The key advantage is that it helps avoid confounding effects by analyzing the relationships between all variables simultaneously. (Sperandei, 2014).

Logistic regression is a widely used method for risk stratification, ideal for cases where the dependent variable is binary (e.g., presence or absence of disease). It models the relationship between this outcome and multiple predictors, producing a predictive equation based on the probability of the outcome occurring. (Imperiale & Monahan, 2020).

The goal is to create a parsimonious model one that is simple yet accurate. The resulting equation calculates the probability of an outcome based on regression coefficients for each predictor and a baseline term from individuals with reference values for these predictors. (Imperiale & Monahan, 2020).

Conclusion

In this chapter, the research methodology employed to address the study's objectives has been outlined and justified. The chosen research design, data collection methods, and statistical and computing analysis were selected to ensure the reliability and validity of the findings.

Chapter Five: Presentation and Interpretation of the Findings

Introduction

1. Presentation of the Findings
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1.1.1. Model Performance Comparison
1.1.2. Logistic Regression Model Performance
1.1.3. ANN Model Performance

2. Key Findings by Method
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Conclusion

Chapter Five: Presentation and Interpretation of the Findings

Introduction

This chapter presents and interprets the findings derived from the data collected during the study. The aim is to clearly outline the results in a structured and coherent manner, highlighting key patterns, and insights relevant to the research objectives or questions. Through the implementation of Ai techniques as such: machine learning algorithm, with the use of ANN and LR in order to obtain highly precise prediction results. It also consists of implications and recommendations for future researchers.

Chapter Five: Presentation and Interpretation of the Findings

1. Presentation of the Findings

1.1. Computing and Statistical Models

- **Logistic Regression (LR)**: A binary outcome model was used to predict the likelihood of weapon use in violent crimes, with the following predictors: crime type, educational level, psychological pathology, marital status, and socioeconomic status.
- **Artificial Neural Networks (ANN)**: A multi-layer perceptron (MLP) neural network was trained using the same set of predictors, optimized for classification tasks. The ANN model was evaluated based on its accuracy in predicting weapon presence and absence.

1.1.1. Model Performance Comparison

1.1.1.2. Logistic Regression Model Performance

- **Model Fit**: The model exhibited a strong overall fit, with a Nagelkerke R^2 value of 0.551, suggesting that approximately 55% of the variation in weapon use could be explained by the predictor variables.
- **Calibration**: The Hosmer-Lemeshow test yielded a p-value of 0.302, indicating good calibration of the model. This suggests that the model's predicted probabilities align well with the observed outcomes.
- **Predictive Power**: Logistic regression demonstrated significant predictive power for specific psycho criminological factors. The odds ratios (OR) provide clear, quantifiable measures of risk associated with each predictor.

1.1.1.3. ANN Model Performance

- **Overall Accuracy**: The ANN model achieved an accuracy of 77.1% on the testing set, indicating a high level of classification performance.
- **Weapon Presence Prediction**: The model was highly effective at predicting weapon presence, with an accuracy of 85.0%.

- **Weapon Absence Prediction**: The prediction accuracy for weapon absence was lower at 66.7%, indicating a potential area for improvement in handling negative cases.
- **Area under the Curve (AUC)**: The AUC for the ANN model was 0.781, demonstrating a good ability to distinguish between cases with and without weapon use.

Training	Cross EntropyError	41.507
	Percent Incorrect Predictions	21.3%
	StoppingRuleUsed	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00.03
Testing	Cross Entropy Error	20.926
	Percent Incorrect Predictions	22.9%

Table 2 :Model Summary

Dependent Variable: arme

a. Error computations are based on the testing sample.

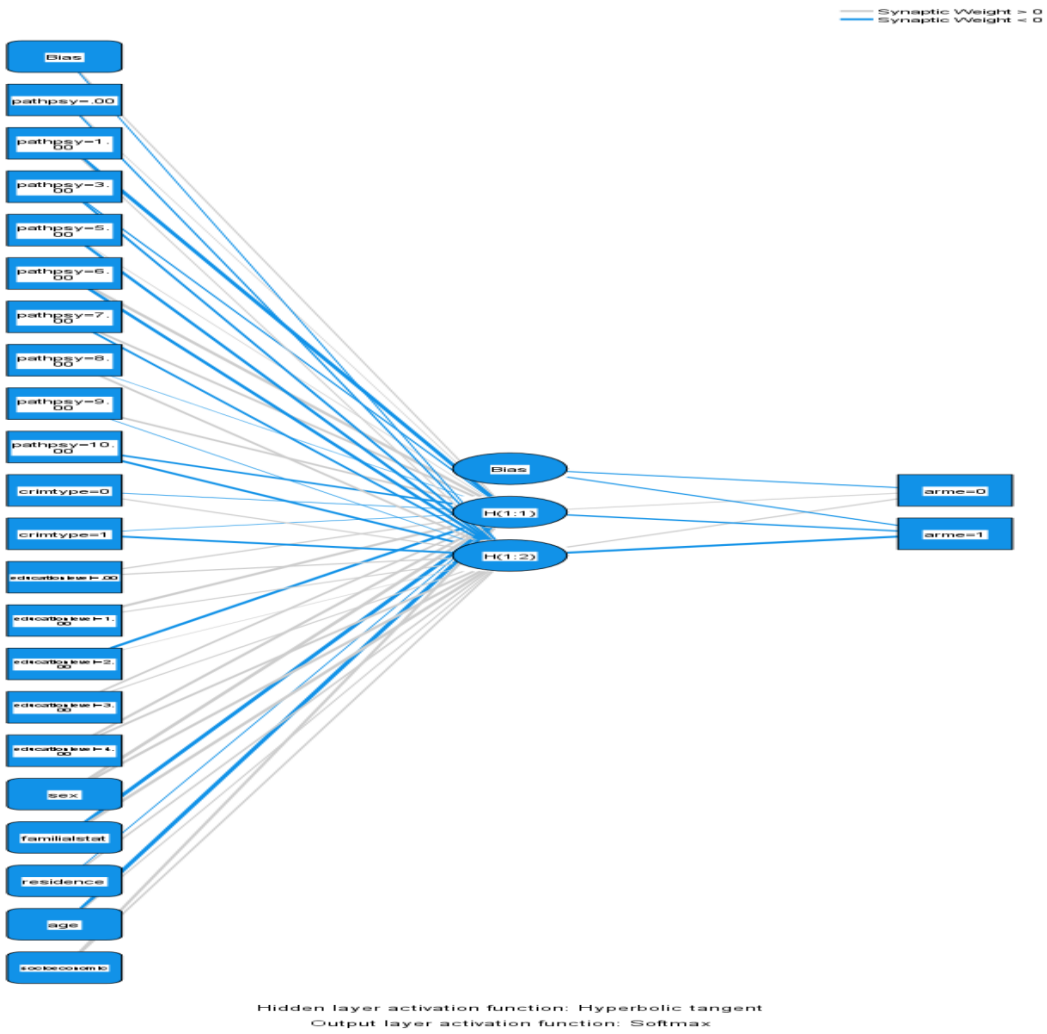

Fig 1: ANN framework

2. Key Findings by Method

2.1. Logistic Regression Findings

. Crime Type Impact

- The type of crime was the strongest predictor of weapon use (OR = 10.781, p = 0.011), with crimes against persons showing significantly higher probabilities of weapon involvement.
- The 95% confidence interval (CI) for crime type was [1.712, 67.882], reinforcing the robustness of the effect.

. Educational Level Effects

- Education level was significant across all levels (p = 0.058 overall). The strongest association was found among illiterate individuals (OR = 81.046), with decreasing odds ratios as education levels increased.

. Psychological Pathology

- The presence of a Hysterionic Personality Disorder was significantly associated with a lower likelihood of weapon use (OR = 0.054, p = 0.023), suggesting a protective effect of certain psychological pathologies.

							95% C.I.for EXP(B)	
		B	S.E.	Wald	Sig.	Exp(B)	Lower	Upper
Step 1	Sex	.118	1.416	.007	.933	1.126	.070	18.040
	Maritalstatus			4.596	.100			
	Single	-.086	2.188	.002	.969	.918	.013	66.809
	Married	-2.058	2.084	.975	.323	.128	.002	7.590
	Age	.017	.042	.171	.679	1.017	.938	1.104
	Crimtype	2.378	.939	6.415	.011	10.781	1.712	67.882
	Psychologicalpathology			7.670	.466			
	Histirionicpersonalitydisorder	-2.923	1.286	5.165	0.023	0.054	0.004	0.669

	Antisocial personalitydisorder	19.954	40192.969	.000	1.000	463191795.273	.000	.
	Narcissisticpersonalitydisorder	19.477	18612.437	.000	.999	287692182.343	.000	.
	Perversion	19.897	40192.969	.000	1.000	437551062.473	.000	.
	Hypomania	-1.434	1.085	1.747	.186	.238	.028	1.999
	Epilepsy	-1.864	1.512	1.520	.218	.155	.008	3.002
	Schizophrenia	-1.711	1.163	2.163	.141	.181	.018	1.767
	Delirium	-1.117	1.121	.993	.319	.327	.036	2.946
	Educationlevel			9.113	.058			
	- Illiterate	4.395	1.946	5.102	.024	81.046	1.788	3672.819
	Primary	3.676	1.730	4.514	.034	39.505	1.330	1173.619
	Middle School	4.161	1.432	8.449	.004	64.166	3.878	1061.647
	Secondary	3.336	1.482	5.066	.024	28.095	1.539	512.984
	Socioeconomic	.312	.729	.183	.669	1.366	.327	5.698
	Constant	-3.662	2.874	1.624	.203	.026		

Table3 : Logistic Regression Results

2.2. ANN Findings

.Variable Importance

- The ANN model identified the educational level as the most important predictor (100% normalized importance), followed by marital status (83.3%), socioeconomic status (59.1%), psychological pathology (53.1%), and crime type (36.9%).

. Prediction Accuracy

- The ANN model excelled in predicting weapon presence with an accuracy of 85.0%, outperforming logistic regression in this regard.
- The model demonstrated a more balanced performance across both training and testing datasets and was better suited to handling non-linear relationships among variables.

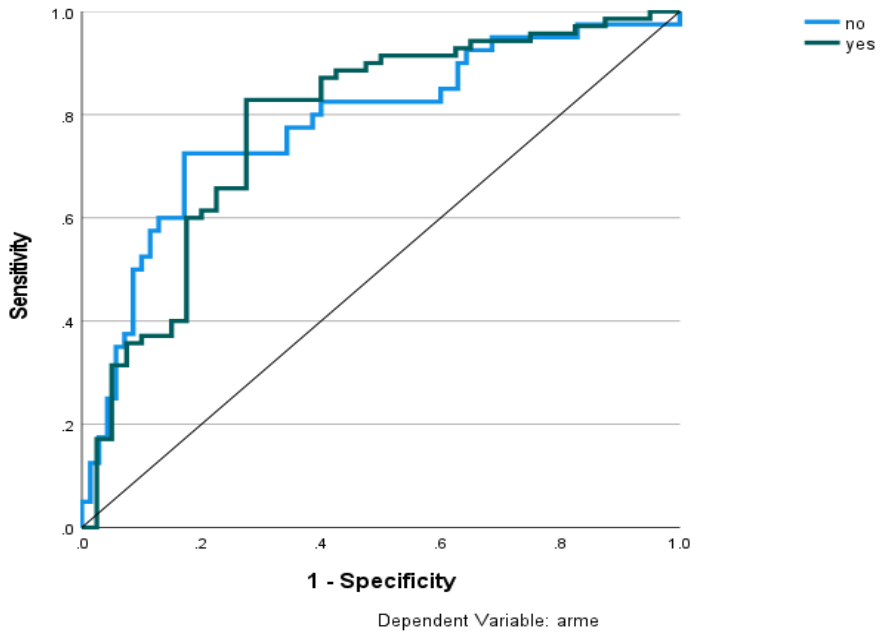

Fig2: The ANN Model

3. Comparative Strengths and Limitations

3.1. Logistic Regression Strengths

. Interpretability: Logistic regression provides clear interpretations of individual factors through odds ratios, which can be useful for understanding the specific impact of each predictor.

. Risk Quantification: The model allows for direct quantification of risk, which can be beneficial for policy and intervention planning.

. Confidence Intervals: Logistic regression generates specific confidence intervals for each predictor, providing reliable estimates of the precision of the model's predictions.

. Policy Implications: Due to its transparency and interpretability, logistic regression is well-suited for making policy recommendations, particularly for resource allocation and preventative measures.

3.2. ANN Strengths

. Higher Accuracy in Weapon Presence Prediction: The ANN model demonstrated superior accuracy (85.0%) in predicting weapon presence, which is crucial for identifying high-risk individuals in violent crime scenarios.

. Complex Interactions Handling: ANN effectively captures complex, non-linear interactions among variables, making it more adaptable to intricate patterns in the data.

. Robustness to Outliers: The model is less sensitive to outliers, which can improve stability and generalizability in real-world applications.

. Performance with Categorical Variables: ANN outperformed logistic regression in handling categorical variables, such as educational level and familial status.

4. Key Insights from both methods

. Educational Factors:

- Both methods identified educational level as a critical factor in predicting weapon use. Logistic regression provided specific risk levels, while ANN

confirmed the importance of education with the highest normalized importance.

. Psychological Pathology

- Logistic regression provided a more nuanced understanding of the impact of psychological pathologies on weapon use. While ANN showed moderate importance (53.1%), both models suggest psychological factors are significant but not primary.

. Crime Type:

- Logistic regression revealed a strong, direct effect of crime type on weapon use, while ANN indicated moderate importance. Both models confirmed the relationship between crime type and weapon involvement.

5. Interpretation of the Findings

This research from a psycho social perspective has identified several key factors that contribute to violent behavior. Each category of these factors plays a crucial role in shaping an individual's inclination towards violence. The findings underscore the complexity behind violent behavior, suggesting that no single factor can entirely account for it. Instead, violent behavior arises from the interaction of multiple contributing factors. These factors include: Educational level; as a crucial factor in predicting weapon use, mainly all educational levels; illiterate, primary, middle, secondary and university. In this study, involvement of mental disorders in crimes was represented by Histrionic personality disorder (HPD) as the major psychological factor contributing to violent behavior. Crime type significantly influences the likelihood of weapon involvement in violence against persons. Non-linear relationships between variables may play an important role in prediction accuracy. This study's subsets of Machine Learning (ML) computing program, the logistic regression (LR) and the artificial neural network (ANN) have distinct advantages in predicting violent criminal behavior. Growing interest has also been shown in the use of NNs in psychiatry for categorization or prediction.(Florio et al., 1994); (Starzomska, 2003); (Price et al., 2000). Machine learning, a branch of artificial intelligence, enables computers to learn and improve from experience without needing direct programming. It uses algorithms that

allow systems to analyze data, identify patterns, and make decisions or predictions. From autonomous vehicles to customized recommendations, machine learning has transformed many industries by extracting valuable insights from vast datasets. Its effectiveness depends on training models with varied and representative data to improve accuracy and generalization. (Alam, 2023).Similarly, a study of (Shah et al., 2021) explored how the integration of machine learning (ML) and computer vision can assist law enforcement agencies in detecting, preventing, and solving crimes with greater accuracy and speed. It also can be used to predict the nature of a crime and, potentially, identify a suspect. Also, a study established a predictive model of aggressive behaviors from hospitalized patients with schizophrenia through applying multiple machine learning algorithms, to provide a reference for accurately predicting and preventing of the occurrence of aggressive behaviors, A total of 2,037 patients with schizophrenia were selected from a hospital in China between July 2019 and August 2021. The study findings identified eight key factors influencing the likelihood of aggressive behavior in patients.(Cheng et al., 2023).

Artificial intelligence (AI), especially machine learning (ML), has seen a rapid growth in recent years, particularly in data analysis and computing, enabling applications to function intelligently (Sarker, 2021). ML typically equips systems with the ability to learn and improve from experience automatically, without needing explicit programming, and is widely considered one of the most prominent technologies of the Fourth Industrial Revolution (Sarker et al., 2020). Industry 4.0 refers to the ongoing automation of traditional manufacturing and industrial processes, which includes advanced data processing through innovative technologies like machine learning automation (Ślusarczyk, 2018).To effectively analyze these data and create relevant real-world applications, machine learning algorithms are crucial. These learning algorithms can be grouped into four main types: supervised, unsupervised, semi-supervised, and reinforcement learning (Mohammed et al., 2016). As in the study which investigated AI strategies in crime prediction through a systematic literature review (SLR). Their review evaluated the crime analysis type, crimes studied, prediction technique, performance metrics and evaluations and others. With a review of 120 research papers published between 2008 and 2021, the data indicates that the most applied approach in crime prediction is the supervised learning approach. (Dakalbab et al., 2022).One key difference between neural networks (NNs) and traditional computing approaches is that NNs are not explicitly programmed to perform specific

operations. Instead, they are trained to solve particular types of problems. This ability to "learn" from data makes NNs especially well-suited for tackling a wide range of problems many of which have remained difficult or unsolvable using traditional methods (Florio et al., 1994).The logistic regression model identified specific risk factors, particularly the strong influence of education level and crime type on weapon use. A result in which other researches had out passed, even though they used ANN or LR but separately, only to predict in theory the occurrence of future crimes. A logistic regression model was developed using interim results, incorporating past criminal history data obtained from the Offender Index (OI). However, since not all prisoners could be located in the OI, the sample size decreased from 960 to 737, which led to a slight increase in the overall reconviction rate from 26% to 28%.

The model calculates the probability of each offender being reconvicted within six months of release (Howard & Kershaw, 2000). The neural network demonstrated slightly superior predictive accuracy, especially for positive cases (weapon presence). Out of all the research papers reviewed, 52 studies, accounted for 43%, employed this particular approach. Spatial analysis was conducted in 19 studies, representing 16% of the total. Additionally, 9 papers (7%) focused on analyzing human behavior to predict crimes. Meanwhile, 24 studies (20%) did not specify the methodology used in their crime analysis. (Dakalbab et al., 2022).In a similar approach, a study explored the application of the ABC algorithm to train an artificial neural network (ANN), resulting in a hybrid crime classification model known as ANN-ABC. Tested on the Communities and Crime dataset from the UCI Machine Learning Repository, ANN-ABC was compared to other algorithms, including back propagation ANN, Naive Bayes, and decision tree models. Results showed that ANN-ABC outperformed the other methods, achieving a 7% improvement in accuracy and statistically significant better performance overall.(Anuar et al., 2015).Also, AI technologies demonstrate strong performance in crime prediction and prevention. These technologies provide highly accurate insights for predicting crimes and enhance efficiency, particularly in applications such as identifying spatiotemporal crime hotspots. It is found that in general, the two ANN and LR models demonstrated high levels of accuracy in predicting violent criminal behavior (Dakalbab et al., 2022). In contrast to many previous studies, the current research utilized a hybrid model combining Artificial Neural Networks (ANN) and Logistic Regression (LR) to reduce sampling errors when assessing predictive accuracy. To tackle the issue of low base rates, several measures were

applied across both models, which helped minimize prediction errors and resulted in a more balanced classification, improving the accuracy of criminal behavior predictions. The logistic regression provides clear interpretability of risk factors, while the neural network offers slightly superior predictive accuracy. Unlike a previous study which examined the extent to which illness perception can predict quality of life. Specifically, it explores the impact of how patients perceive their chronic health conditions on their overall quality of life, using an Artificial Neural Network (ANN) approach namely, the Radial Basis Function (RBF) model. With a number of 316 participants, aged between 16 and 79, from the Arris and Batna regions in Algeria, completed the Revised Illness Perception Questionnaire and the Short Form-36 Health Survey Version 2.0 (SF-36v2). Results showed correlations between the predicted and actual scores across quality-of-life dimensions ranged from 0.34 to 0.43. The artificial neural network demonstrated reliable performance, indicating its potential usefulness in assessing how patients' perceptions of their chronic illness affect their quality of life. (Aberkane, 2016)

Future research might benefit from combining these approaches in a hybrid model. While both models demonstrated effective predictive capabilities, their complementary strengths suggest potential value in using both approaches for comprehensive risk assessment. And this can assist forensic teams and law enforcement in predicting and mitigating the risks of violent and criminal behavior in Khenchela city. It is not surprising to see that the models demonstrated levels of accuracy in predicting violent behavior. The research results show that violent adults were mainly of male sexes who were diagnosed with Histrionic personality disorder; as stated by this disorder can also manifest itself in men in the form of approval-seeking and passive behavior (Gabbard, 2007). The latter is usually more prevalent in women than men. So, this may reflect cultural biases in diagnostic practices rather than an actual difference in its occurrence between the sexes (Perrotta, 2019). Or it could be due to biological causes such as testosterone; research on gender differences in aggression has often focused on the role of androgens, particularly testosterone, in the development of violence. Numerous studies have found a link between higher testosterone levels and increased physical aggression in boys (Scerebo & Kolko, 1994). Histrionic Personality Disorder (HPD) is a condition categorized within Cluster B of the DSM-V. This cluster includes disorders characterized by impulsive, excitable, and dramatic behaviors, alongside Borderline, Antisocial, and Narcissistic personality disorders (APA, 2013). Additionally, Histrionic Personality Disorder (HPD) is a chronic condition And that

is normally rare to witness individuals with Histrionic Personality Disorder (HPD) commit violent crimes and let alone use weapons, given the fact that they are usually known to be characterized by persistent attention-seeking, dramatic emotional expressions, and behaviors often perceived as flirtatious, self-centered, and theatrical. Individuals with HPD may feel unappreciated if not the focus of attention and display rapidly shifting, shallow emotions that may seem insincere (TorricoFrench et al., 2024). People with Histrionic Personality Disorder often focus on gaining attention from others to fulfill their psychological needs. This desire for attention can become a habitual part of their behavior and may be viewed as an overcompensation coping mechanism, where they act in ways that contradict their underlying feelings or beliefs (Asgari et al., 2023). This coping mechanism was referred to by (Young, 1999); (Young et al., 2003). Coping strategies can be grouped into three types: avoidance, surrender, and overcompensation. Individuals with an avoidance style tend to steer clear of situations that might emotionally threaten them. Those who adopt a surrender style react passively, aligning with the underlying schema. In contrast, people with an overcompensation style attempt to manage challenges in a problematic and extreme manner, such as by attacking others or seeking excessive approval. With overcompensation, individuals respond to their schema by behaving, thinking, or feeling in a way that is exaggeratedly opposite to the schema, as if trying to prove the schema wrong or avoid triggering it (Young, 1999); (Young et al., 2003).This may explain why they resort to violence not just as a coping mechanism but also as a way to gain attention, even if it involves breaking the law and engaging in criminal behavior. The connection between Histrionic Personality Disorder (HPD) and Antisocial Personality Disorder (ASPD) remains debated, with continued efforts to clarify their relationship. More research is required to gain a deeper understanding of HPD from biological, developmental, and socio cultural viewpoints further studies should investigate histrionic traits on a continuum from adaptive to maladaptive, explore the links between HPD and other psychological or medical issues, and evaluate the effectiveness of different treatments and the factors that influence better long-term outcomes for individuals with HPD.(Lewis & Mastico, 2017). The previous searches on HPD engaging in violent behavior and weapon use were scarce; our findings are amongst the first to exhibit such results. In contrast to previous research which studied offenders' characteristics and found no obvious mental health condition In terms of mental health, most offenders did not have a diagnosed psychiatric pre-existing condition or one at the time of the offense. Two individuals were sentenced to forensic psychiatric care due to serious mental disorders.

Seven offenders had or still have psychiatric diagnoses, but none were considered severe enough to exempt them from imprisonment. Mental health information was unavailable for one offender. (Khoshnood & Väfors-Fritz, 2017).Moreover, another contributing factor to violent behavior is education level; our findings show that all levels of education were involved in criminal behavior, and not only the individuals with low educational level. Unlike other researches; which invested that education can significantly reduce the social costs of crime, as higher education levels lower the likelihood of crimes like shoplifting, vandalism, and assault (Groot et al., 2010). Similarly, another study investigated the effects of education, poverty, and unemployment on crime rates in Pakistan using annual data from 1991 to 2016. The research finds significant positive relationships between these variables and crime. The study emphasized that improving educational access can reduce crime, poverty, and unemployment, addressing a gap in prior research of (Ahmed et al., 2019). Students who gain access to higher-performing public schools through a selection process do not always show improved academic outcomes. However, they are significantly less likely to engage in criminal behavior during their school years and the initial years after graduation (Deming, 2011). This indicates that education level is not an excuse for criminality; it may be related to the geographic characteristics of khenchela city and the harder ship these individuals encountered while growing up; as stated by a researcher who resides within the same city, the presence of social deviations such as theft, difficulty in mobility during rain due to poor roads and steep slopes, and immoral issues like habitual theft, drug use, and assaults on others all of which are caused by widespread unemployment, family problems, and the absence of security.(Hadji, 2017). Furthermore, weapon use was another crucial factor in violent behavior among these offenders against persons, consistent with previous research; at the time of the crime, ten offenders used a knife or other sharp weapon, making it the most common type of weapon involved. This was followed closely by the use of firearms, which were used by eight offenders. (Khoshnood & Väfors-Fritz, 2017).

It may as well be related to their psychological issues, there was a notable association between certain mental disorders and specific types of weapons; the study revealed a strong link between delusional disorders and the use of sharp weapons, while depressive disorders were more commonly associated with asphyxia. Furthermore, there was a strong association between organic disorders and the use of blunt objects as weapons (Catanesi et al., 2011). An offenders' choice and use of a weapon can also reflect their emotional

expression, including feelings of inadequacy and anger directed toward the victim. In some studies, the weapon's role extends beyond being a mere tool to commit the crime; instead, it is a means to intentionally inflict harm. This aligns with the concept of expressive violence (Salfati, 2000). Robbery patterns were statistically analyzed, in England and Wales, reviewing over 2,000 crime reports and witness statements from seven police jurisdictions. Weapons were involved in one-third of all robberies, especially when offenders employed a confrontational approach toward victims (Smith, 2003).Knives were the most commonly used weapon, appearing in one out of every five personal robberies. Other researchers studied over 2,000 violent and potentially violent incidents described by offenders to examine the role of weapons; their findings indicated that an offenders' intent to cause injury did not significantly influence the decision to use a weapon, and firearm use generally decreased the likelihood of victim injury (Wells & Horney, 2002).A review argued that offenders use weapons as a means of control or to facilitate their crimes, are hypothesized to have longer and more extensive criminal careers compared to other types of weapon use. Those who utilize weapons for emotional purposes are more likely to have a history of violent criminal behavior (Dawson, 2013). Eventually, marital status is often studied when discussing offender characteristics. Our findings indicate that marital status is a significant contributing factor, with the majority of offenders being single, followed by those who were married. Similar to a research which found that regarding marital status, the majority of the 23 offenders were single at the time of the offense (16 individuals), while four were separated or divorced and also single, and three were married. (Khoshnood &Väfors-Fritz, 2017).

All in all, perhaps the violent behavior in the sample of this research is due to the interplay of several factors all intertwined together as mentioned by the Strain theory of violence; which asserts that certain stressors increase the likelihood of violent behavior (Agnew, 2007). According to Agnew, the strains most likely to lead to violence include the inability to achieve important goals, exposure to negative stimuli such as interpersonal violence or child maltreatment, and the loss of valued stimuli, such as the death of a loved one, job loss, or a romantic breakup. Whether these strains result in violent actions depend on various individual factors, including personal disposition and the perceived cost of engaging in violence.(Silver et al., 2019). Or as in the Violent Structure Theory which proposes that every conflict operates within a "social geometry" that transcends factors

such as gender, race, culture, and socioeconomics. The theory is built on two fundamental components; conflict and social life.(Black, 2004).

6. Implications for Practice

6.1. Risk Assessment

- **Initial Screening**: Logistic regression is recommended for initial screenings due to its interpretability and clarity in identifying key risk factors.
- **Complex Cases**: ANN should be applied for more complex, real-time risk prediction, particularly when dealing with non-linear relationships or unknown interactions among variables.
- **Comprehensive Assessment**: Combining both methods can lead to a more holistic approach in assessing and predicting armed violent behavior.

6.2. Intervention Planning

- **Educational Interventions**: Focus on targeted educational programs, particularly for individuals with lower levels of education.
- **Psychological Screening**: Psychological pathologies, particularly those related to histrionic personality disorders, should be incorporated into risk evaluation frameworks.
- **Crime-Type Based Approaches**: Tailored intervention strategies should be developed based on the type of crime, with a particular emphasis on crimes against persons.

6.3. Prevention Strategies

- **Educational Programs**: Implement widespread educational interventions aimed at reducing the likelihood of weapon use in violent crimes.
- **Psychological Screening**: Develop psychological screening tools to identify at-risk individuals based on their psychological profiles.

- **Socioeconomic Considerations**: Address socioeconomic disparities by incorporating these factors into violence prevention strategies.

7. Methodological Recommendations

7.1. Combined Approach

- Utilize logistic regression for understanding and quantifying risk factors, while applying ANN for complex, non-linear prediction tasks. Integrating both methods can enhance predictive accuracy and provide deeper insights into underlying patterns.

7.2. Model Selection

- For policy development and the formulation of actionable recommendations, logistic regression is preferred due to its interpretability.
- For real-time risk prediction and scenarios involving complex interactions, ANN offers superior performance.

7.3. Future Research Directions

- **Sample Size Expansion**: Future studies should aim to collect larger datasets to improve model stability and robustness.
- **Longitudinal Studies**: Longitudinal research designs would help in understanding the dynamic nature of violent behavior and its predictors over time.
- **Gender-Specific Patterns**: Investigate gender-specific patterns in weapon use, as the current dataset is imbalanced in terms of gender representation.

Conclusion

This comparative analysis highlights the strengths and limitations of both logistic regression and artificial neural networks in predicting armed violent behavior. While logistic regression offers strong interpretability and clarity, ANN excels in predictive accuracy, particularly for complex, non-linear relationships. A combined approach leveraging both methods could provide a more comprehensive framework for predicting and mitigating armed violent behavior.

General Conclusion

At the end of this study, and based on its main objective of identifying the most influential psychological and social factors in predicting violent behavior using both logistic regression and artificial neural networks in the city of Khenchela, it was found that violence cannot be attributed to a sole factor, but rather the interaction of a complex set of psychosocial factors.

The results showed that the educational level is a fundamental factor in predicting violence related to weapon use across all levels, the lower the educational level is, the higher the likelihood of weapon use. From a psychological side, it was found that the Histirionic Personality Disorder is the most prominent psychological factor contributing to violent behavior, and it was associated with a decreased likelihood of weapon use.

Both methods logistic regression and artificial neural networks proved efficiency in predicting violent behavior. Logistic regression provided clear and simple interpretations of the influencing factors, along with its ability to measure risk. In contrast, artificial neural networks outperformed logistic regression in predicting weapon possession, especially in handling complex and non-linear relationship between variables.

The research findings demonstrate that psychosocial factors play a pivotal role in predicting violent behavior, especially when analyzed using computing and statistical methods which allow for precise processing substantial quantitative data. Therefore, the set of methods were combined to achieve greater accuracy and effectiveness in predicting violence and reducing its risks. This research ultimately sets a series of recommendations to serve as an important starting point for future researchers, and into helping law enforcements to develop prevention strategies and make early intervention program

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