



The adverse effects of policing on population health: A conceptual model

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ABSTRACT

While negative encounters between police and the community are not a new trend, recent high profile deaths of unarmed people of color have gained widespread national attention and ignited new movements demanding reform, accountability, and progress. Increasingly over the past few decades, researchers have examined the most extreme cases of lethal use of force, describing the context of these violent encounters, situational and personal characteristics, and underlying risk factors. More recent research has aimed to define the broader and more nuanced adverse effects that policing can have on population health. We propose a holistic and multidisciplinary model for the relationship between policing and population health in the U.S. that incorporates contextual, situational, and individual-level factors while also recognizing the direct and vicarious mechanisms by which policing exposures can negatively affect population health. The model captures the short and long term health effects of policing and the cyclic nature by which those effects at the individual, community, and systemic levels can influence each other. We consider the unique qualities of different communities that may influence these pathways, the historical trends of the criminal justice and policing systems, and recommend applications of the model in policing agencies, medicine, and research.

1. Introduction

High-profile killings of unarmed people of color by police have fueled national dialogue on the ways policing affects population health, particularly in marginalized communities. The emergence of contemporary civil rights activism, including the Black Lives Matter (BLM) movement, calls attention to the historically entrenched racial and ethnic inequities of the criminal justice system (Gabbatt, 2020; Garza, 2016; Juzwiak and Chan, 2014; Lartey, 2017; Mindock, 2018; Somashekhar and Rich, 2016; Swaine, 2014; Swaine et al., 2015; Tate et al., 2016). Public health leaders increasingly call for law enforcement-related deaths to be systematically reported to health agencies to support better surveillance and monitoring of this alarming trend, but progress has been limited (Bylander, 2015; Krieger et al., 2015). The idea that policing influences population health is buttressed by extensive research demonstrating how social determinants of health,

including exposure to structural racism through the United States justice system, can have profound and enduring effects on population and individual health (Bailey et al., 2017; Mesic et al., 2018; Sewell and Jefferson, 2016). Law enforcement directly interfaces with larger numbers of people than any other arm of the justice system, therefore policing may be a conspicuous yet not-well understood driver of population health (Geller et al., 2014; McFarland et al., 2019).

The complex historical institution of law enforcement in the U.S. has been well-studied, as have its influence and propagation of state-sanctioned force employed disproportionately against minority groups (Alexander, 2010; Binder and Scharf, 1982; Bittner, 1970; Jacobs, 1979; Jacobs and O'Brien, 1998; Skolnick, 1966; K. B. Turner et al., 2006; Waquant, 1999; Wilson, 2012). The U.S. approach to law enforcement and public safety has centered around an order maintenance model in which officers actively engage many citizens through stops and searches to disrupt situations interpreted as indicative of criminal activity (Sharp,

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2014). Estimates from 2011 suggest that more than 25% of the adult population (62.9 million people) experience contact with police each year with approximately half of these reporting involuntary stops (Langton et al., 2013); the same report for 2015 suggested 21% of the adult population had police contact that year, though data on the voluntary nature of those encounters is not directly comparable (Davis et al., 2018). Most people who experience involuntary contact are not arrested nor do they face any legal consequences (Epp et al., 2014); however, this form of policing may impact not only health and wellbeing of individual citizens but also the social fabric and health of entire communities (Alang et al., 2017).

Research by Alang and colleagues proposed five mechanisms through which officer use of force (UOF) is associated with poor health outcomes among Black or African American individuals; 1) fatal injuries; 2) adverse physiological response; 3) racist public reactions resulting in stress; 4) arrests, incarcerations, and legal, medical and funeral bills; and 5) integrated oppressive structures, all of which result in increased morbidity and mortality, stress, financial strain, and systematic disempowerment (Alang et al., 2017). We recognize that Black and African American identities differ but for brevity we will use the term Black to refer to these unique identities throughout the remainder of this paper.

Alang et al. present a valuable framework for describing the mechanisms by which policing affects health. Our model, however, further incorporates several characteristics above and beyond their approach. Specifically, we recognize that law enforcement agencies and officers can impact more than just individual citizens, with harmful effects for communities, and systems too. Furthermore, the unique qualities of different communities (e.g., state and local policy, historical community-police relations) may moderate these pathways, thus producing different population health outcomes. And lastly, the cyclic nature of the relationship between policing and community factors is especially relevant for population health. These characteristics emphasized in our model can result in a broad constellation of both short- and long-term population health effects.

We propose a holistic model for the relationship between policing and population health in the U.S. that aims to incorporate critical contextual, situational, and individual-level factors (Fig. 1). We have drawn upon multidisciplinary literature (sociology, criminology, public health, epigenetics, psychology) to inform this model and will provide

historical contextualization and recommendations for application. Furthermore, this model was constructed with attention to the pervasive structures of structural, systemic, and institutionalized racism, in addition to other societal prejudices and inequities. We believe that this model provides a framework for further interdisciplinary investigation into the relationship between policing and population health in addition to serving as a roadmap for policy assessment and evaluation. It is critical for interdisciplinary collaborations to engage a range of experts from population health and sociology to criminal justice and law enforcement to evaluate exactly how and which policing practices affect the public and how to improve those outcomes by changing policing norms (Shepherd and Sumner, 2017).

2. Key moderators: individual, situational, contextual, and organizational characteristics

Studies of the effects of policing on population health must account for the inequitable policing of certain communities over others. Prior research has explored a range of potential predictive factors associated with policing outcomes, dividing them primarily across four levels: *individual, situational, contextual, and organizational*. Factors at each of these levels operate as moderators, exerting a differential impact on the association between policing and population health. These moderating factors are displayed in the rectangular boxes with arrows at the top and bottom of the proposed model.

The *individual* level includes characteristics of the community member/s and the officer/s involved which have been studied as potential risk factors for policing outcomes. One California-based study found that white, female, college-educated, and younger officers (with fewer years of experience) were less likely to be involved in fatal and non-fatal shootings than officers of other racial and ethnic backgrounds, men, less educated, and older officers (McElvain and Kposowa, 2008). Officers previously involved in a shooting were more likely to be involved in subsequent shootings. A 1994 officer simulation study found that officer race and sex did not predict shooting behavior in either life-threatening or non-life-threatening situations, however, officers with less experience demonstrated more restraint than veteran officers during non-life-threatening encounters. Officers who were slower to respond, had poor marksmanship, and showed poor judgment during the simulation were also more likely to kill during a life-threatening

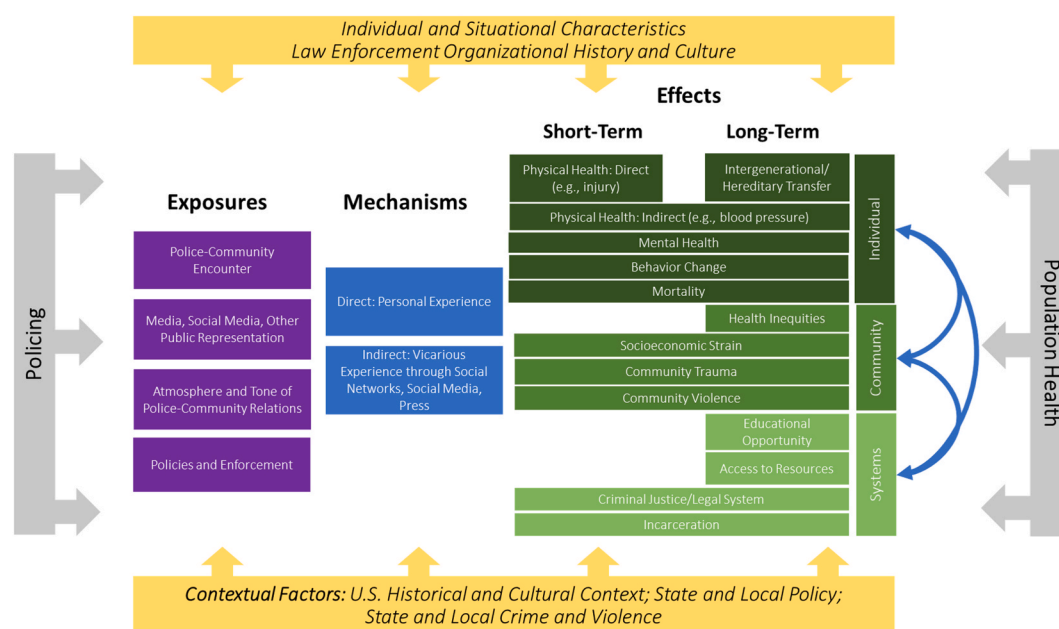


Fig. 1. Conceptual model depicting the relationship between policing and population health.

scenario involving multiple suspects (Ho, 1994). Racial bias has been identified as a strong predictor of officers' decision to shoot, with non-White individuals at an increased risk of being killed by law enforcement (Buehler, 2017; Hickman and Piquero, 2009; Sim et al., 2013). However, not all studies agree (Ho, 1994). In two studies the individual races of the suspect and officer were not associated with fatalities (Jetelina et al., 2017; White, 2002). In another study, Smith found that a more diverse police force did not lower lethal UOF rates (Smith, 2003).

In the U.S., differential policing is observed by race (Binder and Scharf, 1982; Brunson, 2007; Brunson and Weitzer, 2008; K. B. Turner et al., 2006), with research confirming a disturbingly greater risk of mortality and mental and physical health effects from police contact among non-Hispanic Black and Hispanic men compared to White men (Browning et al., 1994; Buehler, 2017; Feldman et al., 2016; McFarland et al., 2018a, 2018b). Though there is some disagreement among researchers, citizen age, resistance to arrest, and intoxication may also predict encounter outcomes. (Brunson and Weitzer, 2008; Correll et al., 2014; Friedrich, 1980; Gaston and Brunson, 2018; Lee et al., 2010; Patterson and Swan, 2016; Ross et al., 2018; William Terrill and Mastrofski, 2002).

The *situational* level describes the conditions under which an incident occurs that can produce a differential officer response and are often identified across individual-level factors (Ho, 1994). One study identified two potential situational predictors of fatal encounters, specifically among gun-wielding citizens, type of incident, and the stage of the response (earlier vs. later) (White, 2002). Another study found situational factors likely contribute to officer decisions more when the encounter is "non-elective," (i.e. situations in which officers perceive a threat to their life) rather than "elective." (i.e., situations where officers do not perceive a threat to their life) (White, 2001). For the latter, organizational factors likely carry more weight. A simulation study tested the role of situational and individual factors and found that officers facing suspects in "safe" clothing in a "safe" neighborhood showed less racial bias in their shooting decisions than in situations where clothing and neighborhoods were perceived as "threatening." (Kahn and Davies, 2017)

The *organizational* level focuses on the internal structures, policies, and practices of law enforcement agencies themselves. Fyfe's work points to administrative policies and training procedures as a primary intervention point for reducing the number of deaths caused by law enforcement. He notes that police agencies should ground their training in the reality that police are supposed to "protect" the lives of the community, with no differentiation between the lives of bystanders and criminals. Fyfe emphasizes the importance of establishing internal agency rules around pursuit of fleeing suspects and UOF (Fyfe, 1981). Yet in the roughly 18,000 policing agencies across the country, administrative policy and programs can vary tremendously (Morrison, 2006).

Willits and Nowacki centered their research around four pillars of police organizations: *organizational professionalization, context, complexity, and control* as they relate to lethal UOF. Among organizational contextual variables, department size (larger), arrest rate (higher) and educational requirements (laxer) and, in larger cities, more organizational complexity (i.e., vertical, structural, occupational, and spatial differentiation) was significantly associated with more lethal UOF. The authors suggest that predictors of lethal UOF may vary based on agency size, and stratified analyses, where possible, should be conducted (Willits and Nowacki, 2014).

Indeed, there is disagreement in the literature about the role of some specific organizational factors in the frequency of deaths, injuries, and other harms caused by officers. Terrill describes the efficacy of stricter administrative policies designed to limit how and when officers use force at reducing incidents of lethal force, non-lethal force, and overall racial disparity in policing activities (W Terrill and Paoline, 2017). Similarly, Terrill and Mastrofski, Lee et al. and Willits and Nowacki found that officer experience, and training and educational

requirements (e.g., associate's degree) were tied to fewer incidents and community complaints (Lee et al., 2010; William Terrill and Mastrofski, 2002; Willits and Nowacki, 2014). In contrast, Smith found that the rate of lethal UOF was not associated with training requirements (Smith, 2004). Gaston and Nowacki also each identified a relationship between policies limiting officer discretion and officer behavior and outcomes (Gaston, 2019; Nowacki, 2011). While internal policies regarding how officers use force can be an effective tool for reducing deaths, the priorities and ethical input of chiefs and agency leaders may supersede administrative policy (White, 2001). Similarly, in a 2003 study of over two decades of police reports from the city of Philadelphia, White concluded that while external policies on force discretion (rather than intra-agency policy) may have had some influence on citizen fatalities over time, it was likely limited by intra-agency policies and culture (White, 2003). Some discrepancies in the literature may have to do with different operationalization of study variables and analytic choices across studies (Willits and Nowacki, 2014).

Finally, police culture can direct not only agency policy and decision making but also individual officer perceptions, attitudes, and behaviors (Armocost, 2004; J. DeVlyder et al., 2020; Hunt, 1985; Ingram et al., 2018; Kraska, 2007; Kraska and Cubellis, 1997; Kraska and Kappeler, 1997; Kraska and Paulsen, 1997; Marenin, 2016; Paoline and Gau, 2018; Simckes et al., 2019). Normalization of a militaristic mentality, a shift from guardian to warrior mindset, a strong us-versus-them mentality, and the codification of these in aggressive agency policies, gear, and tactics draw an even starker line between officer and community (Balko, 2014; Sierra-Arévalo, 2019, 2021). Ultimately, the environment in which an officer learns, grows, and works will influence how they do their job, and thus will impact the health of the population.

The *contextual* level refers to the broader community context, such as racial and ethnic composition. Smith found that the proportion of Black individuals in the community was positively associated with rate of lethal UOF overall (Smith, 2004), while Jacobs and O'Brien did not (Jacobs and O'Brien, 1998). The studies did agree, however, that the proportion of Black individuals in the community was positively associated with more lethal UOF among Black adults specifically. Parker et al. found that community disadvantage and disorganization along with "racial threat" (generally measured as proportion of the population that is Black) influenced policing behaviors indirectly, mediated by police organizational factors (Parker et al., 2005). Their findings also suggest that political climate and social disorganization affect police behaviors directly, particularly in urban areas. Perceived unfair treatment by police was found to be associated inversely with neighborhood affluence (Bjornstrom, 2015), and poverty and economic inequality were found not to be associated with lethal UOF across cities in a different study (Jacobs and O'Brien, 1998). Community unemployment, however, was positively associated with UOF rates (Lee et al., 2010). Research consistently points to a positive association between violent crime in the community and lethal UOF by police (Hickman and Piquero, 2009; Jacobs and O'Brien, 1998; Klinger, 2011; Klinger et al., 2016; Lee et al., 2010; Smith, 2004).

Context at the city and state levels also warrants mention. Presence of a Black mayor, has been tied to fewer lethal UOF deaths among Black adults (Jacobs and O'Brien, 1998), but there was no association between state racial composition and lethal UOF (Gius, 2016). Recent shootings of officers by Black individuals were linked to more police violence against Black individuals in the following days (Legewie, 2016). Finally, the 1985 Supreme Court decision of *Tennessee v. Garner*, set the constitutional standard for "reasonable" force with regards to pursuit and capture of a fleeing felon (Flanders and Welling, 2015; "Tennessee v. Garner," 1985). While most police agencies had already adopted some sort of restrictive policy against using deadly force to stop a fleeing suspect, common law still permitted it, allowing states to decide for themselves. Such decisions ultimately change the context in which modern officer-community encounters occur.

3. Types and mechanisms of police exposures

On any given day, a single police department is likely to have a broad range of interactions with the community it serves such as traffic stops, arrests, community events, televised speeches, social media posts, or interviews with the press. Agencies influence the tone of their relationships with the community by how they instruct officers to dress, the number and types of vehicles assigned to patrol certain neighborhoods, the way they enforce (or do not enforce) certain policies, and by the communication style they train officers to use when speaking with community members. Each of these represents a different type of “exposure” to police that an individual or an entire community may experience.

The effects of any given police-citizen encounter can be farther reaching than just *direct personal experience*, which can have both physical and mental health impacts on citizens. Exposure to police extends to *indirect vicarious experience*: the experience of witnessing or hearing about police interaction through family, social networks, community, or media outlets. Vicarious police exposure is particularly salient from a public health perspective as such exposures can produce ripple effects; one instance of police maltreatment may adversely affect multiple people (e.g. children, siblings, parents, friends, neighborhoods) and thus have a widespread impact on aggregate population health. Vicariously experienced instances of negative police-community encounters can result in enduring worry, chronic vigilance, and the erosion of trust in law enforcement more broadly (Browning et al., 1994; Warren, 2011). Moreover, vicarious experiences may initiate or intensify worry about one’s friends’ and family’s future encounters with police and the ramifications of these interactions.

Recent work supports the idea that the health consequences of vicarious exposures extend to policing. Sewell and Jefferson (2016) show that neighborhood-level stop rates in New York, but not necessarily personal stops, are linked to higher rates of hypertension and poor self-reported health among Blacks but not whites. Moreover, high levels of police surveillance - the regular monitoring, stopping, and searching of citizens for drugs or weapons - are linked to increased psychological stress among men but not women (Sewell et al., 2016). Vicarious perceived unfair treatment by police is linked to shortened telomeres (McFarland et al., 2018b); increased waist circumference (McFarland et al., 2018a); and lower self-reported health (McFarland et al., 2019). Police killings of Black individuals are also associated with additional poor mental health days among Black respondents in the general population (Bor et al., 2018).

4. Three classes of population health effects of policing

We conceptualize the health effects of policing to operate at three main levels: individuals, communities, and systems. We illustrate these effects as short- and long-term in the conceptual model and describe the nature of these effects as currently understood in literature from several relevant fields.

4.1. Individual

What then, might the role of law enforcement be with regards to some of the key social determinants of health and community well-being? Injuries and deaths among citizens occurring as a result of police encounters or while in custody are a fundamental population health issue and have received more attention politically, in the media, and from researchers than other topics related to police-community interaction. However, to understand the full spectrum of health effects that policing can have on individual health, one must consider who is most likely to encounter law enforcement and what the immediate, long-term, and vicarious impacts may be. For example, individuals with criminal histories are more likely to have subsequent police contact compared to those without criminal histories (Geller et al., 2014).

Similarly, prior police contact has been linked to greater subsequent delinquency and therefore additional encounters with law enforcement (Wiley et al., 2013). The timing of these exposures matters too, particularly among youth who may experience lifelong reverberating effects of adverse police exposures during childhood (Felitti et al., 1998; Hughes et al., 2017). These examples underscore the role that policing plays in creating and perpetuating health and other inequities.

After physical injury and death, mental health may be the issue most frequently discussed in the context of police-community interaction, with one recent model suggesting several factors that distinguish violence caused by police from other forms of violence that may contribute to psychological trauma (J. DeVlyder et al., 2020). One U.S. study found that among men, anxiety symptoms were significantly associated with frequency of police stops and perception of the intrusiveness of the encounter (Geller et al., 2014). The same study also found that individuals who reported police intrusion in their lives were more likely to report symptoms of post-traumatic stress disorder (PTSD), where more intrusive encounters were related to stronger symptoms. Among refugees, risk factors for the development of mental health disorders include exposure to traumatic armed conflict, torture, female sex, poverty, unemployment, low education, discrimination, marginalization, poor health care, crowding, collapse of social networks, and traumatic events like death of a loved one (de Jong, 2002). While these are different populations, many risk factors that affect mental health among refugees are common within non-refugee communities that face similar traumas.

Humans are in fact quite resilient, yet the onslaught of chronic trauma can push the limitations of the body and mind. Depression, anxiety, personality disorders, panic disorders, and substance abuse have been identified as long-term reactions to traumatic incidents (de Jong, 2002). For example, exposure to “police abuse,” was found to have a dose response relationship with certain psychoses among Black adults (Oh et al., 2016). Witnessing or experiencing violent police-community encounters (e.g., unwarranted searches, harassment, deaths) can lead to strong emotional and physiological effects (Alang et al., 2017; Jackson et al., 2019, 2020; Oh et al., 2016). When lethal UOF deaths are presented and debated in the media, it is often characterized by victim-blaming which can induce stress, pain, and lack of self-worth among community members (Alang et al., 2017; J. E. DeVlyder, 2017; McFarland et al., 2019). In fact, a 2017 study conducted in Baltimore in the wake of the police-related death of Freddie Gray, found that maternal depressive symptoms were significantly higher among women in proximal neighborhoods in the months following Gray’s death compared to before (Yimgang et al., 2017).

Policing can also influence individual health through chronic exposure to stressors like violence or intimidation, and the subsequent embodiment of these experiences. This can trigger a physiological response, specifically related to the stress response system (e.g. hypothalamic-pituitary-adrenal (HPA) axis), and strain bodily organs and systems. Allostatic load, a measure of multisystem dysregulation which incorporates several physiological responses to stress, is associated with diabetes, ulcers, heart disease, cognitive decline, autoimmune disorders, and death (Groer and Beckie, 2012; McEwan and Seeman, 1999). One study found allostatic load to be a significant contributor to higher mortality among Black adults in the population, independent of other factors like socioeconomic status (Duru et al., 2012). Policing may also have epigenetic implications, whereby chronic exposure to stress from a particularly imposing police presence can lead to altered gene transcription/expression and epigenetic changes that can be passed on to subsequent generations (Walsh and Yun, 2014). A review of over 50 studies that examined the connection between DNA methylation and PTSD repeatedly found methylation of genes involved in the stress response, specifically HPA axis and inflammatory genes. Similar results were found for gene expression, but with a wider range of genes implicated in PTSD (Mehta et al., 2020). Additional research with telomeres, the protective ends of chromosomes, found that Black males

who reported experiencing unfair treatment by police had shorter telomeres than their unexposed counterparts (McFarland et al., 2018b), while another study found experiences of racial discrimination more broadly resulted in shortening of telomeres among Blacks over time (Chae et al., 2020). More research is needed to expand our understanding of how these epigenetic effects may compound or dissipate over generations, and how more specific aspects of policing may contribute to the process.

4.2. Community

While the narrative around police-community interaction often orbits at the individual level, there is a wealth of evidence on community-level effects of trauma and dynamics between the individual and community. In 2016, participants in the National Academies of Sciences, Engineering, and Medicine Roundtable on Population Health Improvement discussed the role of violence as a social determinant of health, and the long-term community effects of trauma, including deterioration of economic and educational environments and intergenerational poverty (D. Thompson, 2016). With the sanctioned use of special weapons and tactics (SWAT) teams to demolish homes, communities are targets of excessive and repetitive intervention from drug-busting agencies operating on official orders (Balko, 2014). Youth exposed to community disorder and physical and emotional violence are more likely to experience repeat victimization and to perpetrate violent acts throughout their lives (H. A. Turner et al., 2016; Wolke et al., 2013). Disadvantage is concentrated in communities that face more trauma, perpetuating the cycle of poverty, disadvantage, and violence (Gamal, 2016).

A survey of 14 different international communities exposed to armed conflict revealed that individual and community-level responses to ongoing trauma can be discordant. For example, researchers found that among individual victims of trauma, there was a sense of resignation to an “inevitable” cycle of violence. But, at the community-level, the higher the proportion of victims, the stronger the group-level support for legal humanitarian norms, especially over longer durations. In other words, community resilience can develop when there is a shared vulnerability and desire for justice, even when individuals experience trauma (Elchereth, 2006). Community resilience is built by empowering communities to create and maintain safe public spaces, clean parks, improve housing quality, and expand transportation (D. Thompson, 2016).

Police encounters can have disparate impacts on different communities, in part due to the systemic racism and other prejudices that often influence policing practices (Mesic et al., 2018). A 2004 study asked drug users and non-drug users in New York City about their perceptions of and experiences with police and “police-perpetrated violence.” (Cooper et al., 2004) The authors found that especially among drug users, a marginalized population with limited community cohesion, there were frequent reports of physical abuse from law enforcement and “psychological violence.” Continual exposure to traumatic incidents and UOF by law enforcement can strain community resilience, drain resources, and lead to higher community-wide morbidity (de Jong, 2002). This can encourage a mindset whereby violent response to police becomes a means of self-preservation for minority community members (Gamal, 2016). While some, generally white and affluent, are the beneficiaries of a politicization of “protection,” Gamal argues that others are the victims of heightened surveillance and state control. Through the Civil Rights era and the “war on drugs,” minority communities have indeed been targeted, and their maltreatment codified in federal, state, and local government structures and decrees (Balko, 2014; Gamal, 2016; Stamper, 2016).

An Israeli study examined factors associated with health across several communities exposed to the chronic stress of repetitive rocket fire. Protective factors included community solidarity, a sense of belonging, and confidence in governmental and legal authorities. Group-level resilience in the face of frequent sirens and rocket fire protected individual mental health (Gelkopf et al., 2012). If U.S. policing

is at times characterized by the same patterns of armed conflict experienced by communities in this study (e.g., unexpected and repetitive violence; fear and confusion), one might reasonably conclude that these findings would also hold relevance in this country. A primary difference, however, is that in the Israeli communities being studied there was a strong sense of trust in governmental and legal authorities that is lacking in many U.S. communities most affected by violence caused by police (Gelkopf et al., 2012). The perpetuation of mistrust between law enforcement and the community can ultimately leave individuals isolated from law enforcement services, hesitant to seek essential support and protection in the event of a violent crime or another emergency (Alang et al., 2017; M. Thompson and Kahn, 2016). This cycle contributes to increased violence and instability within the community, as reportable incidents go unreported.

Law enforcement’s contribution to mass incarceration of minority communities has had drastic economic implications for individuals, families, and communities as a whole (Alexander, 2010). After incarceration, many people lose their jobs and have to cope with long-term psychological trauma, substance dependency, and injury, all of which can yield financial instability (Alang et al., 2017; Alexander, 2010; Bruns and Lee, 2020; Miller et al., 2017). For a community, the prolonged absence of incarcerated individuals can increase financial burden on those left behind, lead to grief and anxiety, and lower productivity as people participate in protests or plan and attend vigils or funerals. Resources are ultimately drained from the community, perpetuating financial strain, which fuels cycles of poverty, limits access to health care, causes food insecurity, preserves low housing standards, contributes to morbidity later in life, and may ultimately perpetuate poor police-community relations (Alang et al., 2017; Alexander, 2010; Szanton et al., 2010).

4.3. Systems

Cyclic patterns of violence, discrimination, and injustice in societal systems, including those perpetuated by law enforcement, are a critical population health issue. Particular trends in policing, including the disproportionate UOF against some communities over others, reinforce longstanding national traditions of racism, segregation, and racial hierarchy through legitimization of aggressive police reaction towards minorities (Balko, 2014; Gamal, 2016; Muhammad, 2019; Stamper, 2016). Because modern day policing, which routinely employs swift and aggressive militaristic tactics, was founded on this history, minority communities are left particularly vulnerable.

As previously discussed, the mass incarceration of communities of color in the past several decades has resulted in intergenerational poverty and economic disadvantage (Hinton, 2017). Systemic inequities in the way law enforcement seek and receive warrants, judges hand down sentences, and courts demand impossible fees are well established (“Ferguson Consent Decree,” 2016; Friedman, 2017). Yet, despite historical evidence of these systemic failures, they are allowed to persist and in some cases are bolstered by policing organizations. Thomas and Tufts argue that the “Blue Lives Matter” mantra espoused by police unions reinforces an exclusionary “blue solidarity” that undermines other working class solidarity movements, even criminalizing them, in the case of movements centered around racialized oppression and police violence (Thomas and Tufts, 2020). Importantly, these police-centric mantras seem to be covered more frequently by the media, thereby limiting the reach of groups seeking to address structural inequalities (Bordonaro and Willits, 2018). It is generally only in response to federal consent decrees that changes to longstanding structural injustices are made (“Ferguson Consent Decree,” 2016; “Seattle Consent Decree,” 2012).

The socioeconomic implications of continued abuse through the legal system are vast. For instance, aggressive policing occurs disproportionately in socioeconomically disadvantaged communities (Stuart, 2016) and is linked to decreased school attendance and educational

performance (Gottlieb and Wilson, 2019; Legewie and Fagan, 2019). Indeed, individuals who have encounters with the criminal justice system routinely avoid surveilling institutions (e.g., banks, schools, hospitals) that keep formal records (Brayne, 2014). Moreover, the effects of arrest and incarceration patterns on communities can contribute to family dysfunction, community disorganization, financial instability, and patterns of violence and crime at the community level, leaving youth at higher risk of subsequent encounters with the criminal justice system (Mallett, 2016). While policing practices are not directly nor solely responsible for these issues, they contribute to and preserve the inequity and injustice that underly them.

4.4. Short and long-term effects

The short- and long-term effects of policing on the population health are captured in the proposed model. Short-term health effects may be easier to identify than long-term. That said, expanding literature on embodiment of traumatic experiences and the intergenerational transfer of this embodied stress offer a sound platform from which to examine the role that policing encounters at any stage of life can have on both short and long-term health. This model was therefore deliberately constructed without temporal anchors, to emphasize how one exposure can have reverberating effects throughout the life course of a person, family, or community. In fact, the time within someone's life at which they experience a negative encounter with law enforcement may further moderate how the pathways described in this model operate. For example, a 25-year-old who experiences daily scrutiny from officers may experience the effects of that repetitive exposure quite differently when they are 65 than a person who experiences that same daily scrutiny when they are much younger. To fully understand how age and life course affect the internalization of negative police encounters, more efforts must be directed towards longitudinal research among particularly vulnerable populations.

5. Cyclic nature of the conceptual model

There are two cyclic pathways within this model that are essential to describing the relationship between policing, health, individuals, and communities. The first is depicted by the arrows to the right and left of the model pointing inward. As communities and people are policed and affected by that policing, their response can, in turn, influence the way that the community or individual is policed in the future. Recent evidence suggests that perceived unfair treatment by police can foster distrust of the legal system and lead to delinquent behavior (Del Toro et al., 2019; Geller and Fagan, 2019). Because police stops tend to cluster in disadvantaged communities, saturating these communities with invasive tactics may lead to more concentrated crime. In other words, it may be impossible to answer the question, are law enforcement agency practices driven by the characteristics of the community or do those practices in fact drive community characteristics? This model aims to capture the complex bidirectional relationship between communities and law enforcement agencies while recognizing that in different contexts the arrows may lean more heavily in one direction over another.

The second cyclic relationship represented in this model is shown by the arrows in the far-right columns listing the effects of policing on health. Individuals are members of their communities and communities are intrinsically tied to the systems that operate in and around them. As such, a change at any of these levels can have effects on the others. The death of a single person killed by police will have effects at multiple levels; family, friends, communities and the nation as a whole may all embody the trauma of that loss. However, it is also possible that the effect at one level may in turn influence another. For example, if a community is strongly affected by this particular death, it may influence how individuals in that community experience mental distress in the long term. Perhaps strong community support and greater community cohesion will protect against deeper individual trauma to subsequent

events. This model is meant to be flexible and to account for the unique relationships between individuals, systems, and communities. The arrows are not meant to constrain the reader to some temporal sequence of events nor are they meant to limit how we define community or systems. Rather, they should serve to remind us of the dynamic nature of policing and population health.

6. Discussion

This new framework draws together research from multiple disciplines to provide a holistic view of the health issues associated with American policing. It explores both the direct and vicarious effects of negative police-community encounters on the health of individuals, communities, and systems, both in the short and long term.

As more is learned about the health effects of policing, this framework must be tested, evaluated, and revised. We envision, however, many potential applications for this framework. For example, in a clinical setting, this model may offer health care providers some guidance in evaluating direct or vicarious police exposures at different stages throughout patients' lives as well as some commonly expected adverse outcomes to consider. Perhaps drawing awareness to the immediate and long-term implications of direct and vicarious police exposures will encourage providers to partner with their patients to identify their evolving needs over time, particularly among youth who may experience lifelong effects of adverse police exposures during childhood (Felitti et al., 1998; Hughes et al., 2017).

Developed by an interdisciplinary team of researchers, this model may be informative to public health, sociology, criminal justice, and other academic fields seeking to advance our collective understanding of the role of police in modern society and the ramifications of troublesome police practices. With growing interest in the study of policing and health, research approaches the topic from many angles, often failing to explicitly situate itself within the context of other work. This model may serve as a unifying platform to which research may be anchored, facilitating easier comparisons across disciplines and methods.

This framework may provide law enforcement agencies with an opportunity for introspection and evaluation on the way communities are policed. By disaggregating the components of the "institution" into the pathways and mechanisms by which policing connects with population health, this model suggests opportunities for growth and improvement. Rather than treating policing as a single tool with one mode of use, this model recognizes that policing agencies play many roles and functions and progress toward more health-conscious practices may require different approaches than those currently in use. The daunting task of dismantling and rebuilding centuries of problematic policing culture, however, is not a magic-bullet solution but rather represents one avenue to partially address a multi-faceted structurally anchored problem.

Reflecting on the murders of Breonna Taylor, George Floyd, and Rayshard Brooks, among others in early 2020 at the hands of police officers, the nationwide protests that followed, and the violent police response to those protests, this model helps us to anticipate the reverberating effects on the health of those at the epicenter and those experiencing these events from a distance. It provides a clear picture of the vast range of health effects police-community encounters can produce to inform policy at the local, state, and federal levels on institutional and broad sweeping policing reform. Indeed, this model underscores why policing is a population health issue of critical importance and identifies the problematic mechanisms in law enforcement agencies that most urgently need to be addressed.

7. Conclusion

This model of the population health effects of policing has several strengths worth noting. First, this model is the first of its kind to offer an interdisciplinary framing of the issues associated with modern day

policing in the U.S. and how the actions and culture of law enforcement agencies can affect the health and wellbeing of individuals and communities as a whole. Second, we constructed this model with the intention that it should be adaptable and interpretable for as many communities across the U.S. as possible. The inclusion of contextual and organizational factors in the model itself along with individual and situational characteristics, illustrates how the pathways depicted can adjust to reflect the specific reality of any given population. Third, we chose not to restrict this model to any particular time frame by which effects must be identified for them to be considered the result of a policing exposure, enabling emerging research into the effects of policing to find a home within its structure. Fourth, we also highlighted the importance of life course and intergenerational approaches to studying the health effects of policing. Finally, this model is meant to be cyclic and iterative, such that the complex patterns of how communities and law enforcement agencies influence each other can be captured.

There are, however, some areas where additional research could bolster this model. This model does not explore the many positive effects of policing on population wellbeing. Future research should examine how positive effects may mitigate negative effects or cluster in certain populations to amplify the inequity of disproportionate policing. More research is also needed to elucidate the biological pathways by which policing impacts health. Finally, we describe how differential policing targets communities of color and of lower socioeconomic status, however, there is simply not enough research about the effects of policing among other marginalized groups, including immigrant and refugee communities, religious minorities, and sexual and gender minorities.

We present this model with the knowledge and hope that it will not remain static, rather it should be revised to reflect new knowledge on the health impacts of policing. We encourage researchers and practitioners to use this model, test it within their own work, and to conduct further research to expand our collective understanding of policing and population health.

Credit

Maayan Simckes: Conceptualization, Methodology, Writing - Original draft preparation, Review and Editing, Visualization, Supervision, Project Administration. Dale Willits: Conceptualization, Methodology, Review and Editing. Michael McFarland: Conceptualization, Methodology, Review and Editing. Cheryl McFarland: Conceptualization, Methodology, Review and Editing. Ali Rowhani-Rahbar: Conceptualization, Methodology, Review and Editing. Anjum Hajat: Conceptualization, Methodology, Review and Editing, Supervision.

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