

# Risk Managed Demand: Operational Risk Management in Police Response to Calls for Service

Police Quarterly  
2026, Vol. 29(2) 254–284  
© The Author(s) 2025



Article reuse guidelines:  
[sagepub.com/journals-permissions](https://sagepub.com/journals-permissions)  
DOI: 10.1177/1098611251383548  
[journals.sagepub.com/home/pqx](https://journals.sagepub.com/home/pqx)



Loren T. Atherley<sup>1,\*</sup> 

## Abstract

This study applies risk management strategies from commercial aviation to better understand when it is safe to send unarmed responders to 911/999 calls. By analyzing three years of community-generated call data from Seattle, Washington (727,423 calls across 356 types), this research assesses risk, or the “credible worst-case scenario” for each call type. Findings reveal nearly half (48.9%) of all call types could be safely addressed by diversified, non-police responders rather than the traditional “all-hazards” police approach. Observations that the all-hazards responder is often necessary to identify such opportunities, or what we term “Ratcliffe’s Paradox,” are confirmed. This study indicates a systematic approach to risk management could enable such a diversified responses, potentially freeing up to 26% of police resources currently allocated to non-police calls. A Risk Managed Demand (RMD) could improve public safety outcomes, reduce the collateral harms of armed responses, and operationalize Alternative First Responder programs resulting in an optimal allocation of resources.

## Keywords

policing, risk management, diversified response, collateral harm, call triage

---

<sup>1</sup>University of Cambridge, Institute of Criminology, Seattle, WA, USA

\*Current affiliation: Seattle Police Department, Performance Analytics & Research, Seattle, WA, USA

## Corresponding Author:

Loren T. Atherley, University of Cambridge, Institute of Criminology, Seattle, WA, USA.  
Email: [lorentatherley@gmail.com](mailto:lorentatherley@gmail.com)

---

**Correction (November 2025):** In the published version of the article, the third-order heading “How Does the Assessment Translate into Action” on page 11 has been changed to the second-order heading. Additionally, the term “Ratcliffe’s” and “Ratcliff’s” have been corrected to “Ratcliffe’s” on pages 3 and 20. The article has been updated to reflect these changes.

## Introduction

The “demand for order in a civil society” (A. Silver, 1967) requires maintenance. Silver describes a common experience for anyone who has lived in a city over the last “two centuries” (now two and a half), as well as an “extensive and relevant journalistic and historical literature concerning reactions to urban crime, violence and riot” as *de facto* demand. The occurrence of crime clearly demands order, but Silver additionally underscores the threat posed to the “center” by “mobs and riots” formed of “dangerous classes” on the periphery. Naturally the result of income, wealth, and opportunity inequality in an evolving society, these political expressions necessitate the formation, application, and maintenance of a “bureaucratic police.” That society expresses support and upholds expectations of service for formal social control (i.e., police) is tacit endorsement of the demand for order (“the demand”).

The tension between safety and apparently desirable qualities for living (e.g., fairness, equity, social justice, etc.) complicates “the response.”<sup>1</sup> The murder of George Floyd, typical of reactions under the “Second Great Awakening” (Sherman, 2017), reinvigorated fundamental questions about the utility, the appropriate use and ultimately, the necessity of police. There is anecdotal evidence to suggest alternatives to police could be effective; however, an extensive and growing body of research suggests that implementation may be more complex (Lum et al., 2020, 2022; Neusteter et al., 2019, 2020; Ratcliffe, 2021). Although “opportunity” for a non-police response appears significant, particularly with the aid of hindsight, but what is the “opportunity cost?”

This study demonstrates the use of conventional risk/safety management principles to optimize the opportunity for a specialist response. We leverage an objective framework adapted from commercial aviation to imagine a “diversified response” (defined below) to emergency calls received by government (i.e., 911/999). This paper finds compelling evidence that non-police responders can address the myriad other, ultimately non-police, requests for service, and do so safely. In so doing we establish a framework for operationalized risk management supporting strategic and tactical decision-making.

With dwindling police resources and sustained public pressure to reduce the collateral harms associated with an enforcement-forward approach to public safety, this study finds a “Risk Managed Demand” (RMD) essential to modern policing. Under the proposed model, lessons from the study of industrial accidents (Perrow, 1984), “human factors” (Edwards, 1985; Perezgonzalez, 2009), and common risk and safety management principles from commercial aviation (FAA, 2010; ICAO, 2013; Müller et al., 2014) are translated to determine the safety and efficacy of a diversified response.

RQ-1: Is it safe to send a diversified response? When?

RQ-2: What mitigations (i.e., “safety policy”) are necessary to a diversified response?

RQ-3: What is the prospective impact (i.e., opportunity) of a full-scale diversified response?

We find an evidence-basis indicating the opportunity for a diversified response can be realized safely, if managed properly.

This work suggests that well-formed “safety policy” (as defined below) would facilitate a safe, specialist response to nearly 50% of service requests (“call types”) currently handled by the Seattle Police Department (as all-hazards responders). In its mature state, a diversified emergency response system could return nearly 27% of police capacity, creating significant efficiency<sup>2</sup> as well as improved service. This analysis strongly indicates a systematic approach to risk management, and in so doing evolves our conceptual understanding of policing, with broader implications for public safety policy.

## Literature Review

Alternatives to the “all-hazards responder” model (i.e., police) have been a common focus of reform under the Second Great Awakening but have yet to gain widespread acceptance. WACS, Durham HART, etc.) have attempted a more nuanced response to emergency calls for service (911/999). Comprised of “alternative first responders,” these programs seek to divert (before police response) or refer specialist response opportunities (e.g., Mental Health Professional, social worker, non-police “outreach” worker) to satisfy the request more completely.

Although significant strides have been made, most jurisdictions have progressed little beyond the pilot stage. Alternative first responder programs are limited by the same issues as conventional alternatives. Police “co-responder” programs (police and a specialist) and “differential police response” (Mcewen et al., 1986) have been contemplated or in development for nearly fifty years. While some technological gaps are evidence, more critically absent is a framework for risk related decision-making. Without some common agreed rules, standards, and concept of “the good,” progress toward a “diversified response” will continue to stall.

## The Problem

Awareness of the efficiency (i.e., use of police for non-police service) is not new. Scholars like Reiss (1971) made note of the opportunity in observational studies conducted in the 1960s. Modern call data analysis confirms, a police responder is not always necessary to successfully and safely resolve a call for service (Amos & Eisenberg, 2023; Gilsinan, 1989; Horspool et al., 2016; Lum et al., 2020; Neusteter et al., 2020; Ratcliffe, 2021; University of Chicago Health Lab, 2022). There are, however, a number of barriers to implementation.

Ratcliffe’s (2021) examination of public health calls in Philadelphia represents the problem. While the opportunity for a specialist response (i.e., Mental Health Provider) to “persons with mental illness” is real and verifiable by observation, the information necessary to discriminate such opportunities, safely, is lacking at the “Public Safety Answering Point” (911 call center). An in-person assessment by an all-hazards responder is necessary to safely affect a specialist response, at present. Although the opportunity for a non-police response is apparent and substantial, paradoxically, it requires a police response to identify it. What we term: “Ratcliffe’s Paradox.”

Violent outcomes are rare but exert an outsized influence on the discussion. Our tendency to catastrophize, particularly in an era of deregulated media, amplifies these events. In September of 2020, two employees of a Seattle apartment complex were attacked by a tenant who had been served with eviction notice earlier that day. One of the employees died. According to the Seattle Times, a “mental health caution” was set in the Seattle Police Departments records system (Green, 2020a). In November of 2020, five blocks from the scene of the September attack, a resident of a low-income housing facility attacked and killed a resident case worker, in her office (Green, 2020c).

Evidence of mental illness is present in both cases. The man said he stabbed the case worker on the delusional belief<sup>3</sup> he was going to be evicted (Green, 2020d). Charging documents in the September attack indicate the attacker was evicted, despite a statewide moratorium on evictions, after having threatened to stab a private security guard employed by the property, earlier the same day (Green, 2020b). In both cases, there is evidence to suggest the person was “in crisis.”<sup>4</sup> While it is not immediately clear why police were not involved in attempting to remove the resident involved in the September attack, it is reasonable to assume the ongoing moral panic over police use of force was present in the minds of those involved.<sup>5</sup>

The tension between the desire for police alternatives and the need to protect responders is real. The violence demonstrated above could just as easily have befallen a “generalist first responder” (Friedman, 2021, p. 925), with the predictably chilling effect on the adoption of alternatives. Society, thusly, finds itself trapped in a perseverating cycle between catastrophization and moral panic. This describes a kind of analysis paralysis in which it is simultaneously true that most calls for service do not require the police, and it is unsafe to send anyone else. An apt predicament for a jurisdiction which has famously labeled said paralysis, “the Seattle Process” (Bennett & Giloth, 2007).

Our generally impoverished understanding of risk in policing (both conceptual and theoretical) has resulted in the formation and perpetuation of a highly risk averse posture. The current system evolved organically to rely on the professional judgement of “street level bureaucrats” (Prottas, 1978) and “streetcorner politicians” (Muir, 1979) acting as “gatekeepers” (Lum et al., 2020) to the myriad services available from government. The 911 systems in the United States receive approximately 240 million calls annually (National Emergency Number Association, 2021b). Those calls are triaged with a combination of “call takers” and what we term “all-hazards” responders (i.e., police). These professionals gather information, assess need, risk, and apply “minimax” thinking (Muir, 1979) to optimize the delivery of service. This manual process is the current accepted practice. It is demonstrably effective but still carries the inherent risks of an armed police response.

### *The Opportunity and the Opportunity Cost*

Decision-makers are often called to consider what economists refer to as the “opportunity cost” when optimizing investments or forming public policy. Some cost-benefit analyses are simple and objective. Some require a more complex framework to standardize and

contextualize the considerations. In this section we review the literature to better understand the opportunities and opportunity costs of a diversified response, as well as gaps in our theoretical and empirical understanding of these concepts in policing.

Loss of efficiency is a substantial opportunity cost incurred under the current model. A recent multi-site survey of call outcomes reveals “Most of the time (between 62% and 83% of calls received) they [police] are likely providing either assistance, advice, or peacekeeping functions” (Lum et al., 2022, p. 15). A similar analysis of calls for service in Seattle estimated slightly more calls were apparently<sup>6</sup> “criminal in nature, approximately 20%, while only about 6% related to felonies.” (National Institute for Criminal Justice Reform - NICJR, 2021, Figure 1). Between 60% and 80% of the time, police are not necessary but are deployed out of an abundance of caution. The all-hazards responder, employing generalist street-level bureaucrats equipped and authorized to defend themselves and other, is inefficient; however, the resulting potential for collateral harms appear to drive the current focus on alternative first responders.

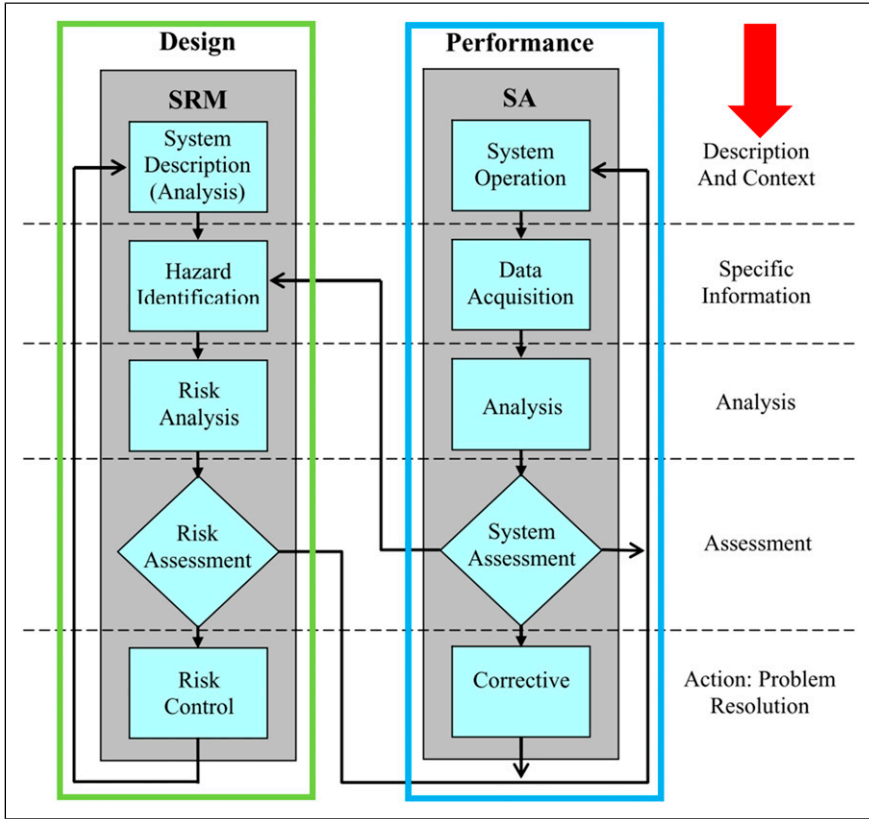
It could be argued that the all-hazards responder model is an effective risk management strategy. Of the 240 million calls received by 911 in the US, approximately 1 in every 244,000, or .00041%<sup>7,8</sup> result in that the Washington Post refers to as “fatal force.” According to statistics maintained by the Washington Post, 80% of those fatal force encounters involve an armed subject,<sup>9</sup> suggesting a large portion of those incidents represent some risk to those involved. Indeed, not all scholars agree the “footprint of police” needs to be shrunk (Thacher, 2022). However, if recent public reaction to incidents involving fatal force is any indication, even this opportunity cost may be more than the public is willing to accept.

In the wake of the murder of George Floyd, several American cities engaged serious attempts to disband, “defund,” or otherwise divest from the all-hazards responder model (i.e., police). In Seattle (WA) and Portland (OR), public demonstrations persisted for more than 100 consecutive nights (Groover, 2020). Those attempts largely failed to appreciably reduce (directly),<sup>10</sup> reform, or reshape police (Cummins, 2023; Lum et al., 2022; Sinclair et al., 2021; Thacher, 2022; Travis, 2021; Vaughn et al., 2022; Weichselbaum & Lewis, 2020), but the effect on the crime rate, public policy, and the urgency to “reimagine” policing appears to reverberate.

While there is much that we do know about the opportunity, and the opportunity cost, we lack a conceptual framework for systematic engagement of these considerations. There is evidence to suggest police perform well as all-hazards responders, serving as street-level bureaucrats and street-corner politicians to effectively optimize outcomes (“minimax strategy” (Muir, 1979, p. 169)) across a diverse set of problem-solving and service functions. The opportunity cost, however, remains too high. There exists a political will to disaggregate the police function (Friedman, 2021), but questions of safety and practicality remain gaps in our understanding.

### *Current Practice*

The systems used to route telephone, text, and email to the call centers, and those systems used to document and coordinate the response are increasingly more



**Figure 1.** Workflow for “Safety Risk Management” and “Safety Assurance” as Detailed in Guidance provided to Commercial Aviation Operators by the US Federal Aviation Administration (FAA, 2010, Figure 1) [Boxes and Arrow Added for Reference]

sophisticated, integrated, and robust. Yet, public safety still depends on a member of the public observing something “... - that-ought-not-to-be-happening-and-about-which-somebody-had-better-do-something-now” (Bittner, 1970, p. 29), and a street-level bureaucrat interpreting descriptions such as “they is clowning tough” (Gilsinan, 1989), to affect the “just right” response. This model, capable of safely handling millions of calls for service across a disparate and fractured system, is nevertheless inefficient and vulnerable to the rare but catastrophe, or “normal accident” (Perrow, 1984).

In 1938,<sup>11</sup> the first “emergency number” (999) in London, UK (The Communications Museum Trust, n.d). A similar service (911) was launched in the United States in 1968 (National Emergency Number Association, 2021a)<sup>12</sup>. While technical systems (e.g., Computer Aided Dispatch), standardization (e.g., policies, procedures, guides) and training have established a robust service, these systems still rely heavily on a professional

to “extract, interpret, and classify” information (Gillooly, 2020; Lum et al., 2020, 2022; Neusteter et al., 2019, 2020; University of Chicago Health Lab, 2022). Call handling is still largely dependent on professional judgement and is thus limited by the perspective of the observer.

As Gillooly (2020) observes, call takers identify the type of service being requested and establish priority but after a rough risk assessment and when triage is complete, an all-hazards responder is still apparently necessary to fine tune the response (i.e., Ratcliffe’s Paradox). Even the mature diversified response competencies (Albuquerque Public Safety, Durham HEART, Denver STAR) rely on a system of manual triage (e.g., field responders monitoring 911, a senior responder in the call center),<sup>13</sup> and referrals from other service providers (e.g., police, fire, social services, etc.). The call triage system in Seattle functions similarly.

Early identification of safety opportunities for a diversified response (call triage) is key and powerful when well governed. An analysis of three years of Seattle call data finds more than 42,000 combinations of how the call was received, how it was classified initially, prioritized, classified finally and “cleared” (disposition) (Atherley, 2024). This analysis considers a single dimension, final call type, and the more than 350 distinct ways to classify a request, after service is complete. A systematic cost-benefit analysis enables strategic development of a diversified response to optimize the benefit. Other industries form strategy in a similar process referred to as “risk management.”

### *Risk Management*

A similar low-frequency-high-impact risk profile is managed by other industries. These systems can be found in a broad spectrum of public and private industrial applications from food safety (Panghal et al., 2018) to nuclear power (Ylönen & Björkman, 2023), the national airspace system and wildland firefighting (Black & Baldauf McBride, 2013). They are as multi-disciplinary as the complex industries they are designed to manage, often reflecting engineering, systems theory, and psychology. This analysis utilizes principles from the highly successful commercial aviation implementation.

According to a 2013 article assessing “problems, challenges, and opportunities” in aviation safety, 2011 was the safest year on record for commercial aviation, with just one out of every 7.1 million passengers suffering a fatality (Oster et al., 2013). Although demonstrably safer than all other forms of transportation, by far, aviation maintains a very low tolerance for mishaps. Much the same is true for policing. A proactive approach to accident prevention has been essential to achieving the current state of airline safety (Oster et al., 2013, p. 3). A 2018 publication by the Federal Aviation Administration credits the maturity of safety systems with a 95% reduction in already low fatalities during the preceding two decades (FAA, 2018). Today, so called “Safety Management Systems” exist to implement “defenses or preventive controls to lower the severity<sup>14</sup> and/or likelihood<sup>15</sup> of a hazard’s projected consequence” (ICAO, 2013, p. xii).

Fundamental to success of these systems is the concept of the “credible worst-case scenario.” In a system processing a high volume of activity, even rare probabilities may

eventually be realized. These rare events represent real individual risks but are not typical of the system; however, the relative frequency of these events provides important context. From this credible (likely) worse-case scenario, an evidence-basis is formed to accept, mitigate, or reject the “hazard”<sup>16</sup>. Rather than fixate on the rare catastrophic failure, to the detriment of an objective good, safety management systems emphasize minimax thinking to optimize opportunity.

The current state of safety in policing is like that of commercial aviation in the late 1970s and 1980s. For much of the 20<sup>th</sup> Century the safety focus was on equipment (FAA, 2021; Müller et al., 2014), or “Hardware” in the human factors SHEL-L model (“Software, Hardware, Environment and Liveware-Liveware interactions”) (Edwards, 1985). It was not until failure was all but engineered out of the hardware that a focus on human factors and organization was embraced (FAA, 2018). A similarly myopic focus is embodied in application of “streetcorner politicians” to “minimize the maximum risk [minimax]” (Muir, 1979, p. 40) as they deliver government service. Empowered to manage physical risk as well as less tangible outcomes (e.g., safety, trust, legitimacy), police discretion and decision-making has long been a trusted bulwark against the permutable harms inherent in the service delivery role they occupy. Now during a crisis of confidence fundamental to the Second Great Awakening, an approach similar to what was applied in commercial aviation nearly a half-century ago, is necessary to affect safety and legitimacy, systematically.

**Commercial Aviation: A Model Process.** Commercial aviation shares a familiar risk profile with policing. In both cases failure is (1) statistically rare, (2) catastrophic and generally regarded as (3) the result of a cascading series of failures in what Perrow called “complex and coupled systems” (Perrow, 1984). The international consensus on the best practice management of these systems prescribes four-pillars: safety policy, risk management, safety assurance, and safety promotion (FAA, 2010; ICAO, 2013). This paper focuses on two of the three, “risk management” (2010, Section 6.b) and “safety policy” (2010, Section 6.a), critical practices for the development and operation of a diversified response.

We focus on the standard methodology for assessing and controlling<sup>17</sup> risk (i.e., safety risk management). Investigation, analysis, auditing, and promotion of safety are all worthy of their own study, far beyond the scope of this paper. Together, these processes serve to classify and eliminate or mitigate (lesson) any given hazard<sup>18</sup>. These are complementary strategic or “design” processes representing the tolerance(s) for acceptable risk or loss, given a cost-benefit analysis, sometimes referred to as a “value proposition.” This synergy is essential to evidence-based decision-making.

A comprehensive overview, [Figure 1](#) (below) depicts guidance from the International Civil Aviation Organization and US Federal Aviation Administration describing the “Design” and “Performance” of safety. This diagram outlines a system where design decisions are informed of the best available information (see “Design” left of [Figure 1](#), outlined in green), and feedback is used from surveillance of actual operations (see

“Performance” right of Figure 1, outlined in blue) to inform continuously improving safety practices, feedback (solid lines between Design and Performance).

Throughout the workflow (Design and Performance), a continuous evolution of data collection, analysis and action (see Figure 1, “swim lanes”<sup>19</sup> depicted far right, red arrow) forms the safety management process.

*How is Risk Assessed?* Mature Safety management systems pursue a comprehensive awareness of all hazards, mitigated to an acceptable level (i.e., all credible worst-case scenarios are acceptable), and actively managed to improve continuously (FAA, 2010; ICAO, 2013). Successful risk management, however, does not require the absence of risk. Opportunities come at a cost. It is the substantive significance of the risk assessment, what is described in *The cult of statistical significance* (McCloskey & Ziliak, 2010) as “oomph” guiding the decision to accept.

Credibility is important to regulators, who decide whether the flying public will be safe. It is equally important to public safety policy makers, for many of the same reasons. For these purposes, risk is defined as the “The composite of predicted severity (how bad) and likelihood (how probable) of the potential effect of a hazard in its worst credible (reasonable or believable) system state.” (FAA, 2010, p. 24) As mentioned previously, given the volume and diversity of services requested of police, anything and everything CAN happen. The credibility of that worst-case scenario is the key difference for policy makers.

“Severity” or “The degree of loss or harm resulting from a hazard,” (FAA, 2010, p. 25) constitutes the fundamental dimension of risk. Like the “hierarchy rule” used to summarize under the Uniform Crime Report (“UCR”), the most severe outcome associated with any operation but in this context a call, defines the hazard. That worst-case scenario classifies the hazard along a simple, ordinal scale. Table 1,<sup>20</sup> demonstrates (below).

Scores range from “Negligible” to “Catastrophic,” and can include as many steps as can be discriminated by the evidence.

“Likelihood,” the “probability or frequency, in quantitative or qualitative terms, of an occurrence related to the hazard” (FAA, 2010, p. 6), is similarly agile. Again, an ordinal score comprised of discrete definitions is used to represent the credibility of the worst-case scenario (see Table 2, below). The degree to which the worst-case scenario is credible (reasonable or believable)<sup>21</sup> or likely to occur is assessed from either the observed history (i.e., frequency) or some *a priori* understanding of failure established through testing or extensive operation.

“Oomph” is found at the confluence of severity and likelihood. Consider the sample risk matrix (Table 3, below). At the convergence of severity (columns) and likelihood (rows) is a *risk classification* scaling the twenty-five cells in a 5 × 5 matrix into three distinct tiers, from “acceptable” (green) to “unacceptable” (red). Those hazards classified in-between (yellow), are considered acceptable with attempts to mitigate. The classifications represent safety policy (pillar of safety management) and are unique to the tolerances and values of the organization they serve. More on this in future sections.

**Table 1.** Sample Severity Scale (ICAO, 2013, pp. 2–29) Severity Levels With Definitional Criteria (“Meaning”) and Their Value to be Plotted on the Matrix

Severity	Meaning	Value
Catastrophic	– Equipment destroyed – Multiple deaths	A
Hazardous	– A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely – Serious injury – Major equipment damage	B
Major	– A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency – Serious incident – Injury to persons	C
Minor	– Nuisance – Operating limitations – Use of emergency procedures – Minor incident	D
Negligible	– Few consequences	E

The decision to accept risk is contextual and relative. A commercial air carrier may elect to suspend service where any phase of the operation includes any probability (i.e., likelihood) of the loss of an airframe (i.e., severity).<sup>22</sup> In contrast, military operations under the same conditions (loss of an airframe) are acceptable. The eventual loss of an airframe (crew and cargo) may be a near certainty; however, the prospective benefit to the enterprise (a military objective) requires the risk to be accommodated. The goal of any organization managing risk is to establish an “As Low As Reasonably Achievable” (ALARA) condition, while still being able to conduct its core function.

**Table 2.** Sample Likelihood Scale (ICAO, 2013, pp. 2–28) Likelihood Defined (“Meaning”) and Their Value to be Plotted on the Matrix

Likelihood	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

**Table 3.** Sample Risk Matrix (ICAO, 2013, pp. 2–29) Combined Severity and Likelihood plots From Definitions in Tables 1 and 2

Risk probability	Risk severity				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent 5	<b>5A</b>	<b>5B</b>	<b>5C</b>	<b>5D</b>	<b>5E</b>
Occasional 4	<b>4A</b>	<b>4B</b>	<b>4C</b>	<b>4D</b>	<b>4E</b>
Remote 3	<b>3A</b>	<b>3B</b>	<b>3C</b>	<b>3D</b>	<b>3E</b>
Improbable 2	<b>2A</b>	<b>2B</b>	<b>2C</b>	<b>2D</b>	<b>2E</b>
Extremely improbable 1	<b>1A</b>	<b>1B</b>	<b>1C</b>	<b>1D</b>	<b>1E</b>

### How Does the Assessment Translate into Action?

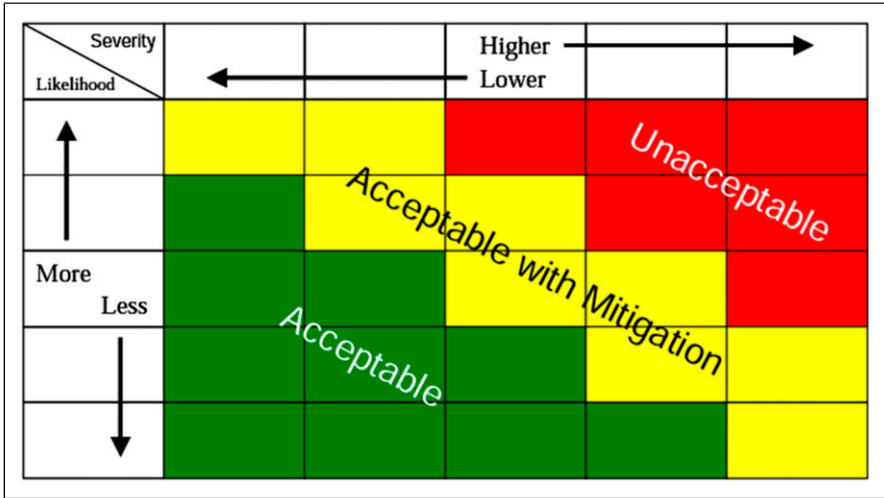
How much risk is acceptable is a matter of first principles. In the example (above), a commercial airline may find the “loss of hull” and all aboard to be prohibitively risky; however, from the perspective of military flight operations, the objective (e.g., benefit) may not be achievable in safe airspace. A similarly skewed cost-benefit relationship exists in public safety.

The utilitarian need to provide the most public safety to the most people often outweighs the needs of the one. “Active shooters” (lone actor terrorists) arguably suffer an acute behavior condition. Yet, when an active shooter is threatening public safety the use of lethal force to stop (mitigate) that threat may be reasonable.

The risk matrix is a logic model and is both an assessment tool (demonstrated above), and a policy driven guide to action. In visualizing the dimensions of risk (i.e., severity and likelihood), encoded to reflect the specific tolerances (acceptable and unacceptable) of the organization, a evidence basis to manage the credible worst-case scenario results. Severity, risk, and risk tolerance (safety policy) are controls to be manipulated. Consider the sample risk matrix, below (see Figure 2).

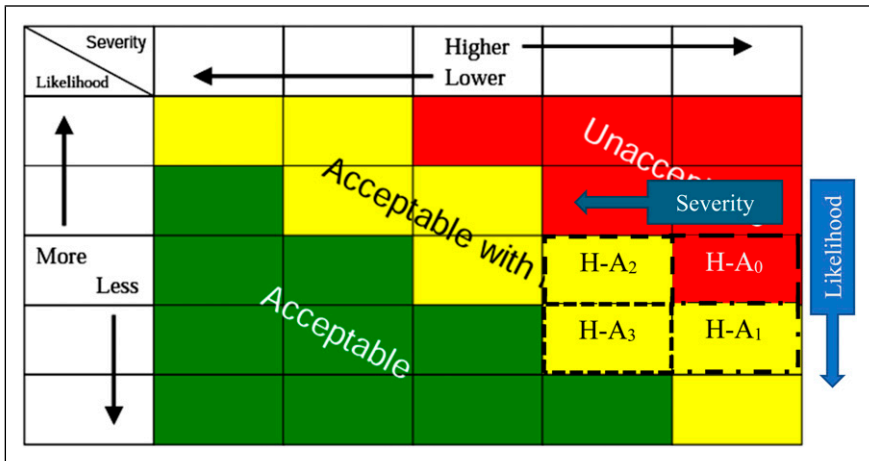
This Figure both classifies hazards according to risk, and differentiates between “Acceptable”, “Acceptable with Mitigation”, and “Unacceptable” risks. The risk matrix visually correlates control inputs (severity and likelihood) to system outputs (risk). These objective criteria are levers to control risk. To achieve a “good” (i.e., a specialist response) otherwise considered an unacceptable risk, either (1) the credible worst-case (i.e., severity) or (2) its probability of occurring (i.e., likelihood), or both might be altered to achieve a lower risk assessment (from red to yellow).

Interactions with those experiencing a mental health crisis<sup>23</sup> are of particular interest to those seeking to disaggregate the police function. As discussed, interactions with this population are not without risk. Consider the previously discussed risk management framework, in the context of public safety. The recommended action to mitigate risk prescribes altering hazard to reduce severity, likelihood or both (see Figure 3, below).



**Figure 2.** Sample “Risk Matrix” Where Red Indicates the Area of Unacceptable Risk, Yellow “Acceptable With Mitigation” and Green, “Acceptable” Without Mitigation (FAA, 2010, p. Appendix 3, Page 3)

With a police officer in attendance (i.e., co-response), and no history of the worst-case scenario outcome (death of a responder), it is no longer credible to assume death will result.<sup>24</sup> The risk assessment, therefore, drops from the observed risk of the hypothetical mental health field response (H-A<sub>0</sub>) to either H-A<sub>1</sub> or H-A<sub>2</sub>, “yellow” or



**Figure 3.** Sample Mitigation Where a Reduction in the Credible Worst-Case Scenario is Achieved by Adjustment to “Severity” and/or “Likelihood.” Hypothetical Scenarios are Labeled “H-A<sub>0</sub>” Thru “H-A<sub>3</sub>” and Boxed (Dashed Lines) With Movement of Severity and/or Likelihood Annotated (Blue Boxes)

“Acceptable with Mitigation” (i.e., the presence of a police officer). Conceivably, the assessed risk of a hypothetical “police assisted co/alt-response” (see Table 4) results in a reduction of both the most credible outcome and the likelihood of it occurring (H-A<sub>3</sub>). The risk assessment, after mitigation (i.e., H- A<sub>1-3</sub>), reflects what is referred to as the “residual risk”<sup>25</sup> state and can be judged to be now As Low As Reasonably Achievable.

This is considered a best practice to mitigate the risks associated with serving this population. Many cities, including Seattle, follow the Memphis Model of police crisis intervention, widely considered to the standard in the United States (Compton et al., 2008). A search of Seattle Police Department records and other sources of local history<sup>26</sup> reveals no examples, documented or in recent memory, of an injury to a responder (sworn or civilian) during a co-response.<sup>27</sup> However organic, the development of a specialized response/responders to address an emerging risk suggests policing is inclined to a safety management.

*The Role of Safety Policy.* “Hedging”<sup>28</sup> may be the key to managing risk in emergency response. Pursuant the order to “reimagine policing” (Durkan, 2020), the City of Seattle commissioned the National Institute for Criminal Justice Reform (NICJR) to evaluate opportunities for a diversified response. The resulting proposed “Tiered Response Model” (see Table 4, below) hedges “the bet” (i.e., risk assessment) that a given service

**Table 4.** Tiered Response Model as an Example of Safety Policy. Risk, as Defined by Severity and Likelihood and Acceptable Tolerances, Corresponds to Policy Governing Handling of That “Response Tier”

TIER	DESCRIPTION	POLICY
TIER 1	Police Response	High Risk – Police Response
TIER 2	Co-Responder Assisted Police Response	Medium High – Must Mitigate
TIER 3	Police Assisted Co-Response	Medium – Should Mitigate
TIER 4	Deferred Response	Low Medium / Low – No Mitigation

type may be safe for a specialist response by attending those marginal opportunities with a police officer, for safety. This set of standard instructions for managing risk constitutes “safety policy.”

Those calls classified as Tier 1 are service relate to obvious life/health/safety threats and/or criminal activity (in progress or having recently occurred). Much of the opportunity for a diversified response resides within Tier 2 and Tier 3 classifications (e.g., co and alternate response). In a Tier 2 response, a “Co-Responder Assisted Police Response,” the police officer takes primary responsibility for the contact until the credible worst-case scenario (e.g., injury to the responder) is no longer credible. Events assessed to be of lower risk are classified Tier 3, or “Police Assisted Co-Response.” In these situations, police may attend or be staged nearby for rapid intervention, but the credible worst-case scenario is safe enough to allow a more flexible problem-solving. Those events and even reports of crime not requiring an immediate response (e.g., theft from a car discovered hours after it occurred) are

classified Tier 4 and are candidates for a differential police response (e.g., online reporting, appointment, etc.) or no police response (e.g., community service officer, outreach worker, etc.).

Safety policy standardizes and governs actions whether in the context of commercial aviation or the delivery of emergency response service. Under the current all-hazards responder model, every phase of the response is controlled by professional judgement. Call takers follow quality assurance and classification protocols, and they extract, interpret and classify information. All-hazards responders (i.e., police) observe, interpret and reclassify/recalibrate the response. All of these actions are governed by professional judgement. Safety policy standardizes those actions and can accommodate additional information (e.g., active risk assessment, call triage, etc.) to realize opportunities while mitigating opportunity cost(s).

## Method

This method demonstrates the principles of risk management to assess the opportunity for a diversified response in Seattle, Washington, USA. Data from police calls for service were assessed using a risk matrix formed by the Seattle Police Department to represent risk tolerance(s) (e.g., acceptable, acceptable with mitigation, unacceptable) for the 356 types of service observed during the study period (2017 - 2019). The Tiered Response Model, proposed by the National Institute for Criminal Justice Reform<sup>29</sup> and contemplated above, was used to evaluate a diversified response where the credible worst-case scenario is mitigated to be, hypothetically, acceptable. The resulting estimates of the opportunity for a diversified response are expressed in the analysis as (1) the proportion of call types deemed to be acceptable/acceptable with mitigation risk for alternatives to police and (2) the sum and proportion of police “service hours” that might not have been expended on non-police service types, had these alternatives been available.

## Data

Data for this study were formed from data representing police calls for service and fire medical or “aid run” taking place during the study period (2017 - 2019). For each response the most severe outcome was coded for the 727,423 records generated in response to a request for service from a member of the public (“dispatched”<sup>30</sup>). Calls initiated by a police officer (i.e., “onview”), as well as those associated with any reportable police use of force were removed to control for any recursive effects (see Controls).

Severity was scored from documentation of injury made by Seattle Fire Department personnel. The observed frequency of these outcomes was fit to a curve (see Table 6, “Likelihood,” below) and final call type classifications were plotted on an amended risk matrix. That risk matrix was used to scale the 356 call types observed during the study period and summarize them across the four response tiers discussed, above.

Severity was coded based on objective criteria independent of the police response. These observations were made independent of the Seattle Police Department response and governed by the standard of care guidance established and supervised by licensed medical professionals. The independence of this observation was essential to the legitimacy of the project, as any potential biasing influence resulting from the police response was scrutinized carefully by stakeholders and members of the community.<sup>31</sup>

Each observed response during the study period was coded “Severity 1” through “Severity 5” (see) based on the medical provider necessary to render aid to the person injured in the response. For events where the person was indicated “deceased” or transferred to the medical examiner’s office in the patient medical record the event was coded Severity 5 defining the top of the scale. Those events where a paramedic provided care to the patient, a standard referred to in the United States as Advanced Life Support, were coded “Severity 4.” Responses where an Emergency Medical Technician (EMT)<sup>32</sup> cared for the patient (i.e., Basic Life Support) and they were transferred to another medical provider (e.g., transported to the hospital by ambulance), were coded “Severity 3.” For aid rendered by a firefighter EMT where the patient did not require transfer to another medical provider, or for whom it was deemed safe for them to transport themselves (e.g., First Aid), the event was coded “Severity 2.” If no injury or aid was documented by a medical provider<sup>33</sup> the event was coded Severity 1.

The severity scale is fundamental to the design of safety policy. That task is even more critical in a political environment predisposed to mistrust police and their application of technology. Mindful of the real and perceived “colonizing” effects of data (Quinless, 2022), this project went to great lengths to assure objectivity and independence within the severity scale. As indicated in Table 5, the American Heart Association standards of care (i.e., ALS, BLS) (American Red Cross, 2021) are used to define severity. These are objective criteria used to govern the skills and abilities necessary to support an injured person. Additionally, they are independent assessments made by medical personnel based on observations/impressions of the patient.

The severity scale adopted by this project is configured to reflect the (1) relative safety of the opportunity and (2) management of collateral harms (e.g., use of force, constitutional seizure) associated with the delivery of police service. This scale does not

**Table 5.** Seattle RMD Severity Scale

Severity	Description
Severity 5	An event with an associated, unnatural, death
Severity 4	An event with an associated injury requiring the ALS <sup>40</sup> (i.e., paramedic) standard of care and transfer to a medical professional
Severity 3	An event with an associated injury requiring the BLS <sup>41</sup> (i.e., EMT) standard of care and transfer to a medical professional
Severity 2	An event with an associated injury requiring care but no transfer of the patient to another medical professional (e.g., first aid)
Severity 1	No physical injury to a person

address other objectives of interest to public safety managers (e.g., civil unrest, property damage, escalating series/spree, etc.). The proposed framework and decision-making system could, however. The sample severity scale provided above (see Table 1, above) demonstrates the agility of safety management. While this project focuses on objective criteria specifically tailored to the question of responder safety, other industries have taken a more subjective approach.

*A Reasonable Approach.* How often an outcome can be realized under “normal” conditions (i.e., acceptable) is context that must be established by decision-makers. The acceptableness parameter (i.e., Likelihood) was established for this project by decision-makers with the advice of subject matter experts and a “reasonableness test.”<sup>34</sup> Based on the legal fiction of the “reasonable man [person]” stakeholders were asked to consider what rate (i.e., Likelihood) would be reasonable or justifiable for each outcome (i.e., Severity) (see Table 6). A 50/50 chance of any outcome was deemed, reasonably, “Very Likely” occurrence. Any outcome observed between 25% and 50% was coded “Likely.” Those observed between 10% and 25% of the time were coded “Possible.” Events occurring between 5% and 10% were deemed “Unlikely,” and those occurring less than 5% of the time or less were coded “Very Unlikely.”

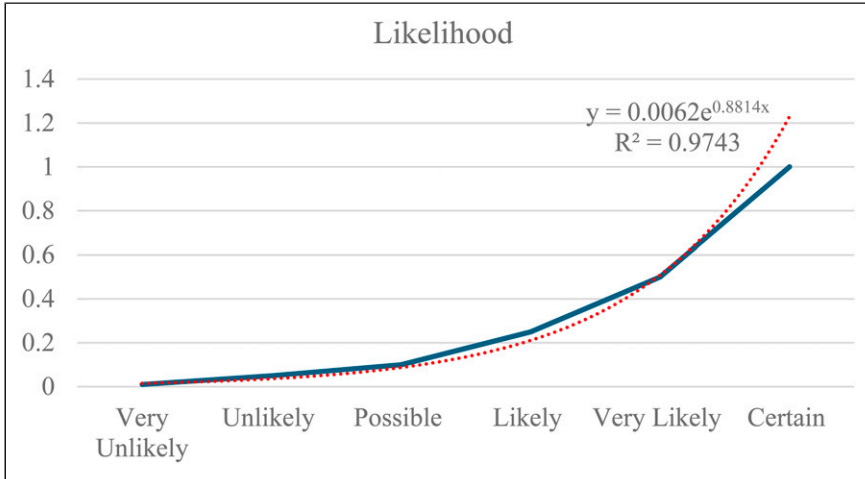
A plot of Likelihood fits an exponential form ( $y = 0.0062e^{0.8814x}$ ), well ( $R^2 = .99$ ),<sup>35</sup> suggesting a compounding effect as the probability of the worst-case scenario approaches one. This figure and its depiction of the non-linear implications for decision-making was presented to decision-makers and subject matter experts for validation of the Likelihood classification matrix. The scale was confirmed to reasonably reflect the values of the organization and was adopted by this project (Figure 4).

Like all safety policy, these definitions reflect the values and tolerances of the Seattle Police Department and are expected to be adapted to each individual use case. To the authors knowledge, no established standard or heuristic exists for the definition of severity and/or likelihood. The figures provided here are offered to demonstrate the concept but are not the definitive example. The author recommends that organizations seeking to adapt such an approach to their operational context do so in a way that is simple and transparent, allowing stakeholders and users of the system to fully understand and engage.

*Raters.* What a reasonable person might consider “acceptable” is critical to risk management (i.e., the legal fiction of the “reasonable man”). Not only does this

**Table 6.** Likelihood or the Rate That the Outcome Occurs in the Universe of Observations. Definitions Arrived at Thru a Consensus Built “Reasonableness Test” (See Raters)

Likelihood	Description
Very unlikely	Occurring less than or equal 5% of the time
Unlikely	Occurring between 5% and 10% of the time
Possible	Occurring between 10% and 25% of the time
Likely	Occurring between 25% and 50% of the time
Very likely	Occurring greater than or equal to 50% of the time



**Figure 4.** Likelihood Plot

reasonable standard reflect the collective values of a given organization, but it is also the same standard by which actions may be judged in a court of law. Questions of liability or even criminal responsibility often come down to what a reasonable person might have done in similar circumstances. The selection of and structure for rendering agreement (rating) are therefore essential governance.

For this exercise, three raters convened representing (1) department leadership (a member of command staff authorized to accept risk on behalf of the department), (2) operations (a ranking police officer with more than seventeen years of operational experience), and (3) analytics (the author). For both the initial risk assessment parameters (i.e., Severity and Likelihood), as well as the risk mitigation necessary to establish the final risk management decision (see Risk Management, below), absolute agreement was achieved in a consensus process (debate until agreement).

In addition to definitions of Severity and Likelihood, raters were asked to consider risk as assessed from the study period and cost/benefit of a specialist response. Where the history of the Seattle Police Department contraindicated alternatives to police (e.g., see Severity, Likelihood and [Table 7 - The Seattle Risk Matrix](#), below) the raters were asked to consider standard mitigations (i.e., Tiered Response Model, above) might reasonably reduce either Severity, Likelihood or both to acceptable levels. Where it was agreed the application of safety policy (standard mitigation) might render the risk(s) to responders and the public acceptable, the call type was recoded (see Risk Management, below).

For all of the apparently quantitative rigor, safety management is a subjective exercise. Risk is relative and what is acceptable to the military is decidedly unacceptable to a commercial enterprise. Those values are best exercised by human raters under a systematic framework. The resulting safety policy, consisting of definitions (e.g., Severity, Likelihood, acceptable, unacceptable, etc.), and

**Table 7.** Seattle Police Risk Matrix. Color Coding Indicates Risk. Red is Unacceptable. Orange and Yellow are Acceptable With Mitigation and Those Service Types Coded Green are Always Acceptable

See	Sev 1	Sev 2	Sev 3	Sev 4	Sev 5
<b>Very Likely (≥50%)</b>	114	0	2	1	0
<b>Likely (25% - 50%)</b>	0	0	1	1	3
<b>Possible (10%-25%)</b>	0	0	5	4	1
<b>Unlikely (5%-10%)</b>	0	0	14	2	0
<b>Very Unlikely (≤5%)</b>	0	2	51	87	68

standardized actions (e.g., Tiered Response Model), affords strategic and tactical guidance for decision-makers.

*Controls.* Risk to non-police responders is difficult to ascertain from existing data because alternatives to police have not been widely fielded in Seattle. This “out of sample” condition (N. Silver, 2012) is a critical but common limitation in formative stages of innovation. For the purposes of this proof-of-concept or prototype risk matrix, the initial risk assessment employs injury to anybody associated with the response (excluding “onviews” and police user of force, see Data, above) as a proxy for the risk or danger inherent in the situation. This assessment is a starting point, a “datum,” intended to aid decision-making. The framework proposed here is designed to be enduring, however. As a diversified response matures, generating data as it does so, assumptions about the nature of risk (e.g., posteriors or priors) are updated as a direct reflection of risk.

Police data represent a unique and powerful source for certain public safety insights but poses some risk. Some real and some speculative. Their application, for example, in guiding future public safety policy comes with a risk of compounding/perpetuating the effects of systemic racism. Additionally, stakeholders engaged in early formative phases of this analysis expressed concern that this analysis originated from inside a police service and does not consider direct community input. In response to these concerns, efforts were made to (1) control conceivable recursive effects in the fundamental design of the system (i.e., independent raters, no police initiated activity, no injuries resulting from the police response), (2) produce a conservative initial estimate of risk, while establishing (3) a responsive framework (i.e., methodology) that could adapt as new observations are made (posteriors), risk is recalculated, and norms/values evolve.

In addition to only considering requests for service from the public, injuries resulting from the police response were controlled. Out of an abundance of caution, all events where a police use of force was reported (600 to 900 a year or between

.24% and .37%) were removed, including those resulting in an injury to the officer, preserving the independence of outcome measures (i.e., severity). Additionally, calls associated with a documented assault on a police officer, regardless of a reported police use of force, were controlled. On the assumption that serious crime, “Crimes Against Persons” (FBI, 2012), represent an imperative and would always receive a police response, calls resulting in a report documenting an offense of this type were additionally removed.

Finally, the SARS-CoV-2 pandemic was observed to have significantly disrupted the response ecosystems in ways yet to be fully understood. To align with the National Institute for Criminal Justice Reform call analysis and control the biasing effects of abnormal operations, the data were restricted to three complete years (2017, 2018, and 2019) on the assumption that activity would return to pre-pandemic levels and findings would be generalizable.

### Procedure

This analysis followed published guidance for safety management systems commonly employed to manage risk in commercial aviation (described above). All calls ( $n = 727,423$ ) were scored from one to five based on the observed most severe outcome (see “severity,” Table 4, above). The rate at which the most severe was observed (see “likelihood,” Table 5, above) was calculated<sup>36</sup> for each of the call types. These data were then summarized by plotting the final call classification ( $n = 356$ ) at the intersection of the worst-case outcome (severity) and its observed rate (likelihood) on the risk matrix (see below).

Once plotted, stakeholders at the Seattle Police Department determined what risks were acceptable (green), acceptable with mitigation (orange and yellow), and unacceptable (red) for non-police responders. The risk matrix was color coded to reflect the risk tolerance(s) of the organization and the desired mitigation under the Tiered Response Model (i.e., safety policy). Raters (see Ra) determined the risk of death or serious injury was unacceptable (Table 7, red). The Very Likely ( $\geq 50\%$ ) occurrence of injury requiring treatment (Severity 3), was also deemed unacceptable (Table 7, red); however, occurring between 10% and 25% was deemed acceptable, with-mitigation-high (Table 7, orange). The remainder of these outcomes, occurring less than 10% of the time, were assessed acceptable, with-mitigation-low (Table 7, yellow). Any call type for which the worst-case scenario injury was not observed to exceed basic first aid (Severity (2) more than 5% of the time or for which the observed worst-case outcome is the documentation of an offense or infraction, was coded green (see Table 7).

**Risk Management.** Of the 356 call types evaluated, approximately 54% required risk management (see Table 8, below) in order to mitigate risk(s) to acceptable levels. Of the 54% that were recoded, 23% were downgraded to a lower response tier. In other words, their credible worst-case scenario calculated by the original risk matrix reflected an anomaly or was otherwise deemed to be not credible through the reasonableness test described above (see Raters). In nearly 31% of call types, the response tier was upgraded because they were either a specific request for a police response (e.g., “SFD –

**Table 8.** Risk Management Results. Table Depicts the Count of Call Types Either “Downgraded,” “Upgraded” or Left Unchanged (“No Change”) in the Course of Risk Management (See Risk Management). Results of Risk Management Reclassification are Depicted in Figure 5, Following

	Count	Valid (%)
Downgrade	86	24.2
Upgrade	103	28.9
No change	167	46.9
Total	356	100.0

ASSIST ON BLS FIRE OR MEDICAL RESPONSE” Tier 1) or were a call type requiring enforcement action, up to and including arrest (e.g., “LIQUOR VIOLATIONS – MINOR” Tier 2).

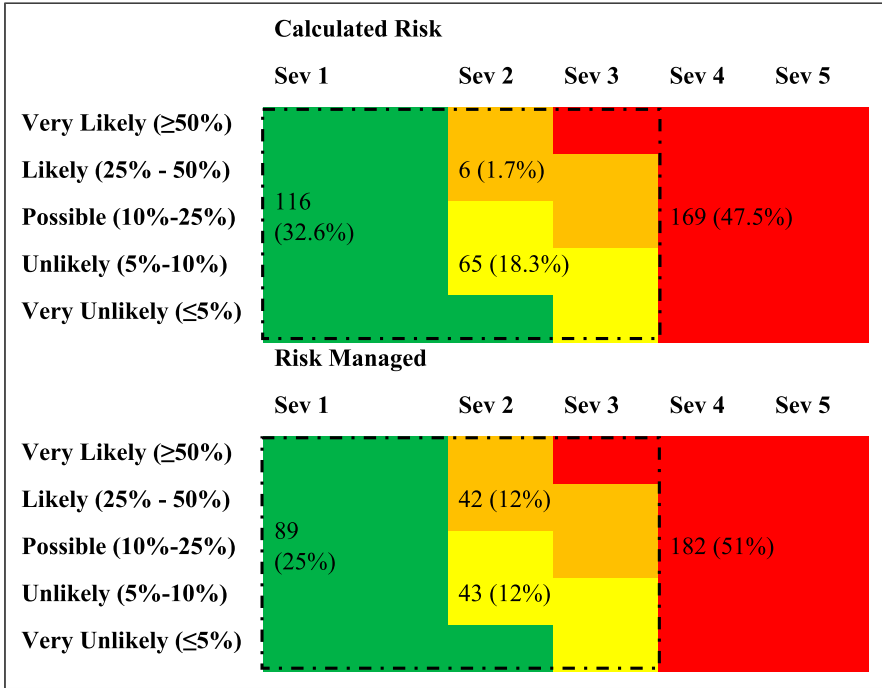
The visual comparison of risk models, pre and post risk management, depicted in Figure 5 (below), demonstrates the systematic management of risk. Distinct from and possibly indicative of government over industrial/commercial risk profiles is government’s apparent intolerance of significant injury or death. Commercial risk management often considers serious injury and even death to be, at least at some level, acceptable in the “opportunity space”<sup>37</sup> (dashed outline).

In industrial applications, this area is where prospective benefit (profit) may be realized. A commercial entity that can operate in this space, safely, has an “edge” on the competition. In government, a similar benefit (just right response) can be realized in this space. The result of that cost-benefit contemplation is depicted in the “Risk Managed” matrix (bottom) and serves as the foundation for continuous improvement. The decision-making process described above (see Raters) reflects the reality of such a contemplation and is familiar to myriad processes observed in any bureaucracy.

### Analysis

This analysis suggests significant opportunity for a safe diversified response. The current all-hazards responder model, where police are the primary responder to all calls, is reflected in the polarized loading of the matrix (see Figure 5, above) and depicts Ratcliffe’s Paradox. As noted above and by many scholars over more than a half-century of study, there are apparently myriad opportunities for a non-police response but it typically requires a police response to determine as much (Ratcliffe, 2021). Measured in service hours<sup>38</sup>, the potential is for between 15.2% and 26.8% (see sum of valid percent of Service Hours for tiers 2 and 3, and tier 2, 3 and 4 in Table 9, below) efficiency, enabling other evidence-based policing strategies.

Under the current model the risk matrix is polarized (see Figure 5, above). Call types are heavily loaded on the “Unacceptable” risk classification (red), reflecting a historically conservative approach to risk management. The all-hazards response model effectively mitigates the risk posed but what would otherwise be a dangerous operation



**Figure 5.** Calculated/Managed Risk Comparison. Table on the Top Represents Raw Calculated Risk. Table on the Bottom Represents the Result of Risk Management “Recoding.” Concentration of Call Types Classified as “Unacceptable” (Red) Classification Depicts “Polarization,” Discussed Below

(e.g., “BOMB THREATS...”, “ESCAPED PRISONER...”, “ROBBERY...”). Similarly, some responses were calculated high risk and received an urgent police response because someone was injured or killed, despite being accidental, in nature (e.g., “INJURED - PERSON/INDUSTRIAL ACCIDENT”, “ANIMAL - INJURED, DEAD HAZARD, OTHER”). As a diversified response is fielded, the data populating the risk

**Table 9.** Risk Managed Demand Resource Estimates by “Call Type” and “Service Hours”

	Call type		Service hours	
	Count	Valid (%)	Hours	Valid (%)
Tier 1	182	51.1	334,066	73.2
Tier 2	42	11.8	53,177	11.6
Tier 3	43	12.1	13,277	2.9
Tier 4	89	25.0	56,095	12.3
Total	356	100.0	456,615	100.0

matrix will begin to reflect the reality of a differential response and not the prospective risk as measured by proxy.

Opportunity exists for a more satisfying and appropriate response. Between Tier 2 and Tier 3, eighty-five (forty-two and forty-three respectively) call types are co-response candidates. Tier 4 responses represent 25% ( $n = 89$ ) of call types and approximately 12.3% (56,095 hours) of all service hours expended during the study period (see [Table 9](#), below). Combined, Tier 3 and Tier 4 responses suggest the potential to divert 15.2% of resource demand. It can be assumed most Tier 2 responses will revert to a Tier 3, allowing police to clear from the call after any life/health/safety threat is mitigated (e.g., a weapon in the environment is removed), increasing the potential resource recovery to as much as 26.8%.<sup>39</sup>

While the analysis suggests significant opportunity, specialized triage systems and specialist resources are necessary to realize this potential. In some cases, municipal governments will have the competency (e.g., animal control, social workers) and will simply need to coordinate their response. Many of the types of specialist response indicated here, by virtue of the state of the social welfare state in the US ([Garland, 2016](#)), will need to be built from the ground up. Finally, as mentioned in the literature review, although this strategic analysis is promising, a confident triage system is essential. So called “intelligent call centers” employ several promising technologies which enable low/unskilled laborers to consistently serve customers requesting assistance. These systems have yet to be adapted to public safety, however.

## Conclusion

This analysis indicates a framework adapted from commercial aviation can answer some key questions and contribute to the sustained operation of a diversified response. Importantly, a diversified response can be managed, safely (RQ-1). With clear, transparent, and objective criteria, the Seattle Police Department and stakeholders employed this approach to conceptualize and accept the opportunity costs of sending the right resource for the service being requested. Where necessary, this model demonstrated value in aiding decision-makers to optimize the opportunities for a right sized response (RQ-2), systematically addressing risk through a tiered-response model, until residual risks were acceptable. Nearly 50% of call types and approximately 26% of the total service hours expended during the study period could have been handled through a diversified response (RQ-3). In a time when police resources are scarce, such a system may realize efficiencies not possible under the all-hazards/street-level bureaucrat/streetcorner politician model.

The safety implications for systematic management of risk are substantial. The Second Great Awakening has sparked excitement, a flurry of serious discussion, and fresh research examining the viability of alternatives to police. While not all observers are convinced that at least some response diversification is necessary, the aftermath of the murder of George Floyd and the continuing calls to defund or otherwise radically reform American policing suggests otherwise. Although the adoption of a decision-making framework may not satisfy calls for reform and is likely to be viewed,

reductively, as incrementalism or bureaucratic sleight of hand, Risk Managed Demand is an important step forward.

Public safety policy is responsive so called “sentinel events.” Statistical outliers or “edge cases” can stimulate extreme responses. These events are the worst-case scenario; however, the credibility (that they may recur) is less certain. Between the lag in reactive public safety policy and the “catastrophizing” reflex (Hilhorst, 2013), rational decision-making is challenging. Risk Managed Demand establishes a rubric by which events can be assessed, and safety policy formed to address a probable future condition, a credible worst-case scenario. The effect on government is to facilitate the utilitarian focus fundamental to collective efficacy (MacKay, 2018). Rather than fixate on an improbable limiting condition, Risk Managed Demand allows public policy to develop to manage the most risk, minimizing the maximum risk. As a system of thinking, Risk Managed Demand is both responsive to the inevitable failure and supportive of the critical thinking necessary to achieve an ideal future state, safely. Further, the use of an established system affords a level of indemnification critical to political decisions.

Adverse outcomes are inevitable. Even under a well-managed system, death and serious injury associated with a diversified response are a near certainty. These statistical realities do little to satisfy the expectation that a seriously injured person be attended to by a trained medical professional, expeditiously. Yet, the generalist first responders proffered by Friedman (2021) will inevitably become casualties. Without a system to assess, manage and accept these risks, police will continue to aggregate, rather than disaggregate function. For this reason, the development of “safety culture,” like that accompanying implementation of Safety Management Systems in commercial aviation, is essential. Although this exercise implements risk management for the purpose of responder safety, the safety of all involved is affected. Safety, as an outcome, is not exclusive or discriminating any more than aviation safety exists for the exclusive benefit of the crew.

This analysis demonstrates the use of Risk Managed Demand to manage risk in designing a diversified response. Each call type is assessed and managed (mitigated) to an acceptable level of risk. Tactically, Risk Managed Demand serves to configure technology designed to aid in human decision-making. So called “Intelligent Risk Management” has demonstrated viability in a proof-of-concept phase (Atherley, 2024). The “labels” generated by Risk Managed Demand can be used to “train” a machine to discriminate the potential risk of criminal violence in near-real-time. More importantly, when these decisions are called into question, Risk Managed Demand serves to memorialize an organizations established safety policy and sanctioned decision-making guidance. Should a specialist response be deployed under this guidance, the decision is indemnified.

Given what appears as increasingly wild “oscillation between over-policing and under-policing” (Sherman, 2022), an evidence-based approach is essential to equitable, accountable, effective, and safe police service. Injuries and even death will happen. A sustainable diversification of responder resource depends upon a transparent and robust rationalization of the credible worst-case scenario. What will be most important in the final analysis is objective proof it was not the result of negligence, and an agile

framework to assure history does not repeat itself. In other words, a safety management system for public safety, a Risk Managed Demand.

### ORCID iD

Loren T. Atherley  <https://orcid.org/0000-0001-6608-1710>

### Funding

The author received no financial support for the research, authorship, and/or publication of this article.

### Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Data Availability Statement

Full upon request.

### Notes

1. Formal (i.e., governmental) action(s) taken to address or otherwise ameliorate “the demand” for order.
2. Efficiency, in this instance, refers strictly to the use of a generalist (police) for a specialist or non-police service type.
3. When the case worker was killed, the State of Washington issued a moratorium on evictions, as an emergency measure implemented during the COVID-19 pandemic. Additionally, the resident was in a low-income housing facility run by a large property management company specializing in government subsidized housing for disables, include those with behavioral and mental illness.
4. The Seattle Police Department defines “behavioral health crisis” as “an episode of mental and/or emotional distress in a person that is creating significant or repeated disturbances and is considered disruptive by the community, friends, family, or the person themselves.” (SPD, 2020).
5. During the summer of 2020, a majority of the Seattle City Council pledged to support a plan to defund the Seattle Police Department by “at least 50%” (Beekman, 2020), a move later described as “a mistake” (Taylor, 2022).
6. The NICJR analysis utilized the description of the call type alone to characterize the incident as criminal/non, felony, misdemeanor, etc. This assessment was made without the aid or benefit of supporting documentation (e.g., the presence of a police report documenting a criminal offense) to confirm the coding.
7. According to the Washington Post, police “fatal force” occurs between 958 (2016) and 1096 (2022) times a year (The Washington Post, n.d; G. P. Alpert & Dunham, 2004; Garner et al., 2018; Hickman et al., 2008; Sherman & Langworthy, 1979).
8. This figure is a rough estimate, with significant limitations measuring police use of force, especially fatal force, is a notoriously difficult problem to solve (Alpert & Dunham, 2004; Garner et al., 2018; Hickman et al., 2008; Sherman & Langworthy, 1979). The Washington

Post counts individual deaths (approximately 1000 a year), and NENA has estimated individual calls to 911 (240 million per year). It is conceivable more than one person could die on a single call. Additionally, it is common to receive more than one call for an event requiring a police response. However, even at twice the rate ( $n = 2000$ ), .00083%, this calculation highlights the relatively rare occurrence of fatal force under the all-hazards responder model.

9. The Washington Post estimates 80% of those killed by police were armed. It could be argued the failure rate is closer to .000083% (200 over 240 million) or 1 in 1.2 million.
10. [Adams et al. \(2023\)](#) identified an effect in police staffing attributable to the events post-Floyd. Seattle demonstrated the largest effect, with more than 16% additional attrition.
11. Testing of the first emergency phone number began in 1937 in London under the General Post Office. In 1938, the service was expanded to Glasgow. The use of a single emergency number would not be available across the full “exchange” 1976 ([The Communications Museum Trust, n.d.](#)).
12. At the turn of the 20<sup>th</sup> Century, 93% of the American population was served by 911 ([National Emergency Number Association, 2021a](#)).
13. Over the course of this research, the author conducted site visits and attended symposia where the operation of these programs was discussed, including integration with existing systems, and triage.
14. Defined below.
15. Defined below.
16. Defined below.
17. “Risk Control: Steps taken to eliminate (remove) hazards or to mitigate (lessen) their effects by reducing the severity and/or likelihood of risk associated with those hazards” ([FAA, 2010](#), p. 24).
18. “Hazard: Any existing or potential condition that can lead to injury, illness, or death; damage to or loss of a system, equipment, or property; or damage to the environment (environmental issues are not within the scope of the SMS). A hazard is a condition that might cause (is a prerequisite to) an accident or incident” ([FAA, 2010](#), p. 22).
19. “Swim lanes” is a term commonly observed in project management or workflow diagramming and is used to delineate a cross-functional process, as in [Figure 1](#).
20. Tables and figures from both ICAO and FAA guides are used throughout this paper to illustrate the flexible nature of risk management tools.
21. The US Federal Aviation Administration does not explicitly define *credible*; however, Appendix 1 (definitions) of the Advisory Circular establishing best practices for Safety management systems, uses the term twice and immediately follows it both times with the parenthetical “(reasonable or believable)” ([FAA, 2010](#)).
22. A real-world example of this calculus is demonstrated in a case study of Malaysian Airlines Flight 17, which was routed over an active combat zone and was downed by a Russian operated surface to air missile. The tradeoff of fuel and time in the air (e.g., operating costs) over the calculated risk to the airframe resulted in a more direct routing. The downing of a commercial airline by military action were quite possibly unthinkable or what Nate Silver might refer to as *not in sample* ([N. Silver, 2012](#)) and so may not have been contemplated by the risk assessment. Given the media coverage of the loss, it is reasonable to assume it has altered decision-making and will be considered in future risk assessment.
23. Sometimes referred to in the literature as “persons with mental illness”.

24. Death may result but at the rate observed in the history of the organization, it is the “worst-case scenario,” not the credible worst-case scenario.
25. “Residual risk is the risk remaining after mitigation has been completed” (FAA, 2010, p. 11).
26. Informal interviews with staff (sworn and civilian) directly involved in the administration of the Crisis Response Unit (CRU) and risk management competencies, including legal, policy and consent decree compliance personnel over the ten years prior to this study.
27. As indicated previously, this analysis took a conservative approach in developing a framework designed to 1) guide risk management decision-making and 2) evolve to more accurately reflect the nature of risk as non-police responders are fielded and observations of injury and possibly death are observed under an other-than-all-hazards- responder model.
28. Hedging in this context is used in reference to its common application in finance, where a position is taken in offset risk, should the strategy fail.
29. The model was adopted however the response tiers were inverted to mirror call priority, where “1” represents the highest or first priority (reverse coded). Otherwise, the model for risk mitigation is as proposed.
30. The Seattle Police Department differentiates between calls generated by officers (onview) and those originating from a member of the public (dispatch).
31. Police data is often regarded with caution and skepticism but in many cases is appropriate, if not ideal, for questions such as this. A careful consideration of, proper handling (i.e., control) and transparency with these data was critical to the success of this project and its perceived legitimacy.
32. All firefighters in the City of Seattle are also EMT certified.
33. Police data systems include the ability to document injuries to a person listed in a police report. Injury documented by police was not considered in this analysis.
34. See Raters for additional detail.
35. A measure of statistical significance is not included as the form of the line is by design (deterministic) and not a reflection of a probabilistic process. Model fit statistics and the formula are provided to characterize the form of the line.
36. The number of observations of the most severe outcome within that call type divided by the total number of observations of that call type.
37. Providers of SMS services refer to the area between fully acceptable risk and unacceptable risk as an “opportunity space.” The author has professional experience working within these systems. Due to the proprietary nature of systems and materials used to document these systems, no open-source reference is available.
38. Service hours are calculated from police response data as the total time elapsed between dispatching to a call and clearing from it, per officer.
39. 26.8% would represent 100% resource efficiency and is likely not possible. Some allocation of “co-responder assisted police response” (i.e., Tier 2) will require some police capacity to field triage potential threats not communicated by the person requesting service.
40. Advanced Life Support.
41. Basic Life Support.

## References

- Adams, I. T., Mourtgos, S., & Nix, J. (2023). Turnover in large US policing agencies following the George Floyd protests. *Journal of Criminal Justice*, 88, 102105. <https://doi.org/10.21428/cb6ab371.4a588631>
- Alpert, G. P., & Dunham, R. G. (2004). *Understanding police use of force: Officers, suspects, and reciprocity*. Cambridge University Press.
- American Red Cross. (2021). *Guidelines: Highlights 2020*.
- Amos, I., & Eisenberg, R. (2023). Dispatching community responders to 911 calls. <https://www.americanprogress.org/article/dispatching-community-responders-to-911-calls/>
- Atherley, L. T. (2024). Intelligent risk management: Natural language processing real-time triage of police calls for service. *Police Practice and Research: International Journal*, 26(6), 654–672. <https://doi.org/10.1080/15614263.2024.2388210>
- Beekman, D. (2020). *Majority of Seattle council pledges to support police department defunding plan laid out by advocates*. The Seattle Times. <https://www.seattletimes.com/seattle-news/politics/majority-of-seattle-council-pledges-to-support-police-department-defunding-plan-laid-out-by-advocates/>
- Bennett, M. I. J., & Giloth, R. (2007). *Economic development in American cities: the pursuit of an equity agenda* (p. 248). State University of New York Press.
- Bittner, E. (1970). *The functions of the police in modern society*. National Institute of Mental Health, Center for Studies of Crime and Delinquency.
- Black, A. E., & Baldauf McBride, B. (2013). Safety climate in the US federal wildland fire management community: Influences of organisational, environmental, group and individual characteristics. *International Journal of Wildland Fire*, 22(6), 850–861. <https://doi.org/10.1071/WF12154>
- Compton, M. T., Bahora, M., Watson, A. C., & Oliva, J. R. (2008). A comprehensive review of extant research on crisis intervention team (CIT) programs. *The Journal of the American Academy of Psychiatry and the Law*, 36(1), 47–55. <https://www.nami.org>
- Cummins, I. (2023). ‘Defunding the police’: A consideration of the implications for the police role in mental health work. *The Police Journal: Theory, Practice and Principles*, 96(2), 230–244. <https://doi.org/10.1177/0032258X211047795>
- Durkan, J. (2020). *Executive order 2020-10 (reimagining policing and community safety in Seattle)*. City of Seattle.
- Edwards, E. (1985). Human factors in aviation I. *Aerospace Royal Aeronautical Society*, 12(6), 13–17.
- Federal Aviation Administration - FAA. (2010). *Advisory circular (120-92A): Safety management systems for aviation service providers change*.
- Federal Aviation Administration - FAA. (2018). *Out front on airline safety: Two decades of continuous evolution*. <https://www.faa.gov/newsroom/out-front-airline-safety-two-decades-continuous-evolution>
- Federal Aviation Administration - FAA. (2021). *Safety management system: Basis*. <https://www.faa.gov/about/initiatives/sms/explained/basis>
- Federal Bureau of Investigation. (2012). Uniform crime reporting (UCR) program national incident-based reporting system (NIBRS). In *Guide*. U.S. Department of Justice, Federal

- Bureau of Investigation. UCR NIBRS Program. <https://ucr.fbi.gov/nibrs/2012/resources/crimes-against-persons-property-and-society>
- Friedman, B. (2021). Disaggregating the policing function. *University of Pennsylvania Law Review*, 169(4), 925–999.
- Garland, D. (2016). *The welfare state: A very short introduction*. Oxford University Press.
- Garner, J. H., Hickman, M. J., Malega, R. W., & Maxwell, C. D. (2018). Progress toward national estimates of police use of force. *PLoS One*, 13(2), e0192932. <https://doi.org/10.1371/journal.pone.0192932>
- Gillooly, J. W. (2020). “911, this an emergency?”: *How 911 call-takers extract, interpret, and classify caller information [dissertation]*. University of Michigan.
- Gilsinan, J. F. (1989). They is clowning tough: 911 and the social construction of reality. *Criminology*, 27(2), 329–344. <https://doi.org/10.1111/j.1745-9125.1989.tb01035.x>
- Green, S. J. (2020a). *Seattle police: Maintenance worker at a Belltown apartment building was fatally stabbed by evicted tenant*. The Seattle Times. <https://www.seattletimes.com/seattle-news/law-justice/seattle-police-maintenance-worker-at-a-belltown-apartment-building-was-fatally-stabbed-by-evicted-tenant/>
- Green, S. J. (2020b). *Woman charged with murder, assault was being evicted for threatening staff at Belltown apartments, prosecutors say*. The Seattle Times. <https://www.seattletimes.com/seattle-news/law-justice/woman-charged-with-murder-assault-was-being-evicted-for-threatening-staff-at-belltown-apartments-prosecutors-say/>
- Green, S. J. (2020c). *Police arrest resident suspected in fatal stabbing of housing case manager at Belltown facility*. The Seattle Times. <https://www.seattletimes.com/seattle-news/law-justice/woman-found-dead-in-belltown-seattle-police-investigate-her-fatal-stabbing-officials-say/>
- Green, S. J. (2020d). *Man accused in Belltown fatal stabbing believed he was going to be evicted, police and prosecutors say*. The Seattle Times. <https://www.seattletimes.com/seattle-news/law-justice/man-accused-in-belltown-fatal-stabbing-believed-he-was-going-to-be-evicted-police-and-prosecutors-say/>
- Groover, H. (2020). *As Seattle passes 100 days of protest*. The Seattle Times. <https://www.seattletimes.com/seattle-news/seattle-protest-of-police-budget-and-union-turns-chaotic/>
- Hickman, M. J., Piquero, A. R., & Garner, J. H. (2008). Toward a national estimate of police use of nonlethal force. *Criminology & Public Policy*, 7(4), 563–604. <https://doi.org/10.1111/j.1745-9133.2008.00528.x>
- Hilhorst, D. (2013). *Disaster, conflict and society in crisis: Everyday politics of crisis response* (1st ed.). Routledge.
- Horspool, K., Drabble, S. J., & O’Cathain, A. (2016). Implementing street triage: A qualitative study of collaboration between police and mental health services. *BMC Psychiatry*, 16(1), 1–11. <https://doi.org/10.1186/S12888-016-1026-Z/TABLES/3>
- International Civil Aviation Organization - ICAO. (2013). *International civil aviation organization safety management manual (SMM)*. <https://www.icao.int/SAM/Documents/2017-SSP-GUY/Doc-9859-SMM-Third-edition-en.pdf>
- Lum, C., Koper, C. S., Stoltz, M., Goodier, M., Johnson, W., Prince, H., & Wu, X. (2020). Constrained gatekeepers of the criminal justice footprint: A systematic social observation

- study of 9-1-1 calltakers and dispatchers. *Justice Quarterly*, 37(7), 1176–1198. <https://doi.org/10.1080/07418825.2020.1834604>
- Lum, C., Koper, C. S., & Wu, X. (2022). Can we really defund the police? A nine-agency study of police response to calls for service. *Police Quarterly*, 25(3), 255–280. <https://doi.org/10.1177/10986111211035002>
- MacKay, K. (2018). Perspectives utility and justice in public health. *Journal of Public Health*, 40(3), E413–E418. Oxford University Press. <https://doi.org/10.1093/pubmed/fox169>
- McCloskey, D. N., & Ziliak, S. (2010). *The cult of statistical significance: How the standard error costs us jobs, justice, and lives*. University of Michigan Press.
- Mcewen, J. T., Connors, E. F., & Cohen, M. I. (1986). *Evaluation of the differential police response field test: Research report*. Washington, DC: National Institute of Justice.
- Muir, W. K. (1979). *Police: Streetcorner politicians*. University of Chicago Press.
- Müller, R., Wittmer, A., & Drax, C. (2014). Aviation risk and safety management. In *Aviation risk and safety management for Professionals*. Springer. <https://www.springer.com/series/10101>
- National Emergency Number Association. (2021a). *9-1-1 origin & history*. Overview. <https://web.archive.org/web/20180515005550>. <https://www.nena.org/?page=911overviewfacts>
- National Emergency Number Association. (2021b). *9-1-1 statistics*. 9-1-1 statistics. <https://www.nena.org/page/911Statistics>
- National Institute for Criminal Justice Reform - NICJR. (2021). *Seattle calls for service analysis*.
- Neusteter, S. R., Mapolski, M., Khogali, M., & O'toole, M. (2019). *The 911 call processing system: A review of the literature as it relates to policing*. Brooklyn, NY: Vera Institute of Justice.
- Neusteter, S. R., O'toole, M., Khogali, M., Rad, A., Wunschel, F., Scaffidi, S., Sinkewicz, M., Mapolski, M., Degrandis, P., Bodah, D., & Pineda, H. (2020). *Understanding police enforcement: A multicity 911 analysis*. Brooklyn, NY: Vera Institute of Justice.
- Oster, C. V., Strong, J. S., & Zorn, C. K. (2013). Analyzing aviation safety: Problems, challenges, opportunities. *Research in Transportation Economics*, 43(1), 148–164. <https://doi.org/10.1016/j.retrec.2012.12.001>
- Panghal, A., Chhikara, N., Sindhu, N., & Jaglan, S. (2018). Role of food safety management systems in safe food production: A review. *Journal of Food Safety*, 38(4), e12464. <https://doi.org/10.1111/jfs.12464>
- Perezgonzalez, J. D. (2009). ICAO: Human factors, management and organization. *Aviation Knowledge*, 2009, 4–5.
- Perrow, C. (1984). *Normal accidents*. Basic Books.
- Prottas, J. M. (1978). The power of the street-level bureaucrat in public service bureaucracies. *Urban Affairs Quarterly*, 13(3), 285–312. <https://doi.org/10.1177/107808747801300302>
- Quinless, J. M. (2022). *Decolonizing data: Unsettling conversations about social research methods*. University of Toronto Press.
- Ratcliffe, J. H. (2021). Policing and public health calls for service in Philadelphia. *Crime Science*, 10(1), 5. <https://doi.org/10.1186/s40163-021-00141-0>
- Reiss, A. J., Jr. (1971). *The police and the public*. Yale University Press.
- Seattle Police Department - SPD. (2020). *Seattle police department manual 16.110 - Crisis intervention*. Seattle Police Department Manual.

- Sherman, L., W. (2017). Reducing fatal police shootings as system crashes: Research, theory, and practice. *Annual Review of Criminology, 1*, 421–449.
- Sherman, L. W. (2022). Goldilocks and the three “Ts”: Targeting, testing, and tracking for “just right” democratic policing. *CrimRxiv*. <https://doi.org/10.21428/cb6ab371.a54bde35>
- Sherman, L. W., & Langworthy, R. H. (1979). Measuring homicide by police officers. *Journal of Criminal Law & Criminology, 70*, 546. <https://doi.org/10.2307/1142641>
- Silver, A. (1967). The demand for order in civil society: A review of some themes in the history of urban crime, police, and riot. In D. J. Bordua (Ed.), *The police: Six sociological essays*. Wiley. <https://doi.org/10.4324/9781315084824-3>
- Silver, N. (2012). *The signal and the noise: Why so many predictions fail-but some don't*. Penguin.
- Sinclair, J. A., Love, M., & Gutiérrez-Vera, M. (2021). Federalism, defunding the police, and democratic values: A functional accountability framework for analyzing police reform proposals. *Publius: The Journal of Federalism, 51*(3), 484–511. <https://doi.org/10.1093/publius/pjab022>
- Taylor, S. G. (2022). ‘50% was a mistake’: Seattle city council abandoned the idea of defunding police. *The Seattle Times*. <https://www.seattletimes.com/seattle-news/politics/50-was-a-mistake-how-seattle-city-council-abandoned-the-idea-of-defunding-police/>
- Thacher, D. (2022). Shrinking the police footprint. *Criminal Justice Ethics, 41*(1), 62–85. <https://doi.org/10.1080/0731129X.2022.2062546>
- The Communications Museum Trust. (n.d.). *The communications Museum Trust - eMuseum - History of 999 service & police boxes (the tardis)*. <https://www.communicationsmuseum.org.uk/emuseum/emergencycalls/>
- The Washington Post. (n.d.). *Police shootings database 2015-2023*. Washington Post. <https://www.washingtonpost.com/graphics/investigations/police-shootings-database/>
- Travis, A. (2021). Defunding the police: A taxonomy of strategies and their potential for change. (Doctoral dissertation, Texas Christian University Fort Worth, Texas).
- University of Chicago Health Lab. (2022). *Transforming 911: Assessing the landscape and identifying new areas of action and inquiry*. <https://www.transform911.org/resource-hub/transforming-911-report/>
- Vaughn, P. E., Peyton, K., & Huber, G. A. (2022). Mass support for proposals to reshape policing depends on the implications for crime and safety. *Criminology & Public Policy, 21*(1), 125–146. <https://doi.org/10.7910/DVN/98DS4F>
- Weichselbaum, S., & Lewis, N. (2020). More cities move to defund the police. But it’s not a silver bullet. <https://www.themarshallproject.org/2020/06/09/support-for-defunding-the-police-department-is-growing-here-s-why-it-s-not-a-silver-bullet>
- Ylönen, M., & Björkman, K. (2023). Integrated management of safety and security (IMSS) in the nuclear industry – Organizational culture perspective. *Safety Science, 166*, 106236. <https://doi.org/10.1016/j.ssci.2023.106236>

## Author Biography

**Loren T. Atherley**, PhD, serves as Sr. Director of Performance Analytics & Research (PA&R) and the Senior Research Scientist for the Seattle Police Department. The

PA&R group represents the department's commitment to continuous improvement and Evidence-Based Policing (EBP) through original research, evaluation, and operationalization of advanced research methods. Loren leads a national data work group focused on Analytics & Evidence Based Policing and a research network comprised of more than seventy research professionals in institutions around the world. In addition, Loren consults across the criminal justice and data sciences on topics including statistics and research methods, Natural Language Processing (NLP) and Machine Learning (ML), EBP, risk management, police management and behavior. Loren is a NIJ LEADS Scholar and inductee to the George Mason University Evidence-Based Policing Hall of Fame, as well as an Adjunct Professor of Criminal Justice at Seattle University. Loren holds a Master of Arts in Criminal Justice from Seattle University (MACJ), and a PhD in Criminology from the Institute of Criminology at the University of Cambridge.