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Counting crime?

A review on the production of crime data

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This literature review is aimed at providing an overview of the arguments, concerns, and issues raised by criminologists, sociologists, and psychologists regarding crime data and their quality. Given the increasing, widespread use of (crime) data to serve analytical purposes (e.g., predictive policing) and global discussions and measures on big data (policing), this review presents relevant and timely insights. It assists our understanding of how crime data are produced, handled, and influenced by first laying out its development and historical background. The main finding of this review is that while crime data are biased and commonly of 'low quality', knowledge on how they are produced, manipulated, and influenced by various actors and factors remains limited and difficult to obtain. As opposed to 'zooming into' crime data to ameliorate it, the findings indicate the necessity and urgency to 'zoom into' the practices of those who create and curate them.

This working paper reviews the literature on crime data and their quality through an overview of the arguments, concerns, and issues raised among criminologists, sociologists, and psychologists. Given the increasing, widespread use of (crime) data to serve analytical purposes (e.g., predictive policing) and global discussions and measures on big data (policing), this review presents relevant and timely insights. It assists our

understanding of how crime data are produced, handled, and influenced. The paper proceeds as follows: the development and historical background of crime statistics are first laid out, followed by the methodology employed; the findings made in the literature are divided into three sections, recognizing, reporting, and recording each comprising sub-topics; and finally, concluding remarks are discussed.

History of crime statistics

The idea and practice of measuring and quantifying crime systematically is nothing new. Around the 1830s, moral statisticians (e.g., (Guerry et al., 1833; Quetelet, 1835)) had a scientific vision of applying quantitative methods and techniques from natural sciences to systematically understand moral and social phenomena (Coleman and Moynihan, 1996; Maguire et al., 2007). Crime statistics developed and were influenced by the governmental and Lombrosian projects. For governments, various forms of empirical inquiries have since the 18th century sought to enhance the efficient and equitable administration of justice by charting the patterns of crime and monitoring police and prison practices (Maguire et al., 2007). As raised by Foucault (1977), the compilation of detailed information about various dimensions of social life was an important element in the development of modernity and closely tied in with the consolidation of central governmental control (Maguire and McVie, 2017). The Lombrosian projects, however, aimed at building a science of cause, a form of an explanatory body of scientifically tested propositions on crime and criminals. Lombroso's (1876) advanced theories of criminal behavior were primarily based on the heritability of criminogenic traits and physical characteristics. For instance, physical features such as low cranial capacity, receding foreheads, darker skin, curly hair, and large, handle-shaped ears were claimed to be commonly found in delinquents or criminals.

These ideas and debates regarding the quantification and measurement of crime relate to the development of crime data. According to the Oxford English Dictionary (2023), data refers to “an item of (chiefly numerical) information, esp. one obtained by scientific work, some which are typically collected together for reference, analysis, or

calculation”. Essentially, data are the translation of empirical phenomena into other forms (Leese, 2022). When discussing data and hence information, it is useful to distinguish between two different forms of information: (1) official crime and criminal statistics by the state and its agencies, and (2) data generated from research samples derived from official sources (e.g., courts, prisons) (Coleman and Moynihan, 1996).

Both types of information exhibit a fundamental limitation in that they originate solely from a subset of the items or individuals comprising the population of interest. Similarly, numerous researchers raised their concerns about the limitations of employing official statistics to analyze crime patterns across space and time (Buil-Gil et al., 2022; Skogan, 1974). This caution about the potentially disturbing implications of the “dark figures of crime” and debates over the quality of reported crime statistics (being affected by multiple sources of measurement error) is almost as old as reported crime statistics themselves (Asiama and Zhong, 2022; Coleman and Moynihan, 1996). This caveat reflects considerations on what the “correct” form of representation would be in the first place. As empirical phenomena can be translated into data in many different ways, with specific use cases, they result in various idiosyncratic structures, properties, and informational value (Leese, 2022).

Indeed, like other empirical phenomena, infractions¹ pass through multiple processes before being legally labeled as ‘crimes’ and compiled into statistics (Boivin and Cordeau, 2011). Along these processes, certain crimes may not be discovered or considered by authorities, they may not be reported by victims, or the offenders’ identities may not be known, and legal procedures may not result in a conviction (Buil-Gil et al., 2022). The decision to report incidents is influenced not

¹ Infractions are violations or infringements of a law.

only by the characteristics of victims and offenders but also by the contextual aspects of the transgression (Boivin and Cordeau, 2011). Many scholars believe that flaws and errors connected with official crime data are caused by discrepancies in police reports (across departments and countries) and changes in victim reporting over time (Boateng, 2018).

It has been acknowledged that to improve our understanding of crime data and their variations, one should gain knowledge about the processing of infractions and production of crime data, which involves different individuals (victims², witnesses, offenders, police officers) and processes (Boivin and Cordeau, 2011; Skogan, 1976b). Nevertheless, certain pivotal realms of criminal activity (e.g., ‘hidden crimes’, cyber-enabled and cyber-dependent forms of crimes) remain inadequately investigated, with some exhibiting incongruent research findings (Maguire and McVie, 2017). Gaining this form of knowledge from law enforcement agencies (LEAs) through for instance ethnographic (field) research is limited, which can be explained by the difficulty of gaining access to governmental organizations and the large emphasis (and body of research) on quantitative methods or technical approaches to improve the quality of crime data.

This focus on quantitative methods is reflective of a broader evolution in criminological methodologies and new technologies which have transitioned from a singular official picture of crime to a more diversified approach (one in which official crime statistics are derived from diverse data sources). It has also expanded the possibilities and perspectives to a broader spectrum of criminal activities and police practices.

However, these developments do not imply the resolution and ‘disappearance’ of the flaws

in crime data addressed over the past decades; Rather, such evolution calls for an important and timely reexamination of the production of crime data. Especially, because ‘flawed’ crime data are fed and employed in data-driven systems (e.g., for training predictive algorithms) they can provide inefficient and faulty results. Within this use-case and context, “low-quality data in public records can result in serious implications for individual lives, as a person can be denied the benefits that they are entitled to, receive a penalty for allegedly unpaid taxes, or falsely extradited or arrested and prosecuted” (Leese, 2022: 3). Furthermore, looking into the quality of crime data is crucial given researchers, policy-makers, media, and scholars' reliance on reported crimes in their analysis (Eterno et al., 2016). Indeed, errors in official estimates of crime incidents may present serious issues for those interested in the development of social indicators; however, for other enterprises, it may not be as harmful and rather may be useful if modest demands to the data are made (Skogan, 1974).

Methodology

Definitional note

Crime data are often discussed in terms of their reliability, validity, trustworthiness, and accuracy. However, these concepts assume that there could be a correct version of a dataset or crime data that would reflect them in their entire empirical reality. Hence, the aim of this review is not to discuss solutions for increasing the quality of crime data, but rather focus our analytical attention on the ways of producing and handling them. Hence, when discussing the flaws, errors, or limitations of crime data, I opt to refer to these as issues of data “quality” and bias. That is

² For the purpose of this review, I employ the term victim; however, it has been widely discussed that the term "survivor" is more suitable to

acknowledge individuals' strength, agency, and their ability to grow as opposed to portraying them as passive and awaiting rescue.

because “data are never raw and cannot be innocent in the sense of providing an untainted reflection of the world” (Egbert and Leese, 2021: 190). Data are actively constructed with specific use cases in mind which largely predefines how data take form to fit into classification systems, how they can be combined with other data, and how they can be processed and their analytical value extracted from them (Egbert and Leese, 2021).

Literature review

This review provides an overview of the arguments, concerns, and issues discussed in the field of social sciences (criminology, sociology, and psychology) regarding crime statistics and their quality. To do so, I first began by identifying relevant literature through keyword searches and filters with the use of Boolean operators on various databases (Web of Science, Google Scholar, and ETHZ (online) library). The filters were employed to optimize and refine the search to relevant fields for the discussion of crime data and their quality.

The fields of criminology, law, psychology, sociology, and policing are most relevant for this overview which aims at discussing the concerns and influences on crime data and its quality from a criminological and social science perspective. These fields often look at individual, psychological, social, cultural, societal/structural, political, and organizational factors which are useful for understanding the processes and influences in the production of crime data. I excluded technical literature (i.e. computer science, information science, and data science) from this review as it does not offer pertinent insights drawn from social sciences literature.

The keywords employed included but were not limited to crime data, crime statistics, police data, police report*, police statistics, and criminology, reliability, quality, validity, and representativeness. I performed several rounds of literature searches and snowball

searches based on the analyzed literature found. For the initial searches, I did not select a time frame as I intended to have a historical overview and understand early debates. After identifying relevant and current topics, such as police reports (which had limited literature about) or victims’ reporting, I narrowed the timeframe to the last five years. This narrowing was to obtain an overview of the latest research which may better reflect ongoing and current issues related to crime data.

Recognizing crime

The initial, yet complicated and problematic step in the official measurement process is the uncovering of events (Skogan, 1974). As modern, big-city policing is largely reactive, the police respond to citizens’ reports of victimization and undoubtedly, many crimes fall under the radar.

To first recognize a crime, one must know what it consists of. Naturally, if you don’t know what a tree is, what it looks like, or how it is defined, you won’t be able to recognize or identify it. While the process of identifying and recognizing objects is relatively easy and learned through childhood, identifying, and recognizing crime is way more complex than that. It is influenced by the police department’s resources (e.g., for training) (Cecconello et al., 2023; Wilson and Boland, 1978), psychological processes such as unconscious biases (Stelter et al., 2023), and the legal definitions or policies (Miles-Johnson et al., 2018) among others. Police training and criminal laws inform street-level bureaucrats (e.g., street police) on what a crime looks like (e.g., ‘red flags’) and its definition, how to respond to it (e.g., FAIR training), and ultimately whether the case can be investigated (which is also dependent on prosecutors). However, there are longstanding criminological debates about the

limitations of the traditional way of defining crime.

What does society define as criminal?

A well-known subfield of crime opportunity theory is the routine activity theory (Cohen and Felson, 1979) which focuses on crime situations (as opposed to offenders' characteristics) and was proposed for analyzing crime rate trends and cycles³. It argues that crime is likely to occur when a likely offender and suitable target come together in space and time in the absence of capable guardians. However, individuals who design predictive systems, based on crime opportunity or situational theory, are commonly not experts in criminological, sociological, or psychological theories of crime and their flaws. Their task is rather to design and train the system for a particular use-case which may employ a specific theory of crime that is not most suitable for such.

Defining or predicting crime solely based on a theory has many risks and fails to consider other potential explanations. Agnew (2011) particularly engaged with the work of various critical criminologists and suggested an 'integrated' definition of crime that seeks to find certain common grounds between mainstream and critical criminological approaches to defining crime. The advantages of this definition of crime are addressed to promote a broadening of the scope of criminological concerns. Hagan (2012) in "Who are the criminals?" provides a critique of the conventional, mainstream framing of the problem of crime, with highlights on street crime or conventional crime and relative inattention to suit crime or high-level white (or gold) collar crime.

Besides the apprehensions voiced by mainstream criminologists, a longstanding tradition of challenging conventional crime

conceptions has been advocated by radical or critical criminologists (DeKeseredy and Dragiewicz, 2018; Michalowski, 2016). Quinney's (1970) influential work, "The Social Reality of Crime", characterizes crime as a construct manipulated by the powerful to serve their interests. Schwendingers et al.'s (1970) "humanistic" definition of crime, which relates it to identifiable harm independently of the capitalist state's definition, is widely acknowledged. Henry and Lanier (2001) propose a "prism of crime" definition, while Lynch et al. (2015) exhaustively demonstrate the scientific inadequacy of the legalistic criminological definition of crime.

The radical and critical criminological critiques emphasize attention to "crimes of the powerful", especially white-collar or gold-collar crime, recognizing their exponentially greater consequences than conventional or powerless crimes. Some criminologists argue that the term "crime" is too constrained by historical meaning and should be replaced with "social harm," leading to the concept of "zemiology" or the study of social harm (Friedrichs and Schwartz, 2007; Hillyard, 2004). Greenfield and Paoli (2013) call for creating a framework to assess the harms of crimes represents a recent initiative to highlight the inherent harm dimension in crime definitions.

Unconscious bias and the ideal victim

With an understanding of certain of the theories mentioned above (which may be acquired through police training, education or interpreted within criminal laws), individuals' assumptions, perceptions, and judgments regarding crime and criminals can hinder the initial identification (or uncovering) of events. This occurs because of our brain's way of simplifying information through perceptual shortcuts or mental maps (e.g., on what crime,

based on crime theories, to predict the offender or offense.

³ Important to note that predictive policing or crime mapping algorithms are commonly designed

criminals, or victims may consist of). For instance, individuals who are physically strong and big, less attractive (Goodman-Delahunty and Sporer, 2010), men (Macken and O Connell, 2023), or/and black (Hammond-Watson and Hamm Baugh, 2018; Meacham et al., 2024; Oliver and Fonash, 2002), and perceived as aggressive or with mental disorders (Garcia et al., 2020; Maeder et al., 2020) are more likely to be (falsely) perceived, prosecuted, or convicted as ‘likely’ offenders (Christie, 1986; Prentice, 2023)

Essentially, when faced with information (situation, person, news) and particularly under stressful conditions, we employ shortcuts to judge and decide quickly. Yet, these shortcuts can lead to errors in thinking and behavior. They are commonly referred to as forms of biases or ‘heuristics. For instance, the anchoring bias is the tendency to overemphasize or rely too strongly on the first piece of information (e.g., gender, age, race, ethnicity) learned or seen when making a judgment or decision. Also, through the representativeness heuristic, the likelihood of an event is judged based on stereotypes because when we try to remember information, we rely on familiarity and societal expectations. However, “as this makes stereotypes predisposed in the human mind, individuals recall stereotype-congruent information faster and more efficiently than stereotype-incongruent information” (Stroh, 2022: 8).

While everyone is vulnerable to these biases, they are especially harmful in the context of crime detection and prosecution but also for victim recognition or assistance, because an event or individual that does not match the ‘frame’, stereotype, or theory is less likely to be perceived as such. Research has demonstrated that police officers and social workers commonly use stereotypes to assess victims of human trafficking (Farrell et al., 2015; Schwarz, 2019), rape (Javaid, 2017), domestic violence (Birdsall and Boulton,

2022; Meyer, 2016), among other crimes (Charman et al., 2019). Often, differentiations in framing victims or offenders based on their physical and mental attributes (e.g., gender, nationality, age...) can be explained by gendered, racial, or other forms of assumptions engrained in society (Loyens and Paraciani, 2023) and are linked to paternalism (Chuang, 2010; Gallagher and Pearson, 2010).

These stereotypes of victims relate to the notion of “the ideal victim” who is commonly perceived as weak, respectable, and blameless (Christie, 1986). An “ideal victim” is oppressed by an “ideal/iconic” perpetrator who is “big and bad, unknown and without personal relationship to the victim” (Christie, 1986: 19). It is assumed that victims passively wait for their heroes to rescue them, personified by law enforcement actors or social workers (Andrijasevic and Mai, 2016; Loyens and Paraciani, 2023). It is only when victims meet these popularly conceived criteria, that they are approached as victims deserving of compassion and sympathy (Loyens and Paraciani, 2023). If that is not the case, these individuals may be viewed as “non-ideal” victims, describing individuals with too much strength or power to convincingly claim legitimate victim status (Christie, 1986) or victims who do not want to be linked with the victim label (Fohring, 2018; Strobl, 2010).

Other researchers addressed this theory in further depth and concluded that the “(ideal) victim notion” is a socially constructed label that was created via processes of meaning-making by significant societal actors, including policymakers (De Perez and Vermeulen, 2015; Herkes, 2018; Kenney, 2002). This demands "a societal necessity to morally convince others to sympathize and pity them because of what they have experienced" (Herkes, 2018: 28) which involves making assumptions about the circumstances proving that someone "deserves" the victim status.

Additionally, unequal police control across areas is a source of data bias that results in community differences in crime documented through police statistics where certain places may have inflated crime statistics as compared to others (Buil-Gil et al., 2022).

Dark figures, the hidden crimes

While police and survey-based methods of producing national crime statistics may be quite ‘good’ at counting certain types of (often ‘petty’) offenses, a broader criticism raised among scholars is that the incidence of other forms of crimes is not meaningfully captured by either method (Maguire and McVie, 2017). These doubts regard the capacity of both methods to capture adequate data on crimes commonly hidden from public view such as domestic violence (Birdsall and Boulton, 2022), sexual abuse, and human trafficking (Maguire and McVie, 2017). Often, these crimes are more difficult to recognize or identify among law enforcement as they are complex, require large investigative capacities, and are made to be hidden (for instance, through corruption, organized criminal groups, and high control and fear over victims) (Bettex, 2023). As part of this initial set of recognition, the ‘hidden figures of crime’ or the concept of ‘dark numbers of crime’ has been widely discussed among criminologists (Asiama and Zhong, 2022) and other social scientists.

Reporting

Crime reporting is the formal act by which citizens communicate incidents and mobilize police services (Torrente et al., 2017). In the 1970s, the growth of crime-victim surveys demonstrated that many crimes were not reported to the police (Skogan, 1974, 1976a). This resulted in an increased interest in studying the factors influencing crime reporting. In reviewing these contributions, four major theoretical paradigms can be

drawn based on Goudriaan et al.’s (2006) typology: rational (Gottfredson and Gottfredson, 1988; Skogan, 1974), psychological, institutional, and community models (Goudriaan et al., 2006).

Through crime reporting, the police become aware of issues and can direct their actions (Baumer and Lauritsen, 2010; Torrente et al., 2017). Reporting criminal activity is important for several reasons. Reporting rates have significant practical implications as criminal justice legislation, policies, and practices are often informed by what has been reported by victims and witnesses to the police (Baumer and Lauritsen, 2010; Hardy, 2019). Thus, non-reporting of criminal incidents can result in inaccurate intelligence, and consequently, legal, policy, and budget decisions (based on reported and recorded data) are likely to have limited effectiveness (Torrente et al., 2017).

It has widely demonstrated that law enforcement agencies are somewhat hampered in their ability to prevent, investigate, and prosecute crime without being notified of the incident, which is why victims and witnesses are considered the ‘gatekeepers’ of the criminal system (without being notified, few crimes would come to the knowledge of the police) (Boateng, 2018; Gottfredson and Gottfredson, 1988; Graham et al., 2020; Skogan, 1976a). However, such (reactive) approach has developed into more proactive approaches to policing, such as the use of predictive algorithms or other data-driven systems aimed at preventing crime and increasing efficiency (Brayne, 2017; Ridgeway, 2018).

Many studies on crime statistics and their quality tend to focus on the influences of victim reporting such as the individual factors which can reduce the willingness to report. It is important to also consider that reporting by victims is also influenced by structural factors, which are practically easier to address and improve. As we will see, victims’ willingness to report (and make a formal complaint) can

be significantly hampered by fear of reprisal, lack of status, and other individual, social, and structural factors. Reporting enables victims to become ‘visible’ to criminal justice agencies and to other relevant organizations, which should result in victims being able to access practical and/or emotional support (Boateng, 2018) (David et al., 2019). Nevertheless, this visibility may form a barrier to reporting. Consequently, victims, who do not report to the police but may need support, are often left to suffer in silence by not possessing the knowledge or resources to access support services (Hardy, 2019).

According to Hardy (2019), there are four layers of resistance to reporting: structural (state-level policies, practices, and narratives), social (family, friends, and community), situational (contextual and environmental), and individual (identity, knowledge, experience, feelings). Another prominent theory regarding the influences on crime reporting is the rational choice theory⁴ which proposes that victims’ decision to report a crime consists of a consideration through the complex process of cost and benefit analysis (Bowles et al., 2009).

Certain forms of crimes, especially hidden ones (such as domestic violence (Birdsall and Boulton, 2022), sexual abuse, and human trafficking), are less likely to be reported by the police and by victims who are more reluctant to mention them in surveys (Maguire and McVie, 2017). The incident’s seriousness and harm were found to be significantly linked to reporting decisions (Baumer and Lauritsen, 2010).

Individual factors

Buil-Gil et al. (2022) argued that a source of data bias that may affect the accuracy of community differences in crime documented through crime statistics is the victim’s

characteristics. Crime reporting is more common among female victims than male victims (Buil-Gil et al., 2022) and young citizens report less often than adults (Hart and Rennison, 2003).

A key factor in reporting is the level of awareness of existing policies and practices as this can influence whether the person conceives an incident to be a criminal offense, whether they understand their rights as a victim, or whether they have knowledge of all available reporting mechanisms aside from the police (Hardy, 2019). However, a victim’s previous experience, especially with the police, can significantly influence the decision-making process. Having a negative experience or receiving an inadequate response affects a victim’s confidence in the police and reduces the likelihood that they would report another incident in the future (Boateng, 2018; Hardy, 2019).

Also, individuals who have experienced (frequent) repeated victimization decreases their perception of the value of reporting a specific form of crime to the police (Hardy, 2019). Where, as a result, these individuals become desensitized and ‘accustomed’ (similar to the Stockholm syndrome) to abuse and threatening behaviors as if they were ordinary. But also, victims are less likely to report when they believe it ‘will not help’, ‘it will harm’, or ‘make things worse’ (Goodman-Williams et al., 2023). When a victim conceptualizes experiences in such a way, it entails that such incidents are often not thought of as deserving of criminal intervention.

Social factors

Regarding social barriers to reporting, it was found that crimes occurring in ‘close circles’, such as inter-partner violence (or sexual abuse that occurs at the victim’s and

⁴ The rational choice theory has also been widely applied to understanding an offender’s decision-

making process (through an assessment of the benefits and risks) for committing a crime.

offender’s home) are less reported, commonly due to fear (that the veracity of their word will be questioned; reprisal) and not wishing to harm their partner (La Harpe et al., 2019).

Also, ‘shared familiar or community practices’ which can include religion comprise behaviors promoted within and come to inform the norm within a given family, friendship group, or community have been found to influence the decision-making to report (Hardy, 2019). In their study, Hardy (2019) found that reporting behavior was heavily influenced by what was perceived to be the normalized response to crime, where for instance, reporting is seen as something weird, shameful, or unnecessary. The influence of shared norms emerged as being particularly prominent within certain groups, including minority faith communities, new and emerging ethnic communities, gypsies and travellers, and the trans community (Hardy, 2019).

Structural/Contextual factors

Institutionalized practices of oppression and discrimination have been commonplace throughout history, creating a legacy of mistrust between certain communities and the police (Hardy, 2019). Prejudicial policing towards minorities (e.g., ethnic and faith communities, LGBTQIA+ community, and various other disempowered groups) or irregular migrants, not only affects the confidence that victims have in whether the police will treat them compassionately irrespective of their identity or lifestyle, but also in whether their experience of crime will be dealt with appropriately (Campbell, 2003). For instance, when an LGBTQIA+ individual hears or reads about the victimization of another queer person, this leads to an increased fear of future victimization, behavioural changes, and contributes to decreased confidence in law enforcement agencies (Paterson et al., 2016). The overall crime rates and citizens’ perceptions of police

forces (vary across areas) affect residents’ willingness to cooperate with the police (Xie, 2012). Indeed, reporting rates at a state level are thought to symbolize the degree to which the country’s citizens trust governmental agencies, where it is suggested that countries with higher reporting rates have ‘good democratic health’ (Torrente et al., 2017: 154). The ‘tipping point’ for reporting also relates to situational-level factors such as the presence of violence, repeat victimization involving the same perpetrator, and the reality of needing a crime number for insurance claims (Dijk et al., 2007; Skogan, 1974).

Furthermore, certain contextual and structural factors affect crime reporting rates across areas which include economic deprivation, the degree of urbanization, the concentration of minorities, and social cohesion (Goudriaan et al., 2006; Xie and Baumer, 2019). Such contextual and individual factors which vary across geographical areas influence residents’ willingness to report crimes to the police (Hart and Rennison, 2003). Demographic, social, economic, and environmental factors that affect the likelihood of crime reporting do not only include the victims’ gender but also their age, employment status, education level, and ethnic group (Hart and Rennison, 2003). For instance, deprived neighborhoods and areas with large concentrations of immigrants have lower crime reporting rates than middle-class areas (Xie and Baumer, 2019), and crimes that take place in cohesive areas have a higher chance of being known to the police (Goudriaan et al., 2006). It was also found that individuals from rural were generally more willing to cooperate with the police than urban citizens (Hart and Rennison, 2003).

Concerning the type of crime, it has been widely demonstrated that a key factor in the willingness of survivors of human trafficking for sexual and labor exploitation to report is whether the police can offer possible legal measures, particularly in situations where the

victim does not have a regular (work or residence) status (Bettex, 2023; David et al., 2019). The residence status (individual factor) of trafficked survivors strongly affects their willingness to report due to fear of detention and deportation (Bettex, 2023; David et al., 2019; Provera, 2015; Rosenbloom, 2016). The underreporting of human trafficking is not only influenced by a lack of legal support, but also by insufficient psychological and social support services to victims (Bettex, 2023), fear of punishment from traffickers, and fear or distrust in law enforcement (Marburger and Pickover, 2020).

Recording

According to Skogan (1974), the recording stage occurs when the decision to give official status to an event is made. Based on the literature, the recording of crime by police officers can be influenced by various factors, which I have clustered into three main categories. Firstly, officers are faced with the task of classifying the crime that has taken place or been reported, and given a discrete and limited list of offenses, this may result in certain types of offenses being categorized poorly/wrongly or inaccurately in cases where there is a misfit or poor suitability. Secondly, changing and developing laws along with modification or changes in crime definitions, may result in wrong classification among officers who may be unaware of such changes. Lastly, how police reports are written influence the details and information within such reports and thus affect the completeness of the report.

Classifying crime

After a crime has been reported or identified, police officers are faced with technical and political considerations for classifying or coding crimes which subsequently shapes the resulting statistics (Skogan, 1974). As raised by Wall-Parker (2019), if something cannot be

defined, then it cannot be accurately measured. The legal seriousness of an event, the deference of the parties towards the police, the preferences of the complainant, social status, and the relational distance between complainant and suspect, all affect the willingness of investigating officers to record officially that a crime has taken place (Black, 1970; Skogan, 1974). Many complaints are not based upon legally actionable events (and/or may lack evidence) and police officers may rule for unfounded complaints or decide which act within a complex (and discrete) series of events is the highest on the offense list (the statistical category it will be counted/regarded as) are understood and followed differently.

This issue in the context of cybercrimes, technology-enabled or dependent crime relates to the pacing problem and Collingridge's (1980) dilemma. The pacing problem describes that technology moves faster than law, therefore, such forms of crime often fall under the radar or are not coded and classified given the lack of legal bases. Therefore, new forms of crime may fall under the radar of law enforcement agencies. Similarly, Collingridge (1980) argued that efforts to influence or control the further development of technology face a dilemma in that the impacts cannot be easily predicted until the technology is extensively developed and widely used (information problem). Still, it is difficult to control or change technology once it has become entrenched.

Maguire and McVie (2017) highlight that certain countries, including the United Kingdom's Home Office, offer guidance on 'counting rules' – specifying how to record individual offenses in cases where an offender repeats the same criminal behavior multiple times within a short timeframe. This guidance not only covers the counting of offenses but also outlines the types of offenses to be recorded in various situations. It's important to note that these rules and guidance are

subject to change over time and between countries. Furthermore, the use of 'police language' by officers, including keywords and abbreviations, is prevalent. This language may pose challenges during the compilation of statistics, especially when officers from different backgrounds use distinct abbreviations. For example, due to time constraints and heavy workloads, police officers may employ abbreviations that may not be universally understood by their peers (Schade and Thielgen, 2022). This practice raises concerns about consistency and comprehension within the law enforcement community about the quality of crime statistics.

Changes in legislation

While lawmaking or amendments are generally slow processes, they are subject to change and vary across jurisdictions or countries. Criminal laws can be amended to include new forms of offenses (e.g., tech-enabled/dependent crimes) or changes in definitions (e.g., Swiss Federal Council revising criminal law in sexual matters⁵); legalize acts that were previously defined as criminal (e.g., sex work, purchasing cannabis); or criminalize behaviors previously legalized (e.g., abortion).

In the United Kingdom, the 'Notifiable Offence List' determines which offense categories are included when recorded crime figures are compiled (Maguire and McVie, 2017). Importantly, any additions to or removals from the list can artificially raise or lower the overall total. In the United States, Vujić et al. (2016) found that the change in legislation⁶ significantly reduced the burglary rates and to a lesser degree murder rates in Virginia. The findings further suggested that while the new

legislation targeted robbery as a most violent property crime, no confirmation was found that the behavior of this crime was significantly altered by the new legislation (Vujić et al., 2016).

Police reports and investigation

Police officers are front-line workers when dealing with crimes. As part of their work, they are required to write reports, such as crime case reports, traffic collision reports, driving under the influence reports, or death case reports about those crimes (Güss et al., 2020). Police reports are the outcomes of behavioral observations, forensics, and interviews or interrogations conducted by police officers themselves (Schade and Thielgen, 2022). Such reports document information about an investigation and are commonly later employed as legal documents for law enforcement or prosecutor services and outside agencies, but also for data-driven systems as 'input' or training data. Hence, a police report should be detailed and contain accurate information about an incident or crime (e.g., factual, accurate, clear, concise, complete, and timely). Nevertheless, for a researcher to analyze the quality of police reports, one must gain access to police data which has been highlighted as a difficult and tedious process (Güss et al., 2020; Schade and Thielgen, 2022).

Some police departments have two forms of reports, an internal (not shared with the public) and an external (can share with the public) one. However, when the document is shared, it commonly does not contain all variables or elements in which a researcher may be interested in (Bettex, 2023; Güss et al., 2020). Given the differences in police departments and countries, reports are not

⁵ In January 2024, the Federal Council set the entry into force of the new criminal law on sexual matters (FF 2023 1521), with its new definition of rape, for July 1st, 2024 (Council, 2024, January 10).

⁶ The 1994 legislation in Virginia abolished parole and established a 'truth-in-sentence' system. It was aimed at reducing the disparity between the sentence imposed in court and the actual time-served.

comparable and do not provide a complete data set as there may be missing or incomplete information (Güss et al., 2020). Similarly, with changes in criminal laws, officers could wrongly (mis)count an offence. Currently, a uniform system of collecting data to identify victims of human trafficking does not exist, which increases the difficulty of obtaining accurate data (Gerassi, 2015; Marburger and Pickover, 2020; Miller-Perrin and Wurtele, 2017). As will be discussed, due to various processes, data collection practices are not uniform across multiple areas, and this thus leads to inconsistencies in the reports' content.

Meterko and Cooper's (2022) literature review on cognitive bias in a criminal investigation demonstrates how human factors inadvertently can undermine the 'seemingly' objective and methodical process of a criminal investigation. They organize these concepts through an organizational framework for case evaluation studies, adapted from Kassin et al.'s (2013) taxonomy of different sources of potential bias that may cognitively contaminate forensic observations and conclusions (Meterko and Cooper, 2022). To summarize, the pyramid is divided into human nature (base); environment and culture; individual characteristics; and case-specific (tip). It must be noted that while crime data are not often based on criminal investigations but rather on police reports, the concepts found in Meterko and Cooper's (2022) review can provide interesting insights and may apply to police reports.

Studies on 'human nature' demonstrate universal psychological phenomena and their underlying mechanisms (for criminal investigation) (Meterko and Cooper, 2022). As raised, cognitive bias may arise during the identification of a crime, criminal, or victim and in police reports (particularly given memory susceptibility) (Lewinski et al., 2016; Loftus, 1979; Loftus et al., 2021), but also along the criminal investigation and case

evaluation. Most 'human nature' research has focused on confirmation bias, while others have looked at cognitive dissonance, recency effects, groupthink, asymmetrical skepticism, and coherent-based reasoning.

Secondly, 'environmental and cultural studies' have looked at how external factors can influence an investigation (Meterko and Cooper, 2022) (or report). These include the type of training and organizational norms of efficiency vs. thoroughness. For example, the type of training seems to impact the ability to generate a variety of relevant investigative hypotheses and actions. Undoubtedly, police departments within a country and between countries have different types of training and resources. For instance, English and Norwegian investigators are trained and responded differently to semi-fictional crime vignettes (Fahsing and Ask, 2016).

Third, studies on 'individual characteristics' of police personnel have described how the level of experience, individual reasoning abilities, and emotional state influence a criminal case investigation and evaluation. For example, police recruits seem to have a strong tendency toward criminal (rather than non-criminal) explanations for ambiguous situations such as the person's disappearance (Fahsing and Ask, 2018). Also, when police officers are induced negative emotions and then asked to judge a criminal case, Ask and Granhag (2006) found that sad participants were better able to entirely process the consistency or lack of evidence, whereas angry participants used heuristic processing.

Finally, as previously discussed, the tip of Meterko and Cooper's (2022) pyramid labeled "case-specific studies" demonstrates how, for instance, the type of crime and its severity, the type of evidence, and the decisional "tipping points" can play a role in the investigation and evaluation of a criminal case.

In the context of police reports, the data collection that forms the basis for the reports

can be affected by competencies, work experience, and choice of wording during investigative interviews and interrogations (Loftus and Palmer, 1974; Schade and Thielgen, 2022; Shaw and Porter, 2015). But also, cognitive biases and memory malleability, which subsequently determine the quality of police reports and demonstrate the subjective nature of these measures. This is particularly important as such reports are commonly used and fed to data-driven systems. However, the written product is primarily a memory report with a time delay to some extent and many possibilities for bias within interviewing and memorizing may occur during such delay (Schade and Thielgen, 2022). In fact, “confirmation bias (for instance during forensics examinations) may arise where an individual’s preexisting beliefs, expectations, motives, and situational context influence the collection, perception, and interpretation of evidence during the criminal process of the case” (Kassin et al., 2013: 45).

People also form mental representations (situation models) of a described situation to understand the language (Eerland and van Charldorp, 2022). It was found that even subtle differences in language use (known as linguistic cues) impact situation model construction and consequently influence how individuals think of a described situation (Givón, 1992; Magliano and Schleich, 2000). How we formulate events matters for how information is processed and remembered, and this can be problematic in contexts in which language is used as an objective means to record what has taken place during a spoken interaction, like police interrogations. As police records are employed as evidence in court (if they adhere to certain criteria) and as statistical data, they must contain information

that is accurate and of high quality. However, as previously raised, countries and regions have different recording systems (and training for recording systems), in some the recording of police interrogations is transcribed verbatim afterward (e.g., UK), while others require police officers to type up a record while interrogating (e.g., Netherlands) (Eerland and van Charldorp, 2022).

Through their three experimental studies on police reporting styles, Eerland and van Charldorp (2022) found the effects of reporting styles on perceived accuracy, imageability, and understandability. Overall, the findings were that the Q&A recording style⁷ was perceived as most accurate compared to the recontextualized recording style⁸, and the monolog recording style⁹ was perceived as the least accurate. This entails that the Q&A style represents the interview better compared to police reports written in the two other styles. The last experiment indicated that reporting style significantly affected understandability, where the Q&A style was easiest to understand. The finding that a described crime was easier to imagine after reading a police report in the Q&A style (than the monolog style) is in line with results on understandability and the theory that mental model construction is central to language comprehension. Information that is easier to imagine, is easier to understand and thus more likely to be remembered better (Eerland and van Charldorp, 2022).

Vredeveldt et al.’s (2018) experimental study examined the effect of collaboration during the writing of police reports and the accuracy of information in such reports. This is particularly relevant to consider for the Dutch

⁷ The question-answer (Q&A) style in writing reports consist of the police officers’ questions and the suspect’s answers (like an interview transcript) – “Q: ...; A:”

⁸ In this style, the officer’s question is told from the perspective of the suspect using indirect speech –

“you asked me which act I performed. I state to you that I kept the windows closed”.

⁹ Monologue style is written from the perspective of the suspect (in first person, using direct speech) – “I have heard and understood that I am not obliged to answer”

context as police officers in the Netherlands commonly submit a single report signed by two or more officers, which, in comparison to other EU countries, is uncommon. They found that collaborative reporting (reports by two officers working together) significantly contained less information as compared to individual reporting (two officers working individually), although no difference in accuracy was found (Vredevelde et al., 2018). When writing alone, officers included more information regarding the actions performed by the police. Police officers who recorded their own memories before collaborating included less incorrect information in the collaborative report than officers who wrote a collaborative report immediately after the incident (Vredevelde et al., 2018).

Moreover, as raised by Schade and Thielgen (2022), several societal and cultural differences may affect police reporting in general. For instance, the role of police officers' perception as a warrior or guardians has been widely addressed and represents opposing cultural orientations of militarization and community policing within the police. As police officer's mindset has been shown to affect their behavior within police-citizen encounters, it can be assumed that the content of police reports can also be affected by the cultural orientations of police officers writing the reports (Boivin et al., 2020; Carlson, 2019; Clifton et al., 2021; Schade and Thielgen, 2022).

Conclusion and discussion

This literature review provided an overview of the different factors that influence the making of crime data. The focus was primarily on social science literature such as criminological or psychological research, to broaden and enhance our current understanding of the production of crime data.

We saw in this review that various individuals and processes can contribute to the making of

crime data. These factors are both internal and external which subsequently influence the production of crime data as they play a role in crime recognition, reporting, and recording. Undoubtedly, the discussed factors are not discrete, they can influence each other and should also be viewed equally together in the making of crime data.

As discussed, crime statistics or data about crime cannot depict a full picture of current crime realities and they are never 'raw'. With developments in proactive and predictive (intelligence/technology-based) approaches to crime, often based on (historical) crime data, one may argue that predicting crimes and criminals is an impossible task that will reproduce biases and always run risks or harms for the organizations who employ/deploy them (or researchers who use them to assess the development of social/criminal indicators (Skogan, 1974)) but also to individuals subjected to them. This is why data quality has become an important issue and deserves renewed attention.

Hence, with the wide use of crime data for data-driven systems and considering this overview, it is thus crucial to shed light on the processes of production and handling among law enforcement actors through a social science perspective as it can reveal in-depth insights into their practices.

Commonly, research on the influences on crime statistics' quality focus on victim's willingness to report. However, one must consider that, ultimately, it is not the victim or witness who can decide whether the crime they report will be considered; rather it is the assessment of service providers, police officers, and other actors in law enforcement who decide whether the case is 'sufficient' enough to be handled, investigated, or prosecuted. We have seen in this review that human decision-making is subjective and at risk of errors through heuristics, but also constrained by legal and technical demands; it is thus important for front-line workers to be

open and reflexive in their assessment and recording of a case.

Undoubtedly, this review holds limitations and does not address all possible influences, individuals, and processes in crime data production. These actors can include data scientists, politicians, and the offenders themselves. Regarding the former, there is a vast quantity of technical literature from computer and data science focused on bias in crime data and improving data-driven systems or crime data themselves. However, other actors (e.g., politicians, offenders, witnesses, etc..) who may play a role in the production of crime data have received limited attention. This can be explained by their hidden nature and difficulties in gaining access to or building rapport. Yet, researching dismissed individuals who may produce, and influence crime data could provide relevant and important insights.

Lastly, but importantly, the key message of this review is not a suggestion to improve data or investigate the data itself, rather it is to raise the need to engage and investigate the practices of those who create and curate them. This essential insight into how data are produced, perceived, modified, and curated within police organizations will be the focus of my empirical research contribution for the coming years.

As suggested by Leese (2022), using the idea of a lifecycle when thinking about data, entails that they undergo certain transformations as they come of age and that they will be exposed to different interactions and experiences. Thinking of data journeys analytically provides the opportunity to follow data across various interconnected organizations and projects within and across knowledge infrastructures (Bates et al., 2016). Data journeys and the lifecycle of data are not smooth and straightforward, they should rather be understood as non-linear and somewhat unpredictable (Kaufmann, 2020; Leese, 2023).

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