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Articles for consideration should in the first instance be sent to the editorial team at anzsebp@gmail.com for initial consideration.

They should be no more than 6000 words long (not including references) and be Harvard referenced.
Articles should be based upon the aims and objectives of the journal and the evidence based policing approach.

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Articles on issues of professional interest are sought from Australasian police officers and police academics. Articles are to be electronically provided to the Secretariat, anzsebp@gmail.com. Articles are to conform to normal academic conventions. Where an article has previously been prepared during the course of employment, whether with a police service or otherwise, the contributor will be responsible for obtaining permission from that employer to submit the article for publication to *Police Science*. Contributors are expected to adhere to the Journal's publishing guidelines. These guidelines are available in this journal. All papers are peer-reviewed.

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Superintendent David Cowan,
Victoria Police



R. Mark Evans (OBE)
Vice President, ANZSEBP

Global societies join forces to deliver 24-hour live broadcast to policing agencies around the world!

Welcome to the Winter 2022 edition of Police Science, the journal of the ANZ SEBP.

Firstly, we would like to welcome Dr Garth den Heyer to the ANZ SEBP family. Garth joins the team as Managing Editor of Police Science and will support the team in sharing new evidence created by police and their partners across the region. Garth is currently Professor/Instructor at the School of Criminology and Criminal Justice at Arizona State University. On behalf of the ANZ SEBP we wish Garth well in this role and look forward to a long and productive relationship.

As you will no doubt have seen, the team have been working away on an ambitious plan to collaborate with our colleagues across policing in the UK, Canada and the USA to deliver a 24-hour live broadcast conference.

The conference theme is **"Exceptional Policing the Evidence-Based Way"** and will be broadcast on October 11th (UK/US) / October 12th (Australia / NZ) 2022.

I'm proud to say that the ANZSEBP pioneered the concept of turning our annual, in-person conference into an on-line broadcast in 2021 during COVID restrictions. The outcomes from this conference were so good that we are now teaming up with the UK to host this year's event together and open it up to policing, partners, and academics across the world to make this a truly global event.

Broadcasting will start in New Zealand in the morning of 12th October 2022 at 8am, which will be 8pm on October 11th in the UK, 3pm on the 11th in New York and 12noon in Los Angeles.

The broadcast runs for a continuous 24hrs from then – coming live, fully interactive and to any device you choose to use. Teams on night or day shifts or people on leave, in study or at work can connect and communicate with the speakers and their fellow conference attendees throughout the conference.

Over 40 speakers from throughout the world come together to present their research, results, and practice, including Dr David Weisburd (George Mason University, USA & The Hebrew University of Jerusalem, Israel), Prof Larry Sherman (University of Cambridge, UK), Prof Lorraine Mazerolle (University of Queensland, Australia), Rachel Tuffin (College of Policing, UK), Prof Tom Kirchmaier (London School of Economics, UK), Dr Barak Ariel (University of Cambridge, UK & The Hebrew University of Jerusalem, Israel), Staff Sergeant Natalie Hiltz (Peel Police, Canada) and other distinguished speakers– the preliminary programme is live now at www.globalebbpconference.com.

Key findings that will be shared during this 24-hour broadcast include:

- How EBP is essential in improving our service to victims, presented by Dr Sarah Bennett, University of Queensland (AUS) and Senior Sgt Kirsten Helton, Queensland Police (AUS).
- Understanding trust and confidence – insights from London, Dr Emily Gilbert, MOPAC (UK).
- Lessons police leadership can learn from evidence-based management, Prof Rob Briner, Queen Mary University of London (UK)

This global collaboration will allow us to continue to attract world class international and local speakers along with thousands of delegates across the world. This is a significant opportunity for teams and networks to collaborate, engage and connect with industry peers and experts around the globe.

Police departments and other organisations such as government agencies, universities or the private sector can sign up their entire workforce to attend this online event. Individuals can register at globalebpconference.com/registration. Anyone who books the event will be able to consume all 24 hours of content live and for 6 months afterwards, ensuring they can enjoy the full range of what is offered, and review and re-watch the sessions of particular interest.

If your organisation is interested in a tailored package price, please email mail@conferencedesign.com.au. To sign up as an individual from \$150 AUD: <https://globalebpcconference.com/registration>

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We hope you enjoy this edition of *Police Science*, and we'd like to thank all our contributors for sharing their applied research in this edition.

Our next edition will be released over the summer period between 2022-2023 and will be packed with evidence presented at the global conference.

Yours in policing,

Dave Cowan
President, ANZSEBP

R. Mark Evans (OBE)
Vice President, ANZSEBP



CANADIAN SOCIETY OF EVIDENCE-BASED POLICING

The Canadian Society of Evidence-Based Policing is making significant strides in meeting our 2022 strategic goals of:

- Understanding our membership & their needs
- Building capacity & sustainability
- Increasing our national & global presence
- Establishing Can-SEBP as an incorporated non-profit

First and foremost, Can-SEBP's core team of volunteers has grown to include two additional Research Associates - Dallas Hill (Ontario Tech University) (PhD candidate) and Cst. Kelsey Trott (RCMP, Saskatchewan) (incoming PhD student at the University of Regina). They're actively working on growing our partnerships with Canadian universities focused on crime and policing matters along with formalizing relationships with federal partners. Two additional talented university students have also joined us to help with developing research summaries and infographics.

Second, our Interim Chair, Stan MacLellan and our Director of Operations, John Ng will be presenting at the annual conference for the Canadian Association of Police Governance in September 2022. We recognize the important role of police boards and commissions in the institutionalization of evidence-based practice as they provide oversight for the strategic direction and performance of police organizations in addition to hiring police chiefs.

Third, in May 2022, our Director of Operations John Ng presented to the Saskatchewan Association of Chiefs of Police on evidence-based policing.

Fourth, despite his recent departure due to other commitments, our former Director of Research Deputy Chief Rich Johnston from the Barrie Police Service was recently inducted to the George Mason University's Centre for Evidence-Based Crime Policy's Evidence-Based Policing Hall of Fame. Most recently he presented with his team on their work on harm focused policing during a webinar by Justice Clearinghouse and at the American Society of Evidence-Based Policing conference.

Lastly, while Can-SEBP continues to develop our high-quality professional infographics, we've recently developed a new network of academics - the Scholar's Corner initiative that can be accessed on our website. This space is intended to encourage police practitioners to connect with Canadian policing scholars to create their own research partnerships. Our website highlights the value and contributions of our academics to Canadian policing scholarship.

We would encourage readers to sign up for our free membership on our website <https://www.can-sebp.net/> (including getting access to our infographics & newsletters) and to follow us on Twitter and LinkedIn for our latest updates.

Creating Resilient Policing Agencies and Frontline Responders: Police Recruit Gradual Exposure to Deceased Persons Program

Authors: Amy van Bilsen¹, Ian Franca¹, Kelly Gurn² and Elissa Rogers² ¹ AFP Forensics, Operational Science and Technology, Australian Federal Police (AFP) ² Welfare Officer Network, People and Culture Command, AFP

Foreword: Commander Paula Hudson – Australian Federal Police Forensic Operations

I am pleased to share this article with you on the implementation of an important resilience program in the Australian Federal Police (AFP) designed for our Police and Forensic officers. The program – Police Recruit Gradual Exposure to Deceased Persons - has been led, researched and developed in-house by our Forensics crimes scenes unit, over a number of years as a means to looking after our most important asset; our people.

Acknowledging the type of work our people are exposed to for the vast majority of their working days and hours, be they responding to, investigating, collecting and examining critical forensic evidence from major crimes scenes carries an inherent risk of psychological trauma is crucial to building resilient policing organisations.

Recognising a key component of building organisational resilience begins with our people, the AFP through specific programs such as this, are using unique training methods to build resilience in our frontline responders to ensure they have the right tools to be able to deal with the emotional and traumatic situations that we know they will be exposed to. The program employs proactive and preventative techniques and is designed to inculcate a bottom up culture of acceptance and understanding of the natural vulnerabilities of our members through targeting recruit entry delivery in both police and forensics staff.

It is important that we continue to openly talk about mental health and well-being and in doing so inspire innovation and development in this area. Early intervention and prevention is the key emphasis in the AFP's health and wellbeing strategy and this specific program embodies that narrative.

As a credit to the founding members, the AFP recently presented this program on request in Sweden at the 2022 European Academy of Forensic Science Conference. If you or your agency wish to learn more or are interested in this program, I invite you to contact AFP Forensics co-founder of this program Amy.VanBilsen@afp.gov.au. Amy and her team have a wealth of knowledge and are very passionate about this program, so I am sure they look forward to discussing it with you.

Police Recruit Gradual Exposure to Deceased Persons program

Police officers investigate death and traumatic scenes, as well as engage with members of the community who have experienced loss, damage, injury or the death of a loved one. Age, preparation and life experience results in individual responses to these stressors. Any crime scene is capable of triggering negative emotions or trauma.

Mental health injuries can develop when an individual fails to process the traumatic or grief memory –because of avoidance or their inability to deal with the memory.

Police go from scene to scene, and seldom have time to recognise issues or process grief before they attend the next job. The dynamic nature of police work means that members may not get the opportunity or have the skills to work through emotions. Unsupported exposure contributes to absenteeism, reduced mental health and in extreme circumstances, self-harm. 2019 data from the National Coronial Information System reported that from 2001-2016, almost 60% of intentional self-harm deaths of emergency personnel (Australia and New Zealand) were police.

Prior to 2020, death awareness training existed for Australian Federal Police (AFP) police recruits however the focus of the training was more on administrative requirements of death investigations, rather than psychological preparation. There was little connection

between managing reactions in relation to traumatic jobs and building resilience.

Training did not prepare police for how to deal with the onslaught of emotions that traumatic scenes provided, to recognise vulnerability in themselves or others, or teach them to be comfortable in uncomfortable situations. Often, the police culture of 'getting on with the job' prevented many from seeking help.

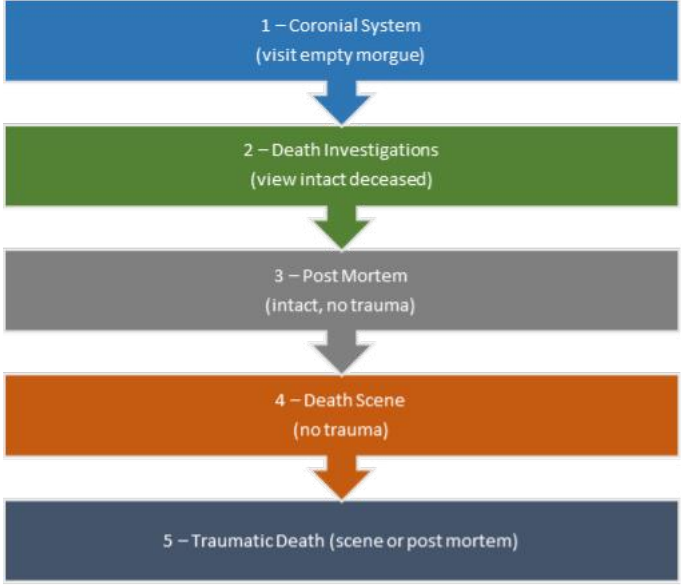
In 2018, the Australian Capital Territory based Crime Scene unit introduced the Gradual Exposure to Deceased Persons program to incoming major crime trainees: teaching new members about grief and loss, stepping through death phases, understanding post mortem indicators and decomposition, being task oriented and focused at crime scenes, creating a culture of normalising not being okay, and seeking help when you need it.

A grief counsellor, SHIELD mental health nurse, social worker and psychologist led each of the following sessions:

- Baseline screening
- Grief, loss and attachment theory
- Mental health awareness
- Culture and PTSD



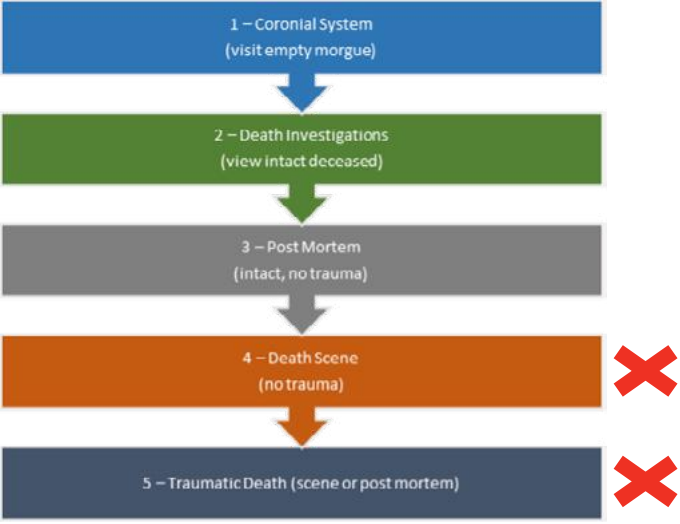
Followed by five phases conducted by AFP SHIELD and Crime Scene staff:



Program outcomes included:

1. Harm Minimisation: early detection mechanism to determine if a member is suitable for a specific role or sensitive to specific scenes.
2. Coping strategies: recognising stress, the knowledge that colleagues feel the same, resilience building, de-stress techniques, understanding mental health triggers, understanding loss and how it manifests in others, and how vicarious trauma effects people.
3. Understanding post mortem changes: understand what you see, knowing what it means and how it affects your investigation. When people understand what they see, they can process it.
4. Crime scene case studies: realistic expectations, sharing of experience, emphasis on task orientation and focus on your role, understanding the role of others, recognising triggers at scenes.
5. Aim for members to have a long, healthy and satisfying career; to maintain a work life balance and to put themselves and their families first.

In 2020, the Australian Capital Territory Crime Scenes gradual exposure model was modified, and a police recruit trial commenced – a shorter version to enable program objectives to be met. The modified program introduces recruits to death scenes, prepares them for trauma and how it may affect them, and assists with creating a culture of asking for help and being comfortable with their own vulnerability. Three phases spread over recruit training schedule, with death scene and traumatic scene attendance were removed.



The modified program also focused on crime scene case studies from a policing perspective, teaching post mortem indicators and change, to assist their investigative process and actions at the scene.

AFP SHIELD (formerly Organisational Health) plays a crucial role in the success of this program and provides members with the understanding that traumatic scenes can and do affect members, regardless of years of experience, whilst highlighting the importance of awareness. Each phase of the program is supported by SHIELD, encouraging and normalising individual reactions and reflections. Experienced police officers share their experiences and exposures to trauma to provide lived experience to members.

The police recruit gradual exposure program is now part of AFP recruit training: preventative, proactive mental health training, akin to defensive skills, to prepare for traumatic scenes. The ability to cope and respond effectively reduces stress on the member, their family and friends, their team and the organisation as a whole.

Acknowledgements

- Sonia Fenwick, Canberra Grief Centre
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- ACT Crime Scene team
- AFP SHIELD team
- AFP College Recruit Training team
- ACT Coroners team
- Forensic Medicine Centre, Canberra

Reference

National Coronial Information System www.ncis.org.au

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Licensed premises lighting: Creating ambience or violence

Authors: Christopher Gregory , Shannon Walding , David Bartlett^{2*}, Janet Ransley²

Objective

This study is the first to objectively quantify the relationship between lighting levels on licensed premises and violence. The overarching goal was to identify whether there is a lighting level which would reduce the likelihood of violence occurring on licensed premises.

We gratefully acknowledge the Queensland Police Service's Drug and Alcohol Coordination Unit and the National Drug Strategy Law Enforcement Funding Committee whose support and financial assistance made this research possible.

Introduction

The Night-Time Economy (NTE) is a substantial contributor to both local and national economies. In the 2016-2017 financial year, Australia's night-time economy contributed \$715 billion in turnover, employing three million people (License & Edwards, 2018). Queensland's NTE has grown at a faster rate than the national average, driven by growth in licensed food establishments, with less reliance on drinking-only establishments than other states and territories.

However, NTEs are frequently characterised by a range of social costs that have been established in the extant literature. These include harms identified as alcohol-related such as drink-driving (including incidents of road crashes, Chikritzh et al, 2007), maxillo-facial injury (Liu et al, 2016), assault (Briscoe & Donnelly, 2003), and homicide (Tomsen & Payne, 2016) or other alcohol-related acute cause of death such as accident (Chikritzh et al, 2007). In addition, harms caused by the gendered violence within NTEs, ranging from unwanted sexual attention through to rape, have been normalised in Western culture (Fileborn, 2012; Graham et al, 2014).

The confluence of night-time socialisation and crime may potentially reduce the economic benefits provided by the NTE through the cost of associated harms, with sector growth and success also affected by increased perceptions of crime victimisation. Samples of both Australians and New Zealanders indicate that the majority perceive alcohol-related violent crime to be a problem in their community (see Tindall et al 2016, and Connor & Caswell 2012). Unsurprisingly then, there is some evidence that people perceive night-time entertainment precincts as generally risky environments (see Miller et al, 2012).

However, that perception varies between patrons, residents in the NTE area and residents of the broader geographic community. McIlwain & Homel (2009), for example, found that local residents were more concerned for their safety than patrons who visited a night-time entertainment precinct. Miller et al. (2012) found that perceptions of safety varied between patrons and broader community residents depending upon the situation (e.g. walking alone or waiting for public transport). The potential economic growth in night-time economies may therefore be constrained by perceptions of crime risk, and in turning willingness to visit those localities. However, within the research the potential magnitude of that economic loss is unclear.

What is clear is that some NTE venues contribute more than others to the crime problem (Graham & Homel, 2008; Madensen & Eck, 2008). The implications of this are twofold. First, characteristics of the venue environment play a significant role in the occurrence of bar violence and crime. Second, campaigns and policies targeting patrons within the NTE can only achieve so much in the prevention of crime; they are generalised campaigns and not specifically targeted to specific higher risk venues (Liu et al, 2016; Homel et al, 1992; Taylor et al, 2019).

That is, within a night time entertainment precinct there are some venues which are the primary generators of crime, the cause of which may be physical characteristics of the venue, characteristics of the patrons attracted to the venue, or the interaction between the two (Madensen & Eck, 2008). Focusing on the physical environment, the extent to which lighting levels inside licensed premises may be a feature of problematic venues is under-examined yet a factor potentially easily addressed through regulation. Similarly, in determining licensing appeals the Victorian Civil and Administrative Tribunal has considered low venue lighting levels to be a contributing factor to the harmful effects of alcohol.

There is considerable literature associating lighting with reduced crime in a wide variety of contexts. Improving lighting is a common situational crime prevention technique most often employed in public places (see Pease, 1999 for a discussion). In line with evidence linking improved lighting to reductions in crime, for example Farrington and Welsh's (2002) meta-analysis, improved lighting has been utilised outside of licensed premises with the goal of preventing violence and aggression (e.g. in the Operation Link: Be Safe Late intervention in Ballarat, cited in Palk et al, 2010).

Miller, Holder and Voas (2009) suggest that increasing lighting levels outside of such venues can be utilised as an intervention strategy against drug use and associated problems. However, there is a paucity of research evidence of the efficacy of lighting in that context. The little research which has been conducted, such as that by Townsley and Grimshaw (2013), typically examines observational measures of lighting levels outside of licensed premises.

When it comes to the internal characteristics of licensed premises, research has identified a range of situational factors, including lighting, being associated with increased intoxication and violence (for example, Green & Plant, 2007; Livingston, 2008; Donnelly et al, 2014; Homel et al 2004; Hughes et al, 2012; Hughes et al, 2013). In their synthesis of observational studies undertaken within licensed premises, Graham and Homel (2008) identified three where a low level of lighting was associated with aggression (in Sydney, North Queensland, and Buffalo), while a non-significant relationship was found in Vancouver and Hoboken.

Hughes et al (2012) undertook observational studies across four European countries, aiming to identify the situational characteristics associated with patron intoxication (rather than aggression or violence). They found that all features of the physical environment of the night-time venue that were measured including lighting were individually significantly related to intoxication levels at the venue.

While these and other studies mention low lighting as a factor in both intoxication and aggression, few studies actually measure light levels, and where they do it is by subjective assessment. For example, Hughes et al (2013) had observers rate lighting on a scale of 0 (bright/can clearly see) to 9 (very dark/can hardly see). Overall, the research would tend to indicate that appropriate lighting is likely to reduce incidents of intoxication and violence within licensed premises. However, the veracity of that finding is limited by the subjective measurement of lighting levels.

While brighter lighting may reduce problems within licensed premises, it may be overly simplistic to suggest that the brightest lit premises will have less violence. Through a collaboration between the National Centre for Education and Training on Addiction, Queensland Police, and South Australia Police, Doherty and Roche (2003) examined best practices to reduce alcohol-related harms in and around licensed premises. From the international literature they identified that lighting should be balanced so that bright light does not act as an irritant to patrons, and low light does not encourage offending.

This is in line with Pease's (1999) assessment that lighting research should focus on context-specific, targeted applications in order to identify how and in which circumstances lighting could prevent crime. While Doherty and Roche (2003) noted the benefits of good lighting inside licensed premises – including facilitating surveillance and deterring loitering – measures of 'good' and 'poor' lighting were not specified.

The absence of research evidence on what constitutes 'good' or sufficient lighting for reducing antisocial behaviour has led to Australian and New Zealand regulators and others providing opaque guidance on the issue of lighting in licensed premises. For example, the Victorian Department of Justice produced two editions of their 'Design Guidelines for Licensed Venues' (2009; 2017), emphasising how dark spaces could "facilitate antisocial behaviour and increase feelings of intoxication" (2017, p.23) as well as reduce passive surveillance.

The Department also noted that lighting "should be appropriate for the time of night and intended use of the space" (2017, p.23) without specifying what those levels should be. The Alcohol Advisory Council of New Zealand's 'Guidelines for CPTED Crime Prevention through Environmental Design for Licensed Premises' (2015) cites research linking poor or dim lighting to aggression and recommends avoiding extremes of lighting to avoid both irritation and inability of staff to monitor customers. Their CPTED checklist includes that "internal lighting is suitable" and "no areas are too dark inside the premises" (p.33), but does not specify levels.

In Queensland, the Department of Justice and Attorney-General has developed a suite of documents including a legislative compliance checklist for liquor licensees (2021), information on providing for patron and staff safety (2020), a downloadable safety audit model (2012a), and a guide outlining risk management practices and procedures (2012b). While all documents reference lighting levels and focus licensees' attention on whether lighting in their premises is adequate for patron safety, effectively monitoring and engaging with patrons, and discouraging criminal behaviour, the documents stop short of identifying specific lighting lux levels required to achieve those outcomes. However, general guidance may be found through reference to general workplace regulatory requirements on lighting.

Across Australia and New Zealand guidance on minimum lighting levels for interiors and workplaces is provided in Standard AS/NZS 1680.1:2006: Interior and Workplace Lighting. While compliance with the Standard is not a regulatory requirement for licensees, workplace health and safety regulators may be guided by it in enforcing legislative requirements within their jurisdiction. In Queensland for example, the Work Health and Safety Regulation 2011 (s.40) requires that:

“A person conducting a business or undertaking at a workplace must ensure, so far as is reasonably practicable, the following—

(d) lighting enables—

(i) each worker to carry out work without risk to health and safety; and

(ii) persons to move within the workplace without risk to health and safety; and

(iii) safe evacuation in an emergency;”

The Standard does not specifically recommend lighting lux levels for licensed premises. However, minimum lux levels for workplace areas similar to those commonly found in licensed premises (such as corridors, walkways and spaces where occasional reading occurs) range from 40 lux to 160 lux. While the functionality of these lighting levels to night-time economy venues would need to be assessed, the Standard demonstrates the possibility of specifying safe, measurable levels of lighting for licensed premises.

The ability to move from subjective assessments and recommendations for 'suitable' licensed premises lighting levels, to a more objective measure relevant to the licensed premises context, provides promise for increasing patron safety in night-time entertainment precincts.

The Current Study

The current study is the first to examine the relationship between objectively measured lighting levels in licensed premises and violence. The research sought to address two primary research questions:

1. Do lighting levels in Queensland licensed premises predict violence and crime in the premises?
2. Is there an optimal range of lighting levels that could decrease the likelihood of violence and crime in licensed premises?

In addressing these questions, the goal was two-fold. First, to ascertain whether the relationship between licensed premises lighting levels and crime continues to be supported when lighting is objectively measured.

Continued>>

Second, to provide licensees and regulators with information on whether there is a specific lighting level that would serve to reduce violence in licensed premises as much as possible. This in turn would assist in the development of regulatory standards and ultimately safer night-time entertainment precincts.

The research consisted of two studies outlined below. All calculations were performed using Stata v.13.1.

Study 1

This study was a cross-sectional exploratory study utilising a purposive sample of licensed premises from across Queensland. The study involved obtaining objectively measured lighting levels from licensed premises using a commercially available digital lux meter, and examining the relationship between those levels and police recorded violent crime incidents occurring on the premises.

Sample

The sample consisted of 60 licensed premises from across Queensland. A purposive sampling strategy was employed, with three groups of licensed premises being included in the sample.

First, the Top 20 high risk licensed premises in the State for the period 2016/2017 were included. Risk level was ascertained using the BiPortal information system which draws upon information collected by both the Queensland Police Service and Office of Liquor and Gaming Regulation (OLGR). Risk levels are ascribed by accounting for the total incidents occurring on a premises, total violent incidents occurring on a premises, and total non-violent incidents which occur in each area of the licensed premises.

Second, 22 matched comparison premises were included. Comparison premises were identified by local police and OLGR members with the same locality as a Top 20 high risk premises. Premises were matched on similarity of venue size, patrons and trading hours, and importantly a subjective judgement of a higher level of in premises lighting.

Finally, 18 randomly selected supplementary premises were added to the sample to overcome sampling limitations and improve generalisability of findings. Premises in this set were hotels or nightclubs in either Brisbane City or Fortitude Valley.

In order to be included in the sample, premises had to meet four eligibility criteria:

- Held a commercial hotel or nightclub liquor licence issued by the Queensland Office of Liquor and Gaming Regulation;
- Principal activity of the premises was not accommodation or dining;
- Venue comprised one site rather than multiple sites;
- The premises was currently trading.

Of the 60 venues sampled, 32 were in Brisbane, with the remaining 28 spread across Gold Coast, Toowoomba, Ipswich, Bundaberg, Mackay, Rockhampton, Townsville, and Cairns. Eighty-seven percent of the sample held a Commercial Hotel licence, as opposed to a nightclub license. Venues varied in terms of their configuration, size, and capacity. Each venue had between three and 13 distinct bars and common areas (sub-sites). The maximum number of patrons ever at the premises ranged from 150 to 2,400 people, with between zero and 20 security officers on duty. However, on the Friday and Saturday nights when the premises were visited for taking light readings, estimated patron numbers ranged from 60 to 1,500 people.

Method

The first author visited each premises once on a Friday or Saturday night between 3 November 2017 and 14 January 2018 during the hours of 8.30pm to 3.00am. Light levels were taken at each premises using the same digital lux meter. To ensure instrument accuracy, readings were compared to those taken by accompanying local Workplace Health and Safety Queensland inspectors using their official lux meters.

Light levels were taken at multiple points in every sub-site within each venue. Readings in bar areas captured minimum and maximum lighting levels at a standard distance of 500mm from each bar across its length. The goal was to capture lighting levels in the area where the first and second person being served should be illuminated, as this represents the most common area where bar staff in busy venues have the opportunity to monitor patron intoxication prior to service. Minimum and maximum lighting levels in all other common areas were obtained based on the observed brightest and darkest zone within that area.

In order to judge the overall level of lighting within each venue, the median or middle value of lux readings across the venue was calculated. The median lighting level was utilised in the analysis as some venues had one very well-lit area (almost always a standalone dining area), which caused the average value of lighting to be artificially inflated. This effect was stronger in venues with smaller numbers of sub-sites as opposed to those with more sub-sites.

The dependent variable of violent crime was measured by the officially recorded violent offences occurring in each licensed premises. The Queensland Police Service extracted from its QPRIME system offence reports associated with each licensed premises that occurred between 1 July 2016 and 30 June 2017 between the hours of 10pm and 5am. These hours were selected as they encompass both peak NTE trading times and the period during which most offending occurs in NTEs; peak counts of alcohol related crime occur late at night or early in the morning (see for example Briscoe & Donnelly, 2003; Chikritzhs, Stockwell & Masters, 1997).

To measure violence at venues, we counted all reported offences that met the following criteria: (1) classified an offence against the person, (2) was not a public nuisance offence which contained an element of violence, and (3) had a victim other than a police officer. We excluded offences such as ‘Assault Police (PPRA)’ and ‘Public nuisance – Violent’ as the context of those offences is qualitatively different. Removing ‘Assault Police (PPRA)’ offences also served to adjust for policing activities which may disproportionately see police visit some premises more than others, and in turn increase the likelihood of assaults upon police.

Violent crime was then measured as the sum of the following offences occurring at the premises during the 2016/17 year:

- Assault occasioning bodily harm
- Assault with intent to commit rape
- Assault, Common
- Assault, minor (not elsewhere classified)
- Grievous Bodily Harm
- Indecent assaults on adults
- Rape
- Rape - Attempted
- Sexual Assault (Other)
- Wounding
- Robbery, armed and unarmed (in company).

The number of violent offences and maximum number of patrons ever on site were utilised to calculate the rate of violent incidents per 500 patrons. As the number of incidents occurring in any specific venue is likely to depend upon the size of the venue, the rate per 500 adjusts for variation in venue size. The maximum number of patrons ever at the premises is a more valid measure of patronage than the official venue occupancy capacity as some venues may never reach capacity. Additionally, using the maximum number of patrons on site is logical because most incidents take place on Friday and Saturday nights (78% of police reports; see also Briscoe & Donnelly, 2003), when most venues are at peak trading.

Prior to analyses data were screened for normality and outliers. Because the relationship between incidents and lighting was not a straight line, the log transformation of the median lux was used. Two venues, both in the same city, were extreme outliers for violence for the time period sampled. Due to the presence of these outliers a robust regression using the user-written Stata program MMREGRESS was used to estimate the relationship (Verardi & Croux, 2009). This method has high resistance to outliers and retains high efficiency for estimators (Verardi & Croux, 2007). It is designed to give less weight in the estimation to the outlying cases.

Predicted levels of violent offences at given levels of median lux while controlling for the ratio of security personnel to the maximum number of patrons were calculated using Stata's MARGINS command, and visualised through the use of an extension to that command called MARGINSCONTPLOT (Royston, 2017). The control variable was included because it clearly improved the fit of the model, suggesting that something about the number of security personnel present at each venue is important to the outcome of violence.

Key Findings

The median lighting level at each premises ranged from a minimum of 1 lux to a maximum of 53 lux, with an average of 11.61 lux (SD=12.79).

Excluding the two outlying venues, the average rate of violent incidents per 500 patrons was 4.81 (SD=4.54), ranging from 0 to 16.67. With the two outlier premises included, the average rose to 6.06 incidents (SD=8.16) and ranged up to 44.44.

Figure 1 depicts the predicted level of violent offences per 500 patrons at each possible median lux level at the venue, surrounded by the 95% confidence level for the prediction. The figure clearly depicts that as lighting increases, violent incidents decrease, and are

predicted to reach almost zero at a median lux level of 34 lux. The 95% confidence interval predicts that violence levels could reach zero with a lux level of 25.

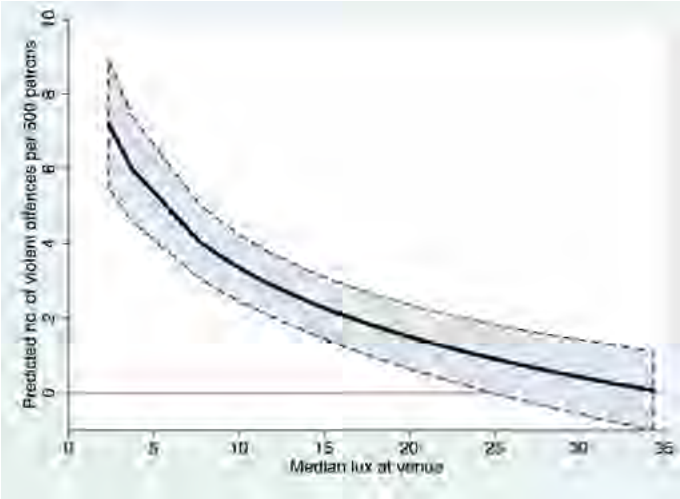


Figure 1. Predicted level of violent offences per 500 patrons by lux

Analyses were undertaken to ascertain how well the prediction modelled above fits each premises. Three premises, including the two outliers, were not well predicted by the model. However, they have not been weighted heavily when making predictions.

Study 2

To assess the reliability and generalisability of the Study 1 findings, a second study was undertaken with a random sample of licensed premises. Noting that many of the licensed premises included in Study 1 were within designated Safe Night Precincts (SNP) , a secondary goal of the research was to control for location within a SNP. This may have important implications for the findings as research has established a relationship between clusters of violence and clusters of alcohol outlets (see for example Grubestic & Pridemore, 2011; Kumar & Waylor, 2003). Additionally, venues in SNPs may be subject to different operating conditions by legislation or due to their membership of a local liquor accord. Controlling for location within a SNP therefore controls for those different operating conditions.

Sample

A cross-sectional random stratified sample of 90 licensed premises across Queensland was utilised. The sample consisted of hotels and nightclubs which were randomly selected from across nine locations across the State: Gold Coast, Toowoomba, Sunshine Coast, Bundaberg, Mackay, Rockhampton, Townsville, and Cairns. Premises qualified for the sampling frame if they met the eligibility criteria adopted in Stage 1; this resulted in some premises being sampled in both Study 1 and Study 2.

Continued>>

Method

Similar to Study 1, each premises was visited by the first author between 2 November 2018 and 5 May 2019, with light readings taken between 8.00pm and 1.45am. The lux meter and procedure for taking readings was identical to Study 1.

For Stage 2, QPRIME data were provided for recorded offences which occurred between 1 July 2017 to 30 June 2018, again during the period between 10pm and 5am. The offences included within the violent crime measure were the same as those for Study 1.

The increased breadth (and representativeness of the population of licensed premises in Queensland) of the sample in Stage 2 meant that a measure of whether a premises had any violent incidents at all became key to analysis of results. An independent measures t-test with effect size calculated using R squared was used to determine differences in the median lux level of venues that had recorded violent incidents compared with those that did not. In addition, the relationship between the median lux level of a venue and whether or not a venue recorded any violent incidents was modelled using logistic regression (because the dependent variable takes one of two values) with heteroscedasticity-robust standard errors and control variables for the maximum number of patrons ever attending the venue and the location of the venue in an SNP area. The intention was to predict whether a venue recorded a violent incident or not using the median lux level.

The relationship between the number of violent incidents and the median lux of a venue was also modelled using a Cragg hurdle model, which involves first determining the influence of lighting on whether there was any violence (using the same methodology described earlier), and then modelling the influence of lighting on how many violent incidents there were. This is an appropriate choice of model when different processes are theorised to be responsible for the zero/one outcome (whether or not a venue records a violent incident within the time frame) and the count outcome (how many violent incidents are recorded during the time frame) (Cameron & Trivedi, 2013; Pohlmeier & Ulrich, 1995). The hurdle model is used to predict the number of violent incidents per venue using the median lux level, again accounting for the two control variables, and most importantly, to improve the specification of the model given the nature of the dependent variable.

All models were selected according to Akaike's information criterion and the Bayesian information criterion for goodness of fit (Long & Freese, 2014).

Key Findings

Premises recorded a minimum level of the median lighting level of 1 lux, and a maximum of 36.5 lux. The average median lux in the sample was 15.33 (SD=7.65).

The average number of violent incidents per venue was 1.51 (SD=2.90), with a minimum of zero and a maximum of 16 incidents. The majority (61%) of premises had no recorded violent incidents. Due to this, we generated two outcome measures for violence levels

at a venue: (1) a dichotomous variable indicating whether a venue had any violent incidents at all, and (2) a count variable of the number of violent incidents per venue.

Because the outcome variable in Stage 2 was more appropriately modelled as a count than the rate used in Stage 1, but the connection between size of venue and number of violent incidents remained, a control variable measuring the maximum number of patrons ever on site at the venue was included (M=311.89, SD=177.7). The model also controlled for whether a venue was in a Safe Night precinct to account for venue clustering and operating differences (73% of venues sampled were in an SNP).

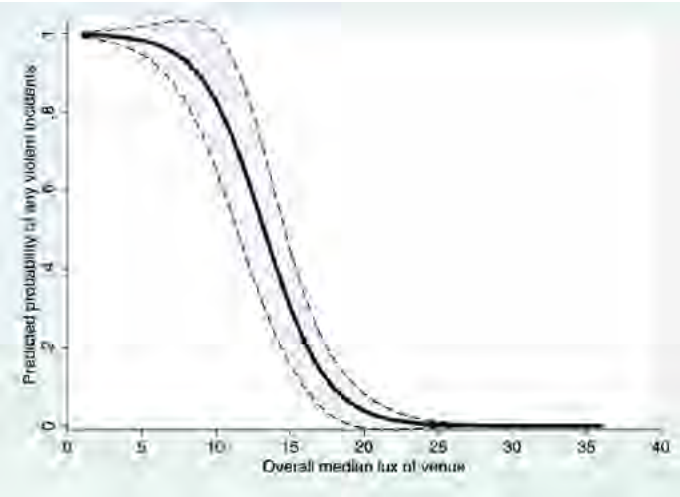
The average median lux both with and without any observed violence is depicted in Table 1. The results of an independent measures t-test and computation of the effect size indicate that the difference between means is both large and statistically significant, and the co-variation in the median lux level of a venue and the presence of any violent incidents is striking at 54%.

	Average median lux level with	Average median lux level without	Difference (p-value)	Effect size
Violence	8.33	19.78	11.45 (p<.001)	54%

Table 1. Average lighting levels in venues which recorded at least one violent incident compared with venues with zero violent incidents.

The relationship between the median lux of a venue and the predicted probability of recording any violence while controlling for maximum number of patrons and SNP area is depicted in Figure 2 using the user-written Stata command MARGINSPLOTT (Royston, 2017), with the predicted probability surrounded by the 95% confidence level for the prediction. The median lux of a venue ranges from a minimum of 1 to a maximum of 36.5 in the sample. As such, we have modelled relationships with the median lux between 1 and 36, so as not to exceed the parameters of the real world in our sample.

Figure 2. Predicted probability of recording any violent incidents per median lux level of the venue, controlling for maximum number of patrons and placement in a SNP area



The overall probability of violence in a venue under this model was 0.39. On average, an increase in the median lux of a venue by 5 lux was related to a decrease in the probability of violence in that venue by 0.17 (while holding the maximum number of patrons and SNP location constant). However, the relationship should not be interpreted on average. While the median lux level in venues in our sample is under 10 lux, the probability of violence in that venue is almost equal to 1. That is, there is almost 100% chance that a violent incident will be recorded on that premises.

When the median lux level increases to above 20 lux, the probability of a violent incident drops to almost zero, and remains there for all venues with median lighting above 20 lux. The number of patrons and situation in an SNP area appear to contribute little to whether a venue records a violent incident or not.

The Cragg hurdle model is used to improve the specification of the model. The first step in the hurdle model repeats the analysis already described. What the hurdle model adds is the prediction of how many violent incidents are expected at each level of lighting. In addition, this model indicates that while the number of patrons and SNP location did not appear to affect whether a venue recorded a violent incident in combination with lighting levels, both influenced how many violent incidents were recorded per venue, supporting our theory that different processes determine these phenomena.

The model predicts that an increase in around 300 patrons at the maximum in a venue corresponds to around 1 extra violent incident over a year, holding lighting and SNP situation constant. Venues not in SNP areas are predicted to record less than one violent incident per year (0.87 incidents, 95% CI [0.51, 1.24]), while those in SNP areas are predicted to record over 1.5 incidents (1.57 incidents, 95% CI [1.23, 1.90]).

Regarding the variable of most interest, the lighting level of the premises, the hurdle model predicts a possibility of zero incidents at around 16 lux at the median, and a prediction of zero incidents at 20 lux and above (Figure 3). In addition, the model predicts that once the median lighting of a premises falls below 20 lux, violent incidents are possible; and with every further fall of 10 lux, there will be two additional violent incidents recorded at that premises.

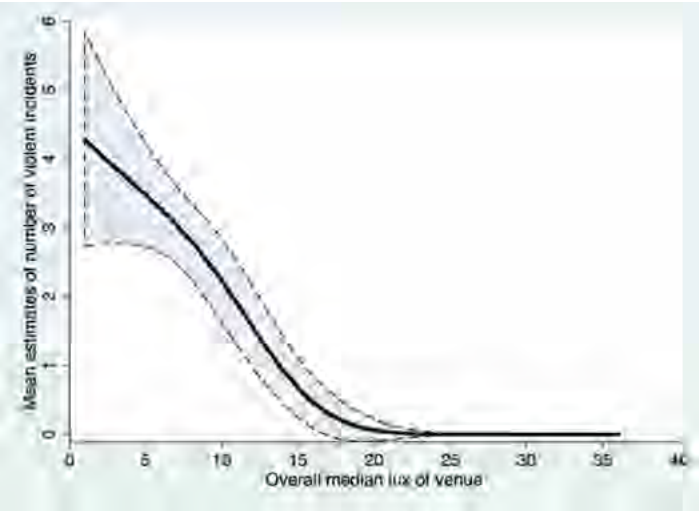
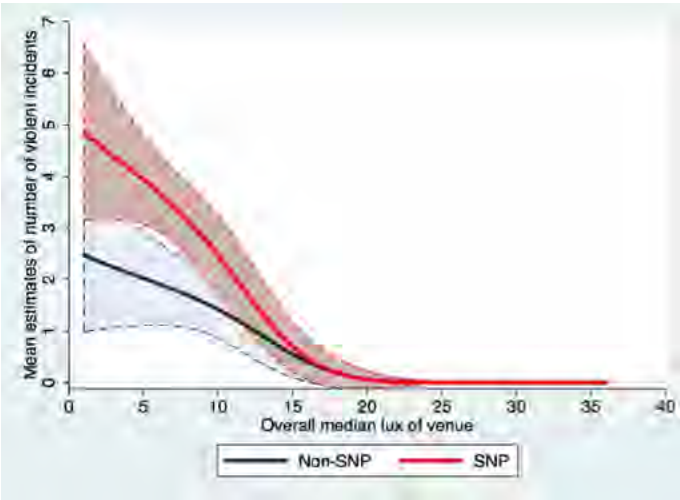


Figure 3. Predicted count of violent incidents per median lux level of the venue, controlling for maximum number of patrons and placement in a SNP area.

Given the significant contribution of situation within a SNP to the model, comparisons were undertaken between SNP and non-SNP venues (Figure 4). Consistent with previous research, venues within a SNP area had greater levels of violence than non-SNP venues. However, the median lux level at which the number of violent incidents would probably reduce to zero is the same as non-SNP venues. Therefore, increasing lighting levels across licensed venues would be likely to see greater reductions in violence in SNP areas than non-SNP areas.

Figure 4. Predicted count of violent incidents per median lux level of the venue per situation in a Safe Night Precinct, controlling for maximum number of patrons.



Key insights

In summary, the results of this research objectively confirm the relationship between lighting and violence in licensed venues. Importantly, the findings quantitatively indicate the potential for violence to be significantly reduced if in-premises lighting levels are specific lux levels.

This research also draws attention to the presence of existing regulatory tools and resources that can be leveraged to increase lighting in Australian licensed premises and in turn reduce violence. Standard AS/NZS 1680.1:2006: Interior and Workplace Lighting, coupled with State and Territory legislative requirements for maintaining a safe work environment, provide fertile ground for exploring how increases in lighting levels could be achieved without the need for creating new regulatory obligations. However, given the findings of this study, there may be scope to create within the Standard a safe minimum lux level to be applied to late night licensed premises.

The findings of this research are clear on what that lux level should be as it relates to creating an environment with a reduced likelihood of violence. The ability to use those regulatory tools is contingent upon the ability and willingness of workplace health and safety regulators to become more involved in regulating licensed premises. However, as this research shows, the principles that police use for accessing the regulatory levers available to other agencies can also be applied to garner support from workplace health and safety regulators.

Continued>>

It is important to remember that lighting is likely one of a constellation of environmental and situational factors that render some licensed premises more susceptible to violence. Previous research has identified a range of licensed premises characteristics that are linked to, and likely interact, to produce violent environments. Similar to previous studies on lighting, research on those factors often lacks objective, quantitative measurement. Having established through this research the ability to objectively and quantitatively measure the relationship between lighting and violence, the challenge for future research is to quantitatively identify the cluster of licensed premises characteristics that are associated with violence.

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Autism training for Australian police: A pilot study of the effectiveness of an online module to improve police officer autism awareness

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Abstract

The purpose of this pilot study was to examine the initial effectiveness of an online module aimed at educating police officers about autism. The module was created using participatory research with both the autistic community and policing professionals. In total, 404 officers completed the module as a part of an effort to train and educate officers in an Australian state-based police agency. Measures of knowledge and self-efficacy were used at three different time points to understand the module's effectiveness, and results showed a statistically significant increase in knowledge as well as high levels of self-efficacy for working with autistic community members following completion of the module. Results of this study can be used as a basis for further funding as well as more rigorous research to understand the ongoing effectiveness of this module, or other similar training platforms.

Introduction

Autism spectrum disorder is a lifelong neurodevelopmental condition, which affects the way individuals process the world; autistic individuals show differences in their social communication, social interactions, sensory sensitivities, along with restricted and repetitive interests and behaviours (American Psychiatric Association, 2013). The communication and social challenges experienced by autistic individuals can lead to challenging interactions and high risk situations with first responders (Cooper et al., 2022; Gibbs & Haas, 2020; Railey et al., 2020). Misunderstandings are common as police misinterpret autistic behaviour and autistic individuals equally misinterpret police behaviour.

For example, police may view common autistic behaviour such as avoidance of eye contact or delayed response to police questioning as suspicious. Likewise, autistic individuals may fail to understand the social cues in an exchange with a police officer, increasing the risk for that individual and the likelihood that escalation can occur (Salerno-Ferraro & Schuller, 2020). Further challenges can result from high stress situations where law enforcement professionals interact with community members, as autistic individuals may find emergency situations more challenging than others due to the increased sensory overload and unpredictability.

Gibbs and colleagues (2021) interviewed a sample of autistic community members in Australia including autistic individuals and parents and carers to investigate perceptions of procedural justice during police encounters. Procedural justice is a construct that captures perceptions of police legitimacy and seeks to understand community perceptions of police (Tyler & Lind, 1992). The authors found that autistic adults were sensitive to what they perceived as abrasive or abrupt police behaviour, which could be due to challenges interpreting police behaviour, instructions, or actions.

Research in this area has steadily been increasing and when examining the most recent findings, it is clear that mistrust and misunderstanding exists between police and individuals with autism and the need for education and awareness is high (Cooper et al., 2022; Gibbs & Haas, 2020; Railey et al., 2020).

Research findings drawn from the perspective of police officers and autistic individuals and their families have established the importance of police training about autism (Copenhaver & Tewksbury, 2018; Copenhaver et al., 2020; Railey et al., 2020). In response to this growing concern from the Autistic community (e.g., Salerno-Ferraro & Schuller, 2020) along with news stories highlighting the serious consequences that can occur following interactions between autistic people and police (Treisman, 2020; Waller, 2021) and a desire from police departments to ensure their officers have autism-specific training (Railey et al., 2020) many police departments in the United States have taken a proactive approach to ensure officers are knowledgeable, including in some jurisdictions mandating autism training. In Australia, autism-specific training has only recently begun to be incorporated into professional development programmes for police.

Initial attempts at designing and evaluating training modules for police have provided some evidence of positive effects including improved knowledge of autism, improved attitudes and awareness about autism, and better self-confidence in responding to calls (Gardner & Campbell, 2020; Love et al., 2020; Teagardin et al., 2012). However, this research is in its infancy and is largely based on face-to-face training. The COVID-19 pandemic and increased training load for police officers has resulted in a rapid shift to online delivery, despite a lack of research evidence to support online training. In addition, all previous investigations have been limited by their pre-post design and future work is needed that demonstrates sustained effects of training and long-term impacts, supported by an experimental design.

In addition to evaluating the effectiveness of training for police, considerations about the way in which training, particularly for minority or disadvantaged communities is developed, has begun to garner attention. The expectation that training includes people with lived experience has become a critical design component to ensure validity and alignment with community intentions (Hollin & Pearce, 2019; Jivraj et al., 2014; Pellicano & den Houting, 2021). To the best of our knowledge, most of the established autism training programmes for police in the United States have been developed and delivered largely by content experts (e.g. researchers, clinicians) or law enforcement personnel who are also parents of autistic people (Debbaudt, 2002; Gardner & Campbell, 2020; Teagardin et al., 2012).

Continued>>



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Donations to **headspace** National Office, ensures the promotion of the importance of seeking help, to break down stigma associated with mental health issues and to make sure every young person across Australia, as well as their friends and family, knows there is help available.

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SEEKING HELP

Getting support can help a young person to keep on track at school, study or work, as well as personal and family relationships. The sooner help is received, the sooner things can begin to improve.

headspace can help any young person aged 12-25 years-old, a family member or friend wanting to seek information on youth mental health.

These are just some of the reasons someone may seek help from headspace:

- If someone is feeling down, stressed or constantly worrying
- If someone doesn't feel like themselves anymore
- If someone isn't coping with school/uni/work or finding it difficult to concentrate
- If someone is feeling sick or worried about their health on alcohol or other drug use
- If someone has questions about, or wants to cut down identity or relationships
- If someone wants to talk about sexuality, gender
- If someone is having difficulties with family or friends
- If someone is concerned about sexual health or wants information about contraception
- If someone is being bullied, hurt or harassed
- If someone is worried about work or study or having money trouble

DID YOU KNOW?

One in four young people have experienced a mental health issue in the past 12 months – a higher prevalence than all other age groups. Alarmingly, suicide is the leading cause of death of young people, accounting for one third of all deaths.

Adolescence and early adulthood is a critical time in a person's life, with 75 per cent of mental health disorders emerging before the age of 25.

Present Study

Previous educational programmes have been designed for police officers to educate them about autism, but the methods and materials, as well as the research, has varied substantially and few have included input from autistic community members. COVID-19 has led to an increased use of online modules that can effectively train first responders across a range of curriculum areas. Online education also offers a potential solution to the challenge of delivering mandatory training to a large police force, and ensures the information can be standardized.

In response to a request for professional development from an Australian police department, we designed a module to train current police officers about autism. We employed a community based participatory research (CBPR) approach which aims to equitably involve community partners in the full research process to create knowledge user-research collaborations throughout the research cycle (Minkler & Wallerstein, 2003). We engaged the users of the module (police officers) and those with whom the module is ultimately meant to benefit (autistic community members) into the design.

This paper outlines the development and initial evaluation of an online training module for police officers about autism within an Australian policing context. We evaluated the initial effectiveness of the module which was introduced to one police jurisdiction in Australia in early 2021. Initial effectiveness was measured by police officer’s knowledge of autism, self-efficacy and confidence for working with autistic individuals, and satisfaction with the module. Two primary research questions guided the study: (a) Does completing an online autism module improve police officers’ knowledge and confidence in dealing with incidents involving autistic individuals? and (b)What level of satisfaction do officers report after completing an online module about autism?

Method

Training Module

The module used in this study, the “Autism Training for Australian Police,” was created in partnership with stakeholders including Autistic advocates, police officers, and researchers through a series of workgroups and expert review opportunities (see Figure 1). To create the module, a member of the research team completed a trip to the United States to meet with providers of three well-established autism training for police programs in Boston (Autism Law Enforcement Coalition) , Maine (Autism Safety Education and Training) and Philadelphia (A.J. Drexel Autism Institute). Opportunity was taken to review each program’s content and observe training.

Scientific literature, including grey literature was also reviewed. Then, a working group was created where stakeholders, including autistic advocates, police officers, and academic researchers engaged in criminal justice training research, came together to design the learning outcomes, review content, and create the module. A finalized storyboard was shared with an Autistic Development Group consisting of six autistic adults who had prior experiences with police to gather additional input. Alongside this process, research was conducted to better understand the experiences of autistic individuals and families and caregivers when interacting with law enforcement in the Australian context (Gibbs & Haas, 2020; Haas & Gibbs, 2020;

Gibbs et al., 2021). In total, these steps aimed to gather evidence for validity and provide confidence that the module was going to reflect stakeholder perspectives. The final module was 30-minutes in duration and included direct teaching, video clips, and scenarios (see Table 1).

This module was unique in the attempt to not only provide knowledge and education about autism for police officers, but also to expose the officers to a range of autistic community members. The module included perspectives from six autistic individuals with diverse characteristics, who guided police through strategies that could support autistic individuals with whom they may interact during their work. The module aimed to use the voices of these autistic individuals to help educate and increase exposure for police officers who may not have had an interaction previously with someone with autism.

Table 1: Components of the “Autism Training for Australian Police” module

Component	Duration	Description
Direct teaching	5 mins	Description of autism and examples of how autism may affect interactions with police
Video clips	15 mins	Autistic people describing interactions with police; police officer describing the importance of education about autism for officers
Interactive Components	5 mins	Two scenarios followed by interactive Q and A

Procedures

To evaluate the training module’s effectiveness, we administered a series of questionnaires at three data collection time points: a pre-test immediately before the module, an immediate post-test following the module, and finally a post-training follow-up survey to police officers who participated in the module (see Figure 1). The pre and post tests were embedded in the online learning platform of the police department and presented to officers immediately before and after completion of the module between February and November 2020. Demographic information was also collected (age, years as a police officer) along with information about their prior experience of autism (any personal connection to autism; any encounters with an autistic person in their role as a police officer).

Demographic information was limited due to police confidentiality and restrictions on the police interface where the module was being hosted. All questions were optional, and participants gave informed consent to participate in the research study prior to commencing. The follow-up survey (Phase 3) was housed on the Qualtrics platform (www.qualtrics.com). An email was sent to all officers (n = 629) 6 to 12 months after completion of the module which included a participant information and consent form and a link to the follow up survey. Data from the follow up survey was not able to be linked to the pre and post data to protect confidentiality of officers. Ethical approval was obtained from the University of New South Wales (HC200860).



Figure 1. Data collection timepoints.

Participants

In total, 404 police officers completed the module and agreed to have their data included in this study. The pre and post evaluation was a standard evaluation that was designed by the police department; therefore, demographic information was limited. When examining the size of the department and the officers that were offered the module, this represents a 59% participation rate from those actively serving. The average age of officers was 39.6 years (SD = 10.59; range 20 – 66) and the average number of years of policing was 10.84 years (SD = 9.83; range = less than 12 months to 41 years). The majority of officers reported that they knew someone with autism in their personal life (e.g., a family member, friend, child, or family friend) (68.0%) and that they had had encountered an autistic person in their professional role as a police officer (65.3%). Of these 404 police officers, 385 participants (95.3%) answered the post-test questions, and 70 (17.3%) answered the follow-up questions.

Measures

Autism knowledge. To measure autism knowledge, a scale was developed based on the information included in the module (see Table 2). The autism knowledge scale included 18 items that were assessed at pre, post and follow up. Participants answered “true,” “false,” or “I don’t know” and an example of an item was, “Sensory stimuli like noises and lights may adversely affect people on the autism spectrum.”

Perceived confidence. To assess officer’s perceived confidence in interacting with autistic individuals in a professional capacity, participants answered 3 items using a 4-point Likert-type response scale ranging from “strongly agree” to “strongly disagree.” An example of one of the items was, “As a result of completing this module, I now feel more confident in my capacity as a police officer to communicate effectively with a person on the autism spectrum.”

Satisfaction. Police officers answered open-response questions about their satisfaction with the module and also indicated with a dichotomous response (“yes” or “no”) whether they required further training or support in relation to autism before and after the module.

Police officer self-efficacy. Police officer self-efficacy is a construct that helps to examine police confidence, or perceptions of their own abilities to support individuals on the autism spectrum. In the follow up survey only, the Police Self-efficacy for Autism (PSEA; Love et al., 2020) instrument was used to measure police officer self-efficacy for supporting individuals with autism. The measure has 14 items and participants responded using a five-point Likert-type response format ranging from 1 (not at all confident) to 4 (very confident). The stem for each item was “When working as a police officer,” and an example item was “I can identify some signs of autism when I observe them.” Previous psychometric evaluation (Love et al., 2020) reported internal consistency for the scale, $\omega = 0.89$ bootstrap corrected [BC] 95% CI [0.86, 0.91].

Table 2: Knowledge Questionnaire

- | | |
|---------|---|
| Item 1 | How common is autism? |
| Item 2 | Autism only affects children |
| Item 3 | Most people on the autism spectrum never learn to speak |
| Item 4 | People on the autism spectrum may engage in repetitive body movements such as hand flapping and rocking back and forth |
| Item 5 | People on the autism spectrum people can't tell the difference between truth and lies |
| Item 6 | Almost all autistic people have poor eye contact |
| Item 7 | When interacting with a person on the autism spectrum, it is best to keep the mood light by making a few jokes |
| Item 8 | When responding to a call involving a person on the autism spectrum, use lights and sirens where possible to indicate your presence |
| Item 9 | When asking a person on the autism spectrum a question, if you don't get an answer immediately, keep repeating the question until you do |
| Item 10 | When a person on the autism spectrum is screaming or yelling, use restraint as a first line intervention to gain control |
| Item 11 | When interacting with a person on the autism spectrum, use direct speech, avoid using sarcasm or figures of speech (e.g. are you for real?) |
| Item 12 | To aid communication with a person on the autism spectrum, use a loud, firm voice |
| Item 13 | When trying to communicate with a person on the autism spectrum, consider using alternative communication methods such as photos, text, drawings or digital devices |
| Item 14 | People on the autism spectrum have difficulties in social situations |
| Item 15 | Sensory stimuli like noises and lights may adversely affect people on the autism spectrum |
| Item 16 | People on the spectrum may have difficulty understanding jokes, sarcasm and figures of speech |
| Item 17 | Changes in routine or environment may be stressful for a person on the autism spectrum |
| Item 18 | When stressed, some people on the autism spectrum may go silent and find it very difficult to respond to questions |

Note. Respondents replied with “I don’t Know,” “Yes,” or “No.”

Results

Results indicated a statistically significant increase in autism knowledge for the 385 officers who answered both pre and post questions when comparing knowledge scores from the pre-test (M = 13.99, SD = 2.83) and post-test (M = 15.28, SD = 1.67); $t(384) = 9.891$, $p < .001$. The mean pre-test score of 13.99 reflected a mean score of 14 items out of a total 18 items. The post test score was a mean score of 15.28 out of 18 items. Officers reported increased knowledge (90.2%), increased confidence to de-escalate a situation involving someone with autism (93.9%), increased confidence to communicate with autistic individuals (91.0%), and confidence to use the information in the module in future encounters with autistic people (92.7%) as a result of completing the module.

Additionally, police officers reported moderate levels of police officer self-efficacy for working with individuals on the autism spectrum 6 to 12 months after completing the module (M = 24, SD = 5.51; Range = 13-38).

The second research question related to the level of satisfaction that police officers had with the module. Following the module, 80.7% of the officers reported they had no further training needs following the module. Officers were asked an open-response question about further training needs, and 95 participants responded. From these responses, two primary themes were identified i.e. a need for ongoing training and a desire for face-to-face exposure. Responses that fit into the need for ongoing training included participants who were satisfied with the module but felt refresher courses and ongoing training was critical. For example, one officer said, “Police always need further training in all manner of dealing with the public. Unfortunately, due to time and resourcing it always seems to be a one-off training program, then nothing.” The second theme related to the importance of receiving additional on-the-job training, or the need for more “face-to-face interactions and advice directly from caregivers.”

At the Phase 3 follow-up data collection (n = 70), 73% of officers reported that they had no further training needs in relation to autism. An open-response question was again included to further address officer satisfaction and ask for additional module feedback. However, not enough responses were included to analyse.

Discussion

In response to proactive requests for autism education and professional development by an Australian police department, a module was created that delivered online education for community police officers. This research measured initial effectiveness of the module, and the results demonstrated the feasibility and promise of the training, as well as the satisfaction by officers who participated in the training. Based on the increase in knowledge and positive perceptions of the module, future research is warranted into measuring and improving the ongoing and real-life impact of the module.

One interesting finding of this research was that officers in our study reported high knowledge scores before the training, and although there was an increase after the module, it was small due to this initially high score. This is a finding that is consistent with Crane et al., (2016) who also noted the high knowledge scores for the participants in their study as well as Gardner and Campbell (2020) who found officers reported high pre-training knowledge. Having replicated these findings, it is clear that while police officers may be able to perform well on a knowledge exam or questionnaire, this may or may not be translating to practice. This is supported by findings in prior research that has highlighted the problematic interactions of autistic individuals who also call for more police training in autism (Crane et al., 2016; Gibbs & Haas, 2020). Therefore, it will be critical for future research to move beyond knowledge to measure the impact of training about autism. Advice should be sought from the autistic and law enforcement communities for ways in which researchers can measure possible changes in behaviour or communication during real world interactions subsequent to training. Partnerships with police departments will be critical for future studies to effectively undertake impact measurement.

Self-efficacy scores were reported as moderate by officers who had completed the module, (M = 24, SD = 5.51; Range = 13-38), which means that officers reported some confidence to work with individuals with autism but also reported some ongoing challenges. Self-efficacy is a construct that relies on Bandura's (1986) social cognitive theory. The theory and large research body around self-efficacy names four sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological responses (Bandura, 1997). In trying to increase an individual's self-efficacy in future studies, each of these four sources need to be addressed. Designing a future study that collects baseline self-efficacy scores would also lead to more understanding of the direct effects of training on officer self-efficacy which was not able to be established in the present research.

The results of this study were shared with the police department that requested the module, with recommendations for ways to better measure the impact and see additional improvements in autism knowledge and awareness amongst police officers. The module has also been extended to other Australian police departments. It is recommended that this module be used with a clear ongoing training and refresher course agenda in order to maximize the impact. Finally, these findings were shared as initial evidence of the success of the module, and a more rigorous evaluation to gather information on police officer behaviour changes following completion of the module is recommended. If future work continues to demonstrate high knowledge scores but increased problematic interactions between autistic people and police, it may be necessary to determine what else, in addition to addressing factual knowledge about autism, can be used to shift culture, attitudes, and behaviour of the police and autistic individuals.

Limitations

This study was limited due to the nature of the data and limited demographics of participants, which restricted our ability to compare the results of this study and generalize the findings. It is unknown how representative the participants in this study were compared to Australian and other international samples. Additionally, the knowledge questionnaire was not standardized or psychometrically tested, as it was created for this study and based on the content contained in the training module. Without linked, rigorous, longitudinal data that includes behavioural measures and tools that gauge the impact on police interactions with autistic people, it is difficult to state the true impact of the training module. However, this study does show that police officers do gain knowledge from an online module, find these modules acceptable and useful, and believe that they meet their training needs. More rigorous further study is needed to understand the true impact of online learning modules of this kind. Further research is also needed to understand the nature of any additional initiatives which can improve interactions between police and the autistic community beyond online or in person training.

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Abstract

We are interested in identifying patterns of behaviours, and ways to optimise policing efforts, by exploring the strategies and decisions made by police officers in Perth, Western Australia. In the current economic climate, many police agencies have reduced resources, especially personnel, with a consequential increase in workload and deterioration in public safety. There is a need for tools to assist with optimising police patrolling.

We present a novel method for representing police officer agreement and reliability in their understanding of where crime takes place and therefore where priorities are to police. Agreement is the degree to which officers have the same responses to a particular task. Reliability is the degree to which a response is the correct one. Both measures can be presented as a social network, with agreement presented as links between nodes (officers), and the grayscale shade mapped over a node representing the reliability (or correctedness) of the officers' assumptions. The method is used for hotspot policing of street level crime but can be simply repurposed for different crime types.

Keywords

Geospatial, SNA, GPS, Policing, Behaviour

1.Introduction

In the current economic climate, many police agencies have reduced resources, especially personnel, with a consequential increase in workload and deterioration in public safety (see den Heyer, 2017). Designing efficient and effective patrolling strategies can be framed in terms of performance attributes such as workload, response time, etc. A balanced definition of the patrol sector is desirable as it results in crime reduction and in better service. (Camacho-collados, et. al., 2015). Especially in places with shrinking or stagnant funding for policing, and in light of the widely-reported difficulties in recruiting new police officers in the wake of the pandemic, there is a need to optimise police patrolling and make best use of scarce human resources (Camacho-collados & Liberatore, 2015). We are interested in identifying patterns of behaviours, and ways to optimise policing efforts, by exploring the policing strategies and decisions made by police officers.

Geographic Information Systems are routinely used by police forces and crime locations can be envisaged as clusters in spatial or spatiotemporal data, so-called hot spots. There now exists a compelling and ever growing body of literature which supports hot spots policing as an effective strategy for preventing crimes and citizen calls for service (Braga, et. al., 2014; Williams & Coupe, 2017; Simpson & Hipp, 2017; Hutt, et. al., 2018; Oatley, et. al., 2019).

Several studies have investigated the differences in officer patrolling

strategies, and how they interact with crime locations. Officers seem to have different perceptions of hot spots, formed as a result of their experience in policing an area compared with those identified thorough geospatial analysis. For instance there is evidence that officers often focus on short term crime problem places, identified over the course of a few months or even hours (see Weisburd & Braga, 2019).

In a study conducted in Belfast, Northern Ireland (Macbeth & Ariel, 2019b) researchers concluded that data analysis was as good as, if not better than, professional judgement in predicting where hot spots occur (Kahneman, 2012), and as a result where patrol effort should be focused.

This paper looks at a policing area which, at the time, it did not routinely map or provide information to officers on micro hot spots of crime, as defined by Sherman et al., (2014) as a place where officers can see the public and the public can see the police. This provided a unique opportunity to examine officer perceptions, using their professional judgement, of hot spots in Perth and compare these with data derived or empirical hot spots, and to explore their movement in this space.

In an applied criminology context, recent meta-analyses and randomised control trials have demonstrated the benefits of targeting police patrols at hot spots or concentrations of street level crime and disorder. This study asked a group of 79 police officers from Perth to make a prediction, based on their experience, of where hot spots of crime would occur in the near future. Officer defined hot spots were then compared with data derived hot spots based on crime data from the preceding 24 month period. Finally, officer patrol time was tracked using a Global Position System (GPS) enabled smart phone and overlaid against both types of hot spot. Analysis reveals officers patrol both their own and data derived hot spots regularly, however, they only stay for a matter of a few short minutes in these locations. These short stays are contrary to best evidence, which dictates officer patrols in hot spots should last for approximately 15 minutes (Koper, 1995) in order to create both initial and residual deterrence.

2. Literature

This section provides a brief review of selected studies spanning over two decades that compare officer perception of crime locations versus empirical or data derived knowledge of crime locations.

Paper	Crime	Data/ notes	Method/algorithm
(Rengert & Pelfrey, 1998)	Violent crime	Empirical vs. perception of safety (police recruits). Environmental cognition/ cognitive psychology	Correlation (Spearman for rank ordered lists)
Ratcliffe & McCullagh (2001)	Range of crime types in Nottingham UK High volume crime -vehicle crime, residential burglary, non-residential burglary	Hotspot analysis within a GIS. Also uses focus group Number of crimes used to generate the hotspots, number of hotspots generated from the recorded crime data, number of police hotspot estimates from the survey, the percentage of the police area that consisted of a hotspot area, the number of police estimates that were within a hotspot area expressed as a number and as a percentage.	Household burglary correlated well, other crimes (including vehicle crime) the correlation was weaker
(Craglia, Haining, & Signoretta, 2005) (Haining & Law, 2007)	Serious crime in Sheffield, England drug related offences, violent offences against the person (murder, robbery, aggravated bodily harm)	Census output areas. 'high intensity areas' (HIAs) as defined by Home Office (1997). <u>police-defined</u> versus empirical HIAs	Map overlay operations and correlation measures. Correspondence between predictions from the national model and police-define HIA's Counting how many <u>match</u> (correlation). <u>Spatial regression</u>
(McLaughlin, Johnson, Bowers, Birks, & Pease, 2007)	Residential burglary short term and <u>long term</u> hotspots	Point locations smoothed by Kernel Density Estimation, both for actual and police defined locations.	Turned into hot and cold cells, chi-square statistic to evaluate
(Hibdon, 2011)	All crime types (calls to response systems)		Descriptive diagnostics, t-tests, zero-inflated count regression analysis and ordinal logistic regression
(Macbeth, 2015) (Macbeth & Ariel, 2019a)	Violence against the person, domestic burglary, vehicle crime, criminal damage, anti-social behaviour “We conclude that preventative policing ought to be based on statistical forecasting, rather than on professional judgment.”	Waymarker street segments which are identified as hotspots by <u>officers</u> vs street segments identified using data analysis	Crime counts, also the concentration of harm “The vast majority (>97%) of street segments which were included in 'Waymarkers' were not identified as hotspots or harmspots resulting in wasted police resource. In addition, over 60% of street segments which were identified using data analysis were excluded from 'Waymarkers' which represents missed opportunities to prevent crime and harm”

(Wu & Lum, 2017).	For each crime call received at a street block, police initiated 0.7 proactive activities and spent approximately 28 min carrying out proactive works. Conclusions: This study develops a way of measuring proactive activity by patrol officers using calls for service data.	Points	Andresen’s Spatial Point Pattern Test to compare the spatial similarity between police proactivity and crime, as well as regression modeling to explore the relationship between proactivity and crime and the time spent on proactivity and crime
(Ilijazi, Milic, Milidragovic, & Popovic, 2019)	Residential burglary in Belgrade, Serbia	54 police officers Point locations of buildings for perceived and actual crime positions.	Percentage matching. Interesting visualisation showing several officers perceptions on one image, which is very effective because they are placed within the boundaries of the actual building locations.
(Marco, Gracia, López-Quílez, & Lila, 2021).	Street-level and intimate-partner violence, in Valencia, Spain	Census-block groups	Bayesian joint model was run to analyze the spatial overlap. In addition, two Bayesian hierarchical models controlled for different neighborhood characteristics to analyze the relative risks. Results showed that 66.5% of the total between-area variation in risk of reporting street-level crime was captured by a shared spatial component, while for reporting IPVAW the shared component was 91.1%. The log relative risks showed a correlation of 0.53, with 73.6% of the census-block groups having either low or high values in both outcomes, and 26.4% of the areas with mismatched risks. Maps of the shared component and the relative risks are shown to detect spatial differences
This study	Street level crime	Empirical – Getis ord gi* Perceived – vector polygons (Shapefiles)	Polygon overlap/intersection to calculate Jaccard similarity measure. Visualised by network diagram.

Table 1. Sample literature comparing empirical versus police-defined crimes

Of the literature summarised in Table 1, there are many different ways to represent perceived and actual crime locations, however all studies report measures of similarity between these two measures, with variations in crime types and time durations. Of particular relevance to the novel visualisation technique presented in this paper is that of (Ilijazi, et. al., 2019). Shown in Figure 1, this visualisation technique combines several pieces of information in one informative representation. The ‘index measure’ refers to a measurement of geographic area used in that study, with the additional values of: number of actual crimes (C), number of police perceptions (P) and number of police officers who placed their perceptions in that location (PO).

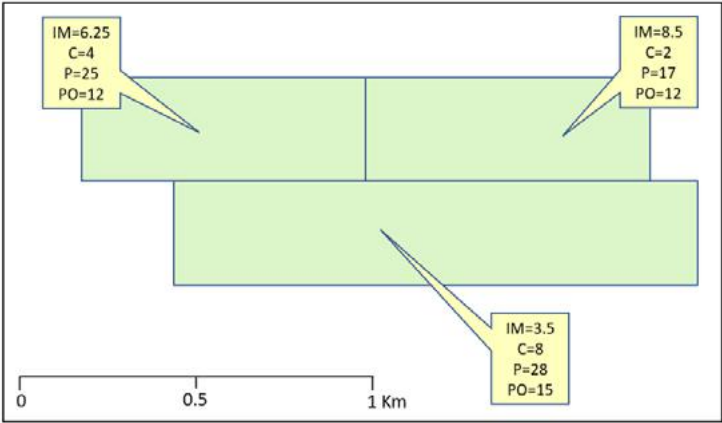


Figure 1. Locations with Index Measure > 3. Where: IM – Index Measure, C - the number of crimes inside the atom, P - the number of police perceptions inside the atom, PO - the number of police officers who placed their perceptions inside the atom. Adapted after (Ilijazi, et. al., 2019).

3. Data and experimental design

Between July 2015 and May 2018 the central police district in Perth recorded approximately 100,000 crimes defined as street level crimes (SLC), characterised as high volume, visible or public actions that might reasonably be deterred by overt police patrols. All offences generated by police activity (‘detected’ offences such as drug possession, breaches of legal orders, and offences against police officers) were classified as non-street level offences.

Hot spots were derived from the crime data using a range of techniques, including Kernel Density Estimation (using an 8 km x 6 km area divided into 75 x 75 metre grid squares), Spatial and Temporal Analysis of Crime (STAC) ellipses (Bates, 1987), and the Getis Ord Gi* algorithm (Craglia, Haining, & Wiles, 2000) - implemented in ArcGIS). This analysis was used to identify both hot areas and hot spots where crime has concentrated during this time in Perth city centre. These can be considered the empirical or data derived hotspots and hot areas.

Seventy-nine officers were provided with two A1 maps of Perth city centre (Australia) to draw on and were tasked with indicating where they thought significant volumes of crime occurred.

Firstly, they were asked to consider public generated crimes and calls for service, which we defined as street level crime (SLC - acquisitive crimes such as; burglary, robbery, theft, theft from and of motor vehicles, damage, disorder, arson, etc.) and, without any parameters or instruction asked to draw freehand where these crimes occurred. These areas tended to be large and were later defined as “hot areas”.

Secondly, officers were given a definition of a micro hot spot (an area ‘that can be seen completely and simultaneously, at least on its surface, by one’s naked eye’ or an area whose boundaries are ‘easily visible from an epicentre’ (Sherman et al, 1989; 1995) and provided a small circular template representing 100 metre in diameter. Officers were asked to draw where, in their experience, SLC really concentrated. There was no upper or lower limit to the number of hot areas or hot spots officers could draw.

Figure 2 illustrates the steps taken to digitise and georeference the officers’ maps, as follows:

2.1. Maps were scanned and the resultant images were then imported into the Geographic Information System (GIS). Georeferencing was achieved by using several features on an underlying vector map of Perth were used to manoeuvre the now semi-transparent image file into the correct orientation.

2.2. The drawn hotspots on the image file were reproduced in a vector later.

2.3. The image file was now discarded as the officer hotspots were now “digitised” in the GIS, resulting in vector polygon files (ESRI shapefiles).

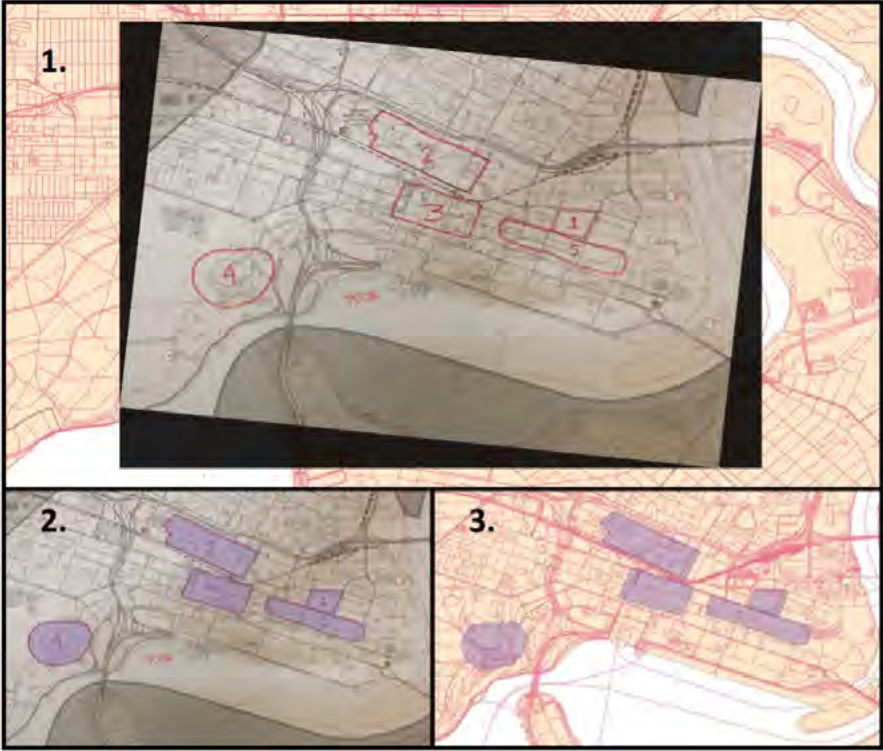


Figure 2. The stages in georeferencing officer hand-drawn maps. 1. Scanned images are imported into a GIS and a transparent version is overlaid on a vector map of Perth and shifted until four chosen points are correctly oriented. 2. Officer hotspots/areas are sketched using GIS tools. 3. Final result is a vector version of the officers’ hotspots/areas.

These polygon versions of the officer hot areas and hot spots could now be used for this research aim in two important ways, namely:

- (i) determine the intersection of an officer’s derived hot areas/spots with those of all other officers; and,
- (ii) determine the intersection of an officer’s derived hot areas/spots with empirical data.

The Jaccard coefficient (Equation 1) is used to determine concordance between officer’s definitions of hotspots/areas (i) and with empirical data (ii).

$$J(A, B) = |A \cap B| / |A \cup B|$$
(Eq. 1)

This coefficient is equal to the intersection between the two sets of polygons divided by the union between the two sets of polygons, as shown diagrammatically in Figure 3. Because sets of polygons are being intersected with sets of polygons, the final algorithm necessitated the use of the POSTGIS functions ST_Area, ST_Intersection, ST_Union, ST_Contains, and ST_Overlaps.

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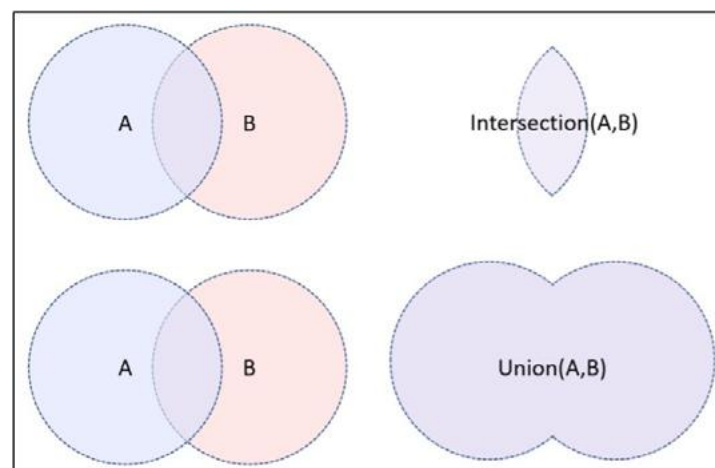


Figure 3. Intersection and Union between two sets.
Implemented in PostGIS database using functions *ST_Intersection*, *ST_Union*.

4. Results and Discussion

Using ArcGIS's implementation of Getis Ord G_i^* statistic, data derived hotspots were created, as shown in Figure 4.

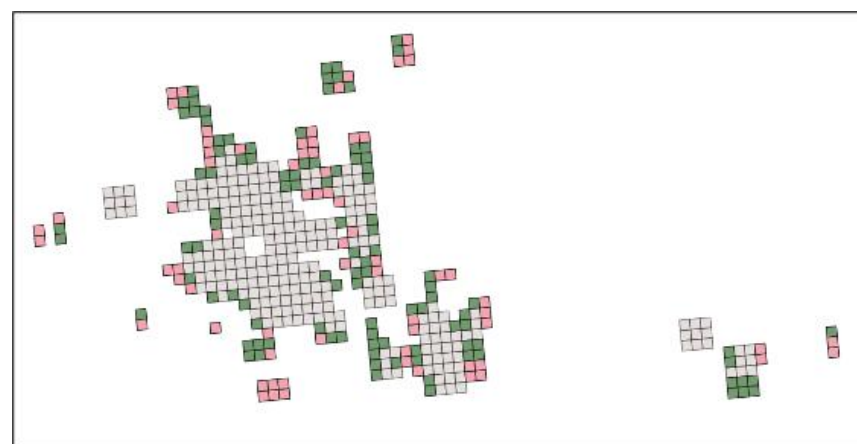


Figure 4. Getis Ord G_i^* statistic. Grey squares indicate 99% confidence, Green squares indicate 95% confidence, Pink squares indicate 90% confidence.

The degree of intersection of the data derived hotspots with officers' maps can be seen in Figure 5, with 5a. showing an example of hot areas (any size or shape), and 5b. showing an example of hotspots (100 metre diameter circles). Figure 6 shows two different officer's perceptions (hot areas) intersecting with each other and overlaid on the empirical data.

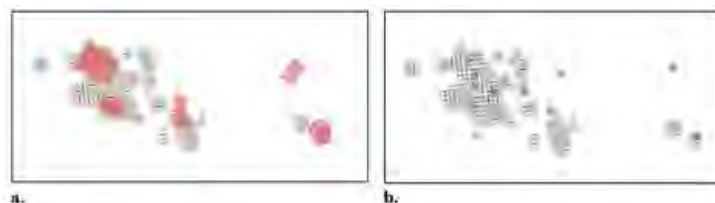


Figure 5. Example intersections of officer perceptions with empirical data. a. Hot areas intersecting data derived hotspots, b. Hot spots intersecting data derived hotspots.



Figure 6. Two sets of officer derived hot areas (pink and yellow) overlaid on empirical hotspots (grey squares).

4.1 Agreement/disagreement between officers

Analysis of digitised and overlaid officer hand drawn hot areas revealed some variance in agreement between officers in where crime concentrated. More than two-thirds of officers had a 30-40% agreement rate in identification of hot areas. There were only five officers with an agreement rate more than 39% and three officers with an agreement rate of less than 15%. Although this might seem surprising, each officer has developed his or her own perception of areas in central Perth, based on a range of different incidents they have attended. Put simply, it might be we remember the pain

(Kahneman, 2011) of those incidents and recall these with relative ease – even if these have not occurred in a place that has been a persistent issue over a longer period of time. Figure 7 provides an interesting visualisation of this agreement/disagreement between officers.

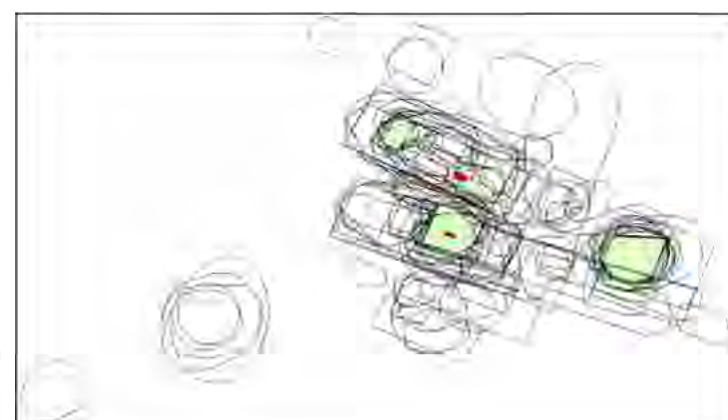


Figure 7. Intersection between overlapping officer drawn maps. The green areas indicate where a significant number, but not all, officers agreed. The red areas indicate where most, but not all, officers agreed.

4.2 Network visualisation of Agreement and Reliability

Two measures were calculated, (i) agreement - the intersection of an officer's derived hot areas/spots with those of all other officers, as illustrated in the previous section; and, (ii) reliability - the intersection of an officer's derived hot areas/spots with empirical data. Figure 8 shows both of these measures in a single network diagram, where the nodes represent individual officers. The only links included are those where the Jaccard similarity measure is greater than 0.2, to avoid cluttering the diagram with the many links less than this value.

(i) Agreement. If there is a link between two officers, it is because the hot areas of these officers intersect to some degree – this degree (presented as the Jaccard coefficient) is added to the link as a label. For instance, the right most officer #21 is connected to officer #60 by virtue of a 0.22 or 22% intersection between their respective hot areas. The absence of a link means that there is less than 0.2 agreement, in many cases no overlap whatsoever, between two officers. This means officer #21 has less than 0.2 overlap with any other officers. Therefore it is clear that there are more than a dozen officers who only have slightly more than 0.2 overlap with only one or two other people, i.e. officer #58 (top of the diagram), #15, #32, #51, and #45 all have only one single other officer with whom they have an overlap greater than 0.2. The densely connected cluster in the centre of the network is precisely the same cluster of agreement as shown in Figure 7.

(ii) Reliability. The colour of the nodes indicate how well each officer matches the Getis Ord G_i^* statistic at 99% confidence. Black is the best match, with white indicating zero match. It is important to note that this is a scaled representation, to aid visualisation, and so a completely black node does not indicate a perfect match of an officer's perceptions with the empirical data, it simply indicates the best match amongst the data visualised, with all other officers scaled accordingly. Likewise the whiter a node is represents the smallest reliability, with pure white representing zero match with the Getis Ord G_i^* statistic at 99% confidence.

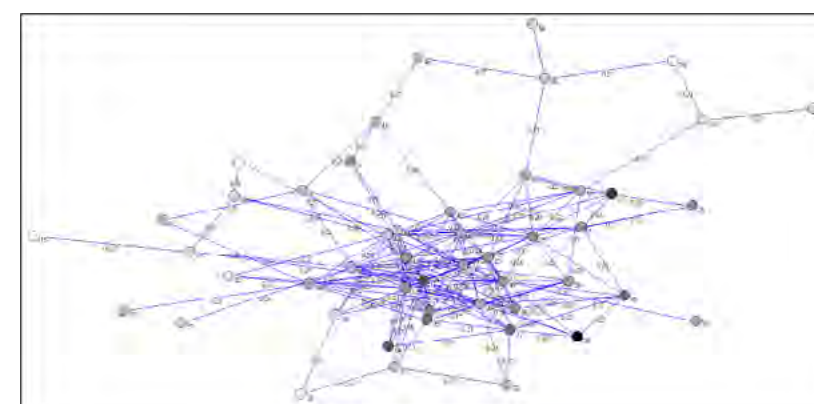


Figure 8. Officer agreement and reliability. Jaccard similarity between officers presented as link weights. Most similarity between officers is quite low, around 0.2 (20%).

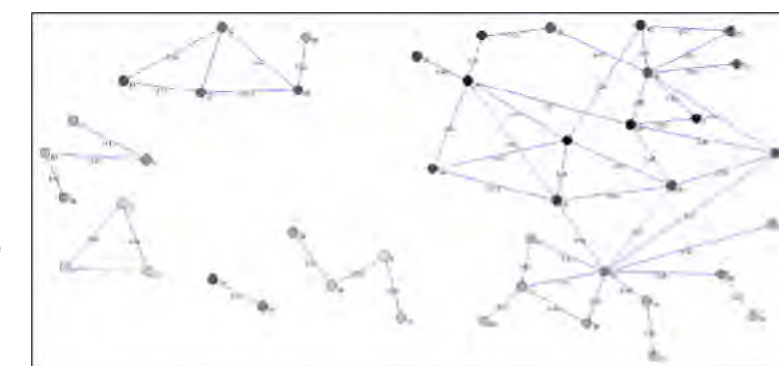
Networks such as this can be analysed using measures from graph theory and Social Network Analysis, such as degree centrality and brokerage (Oatley & Crick, 2015), and other combinations of graph

and spatial data (Oatley et al, 2006), however this paper merely presents the very clear benefits of this as a visualisation tool.

To simplify the representation, only those links with a Jaccard similarity of greater than or equal to 0.4 are shown in Figure 8. Here it is easier to see:

- There are clusters of officer perceptions. These are the most strongly matching officers.
- Again, the Black colour of a node indicates that this is the officer that best matches reality, or the empirical data (Getis Ord G_i^* , 99%).
- It is now possible to see clusters of officers with good reliability (Black and Dark Grey nodes), linked to periphery clusters of Light Greys (officers with misconceptions).
- Smaller clusters represent those officers who have chosen more uncommonly agreed upon geographical areas, sometimes based on misconceptions (light grey cluster), or missed by most officers but where there is actually something there (darker greys).

Figure 9. Network generated with Jaccard similarity ≥ 0.4 .



5. Discussion and Conclusion

There are many different ways to represent perceived and actual crime locations in the literature. The only study that offers a valuable visualisation technique is (Ilijazi, et. al., 2019), which combines several pieces of information in one informative presentation.

We have presented a novel visualisation technique that incorporates both agreement and reliability of police officer performance. There are several very practical uses and extensions of this technique, and it includes several interesting features:

It is very straightforward to identify: (i) Common ground, (ii) Common misconceptions, (iii) Outliers

It can be easily used for training purposes, with officer maps remaining anonymous.

Continued on next page

It is the starting point for a deeper analysis:

- analysing clusters of agreement, hypothesising the reasons why
- which officers did not agree with the major clusters, and what did they favour instead.

These steps could be repeated as follows: (i) analyse then eliminate the biggest clusters, (ii) what remains are those officers who have the next level of agreement, analyse these, repeat to (i). This can be used to make a Multi-Dimensional Scaling (MDS) plot, aka. Smallest Space Analysis. The MDS dimensions can then be explained (explored).

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Within this particular dataset, officers worked together on shift patterns in specific areas of Perth. The agreement between officers can be investigated considering these connections, to see if this is where their shared understanding of what was developed (or not). It would also be interesting to know the officers' length of service and how long they had been assigned to patrol, to see if there are differences between investigators and patrol staff. Additionally, the associated GPS data gathered can show the degree to which an officer actually visits the locations which are considered important.

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Challenges, Overcoming Strategies, and Possible Considerations for the Future Implementation of Workload-Based Police Patrol Staffing Analyses: A Methodological Commentary

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Abstract

Amidst changing demands on police and increasing pressure on the public funding allocated to the police agencies, police administrators need to develop evidence-based methods to determine and justify their staffing needs. One of the current methods used for that purpose is the “workload/performance-based approach.” This particular approach was utilized during the staffing analysis of a municipal police department in North West Florida. Based on this experience, this research note presents the challenges faced and the strategies utilized to overcome those challenges during the implementation of the workload approach. Those challenges and overcoming strategies included issues related to identifying, addressing, and imputing missing information for the estimation of the service time, selecting a method to account for the time of the field supervisors and ancillary units in handling regular patrol tasks, and for over-time use. These strategies are presented to shed light on the future implementation of the workload approach in staffing analysis for police agencies.

Key Words: *Police, staffing, patrol, workload, budget, evidence-based*

In recent years, the leaders of local communities have needed to develop strategies to meet the changing demand for the types and levels of police services while effectively dealing with budget restrictions that have existed since the 2008-2009 economic recession. This effort has come while confronting an ongoing recruitment and retention crisis (Wilson et al., 2011). Furthermore, various communities have been discussing the idea to “defund police” in the United States in recent years, which eventually increased the pressure on local leaders to determine an optimum size for their respective police departments.

The “defunding police” arguments consist of several demands and expectations but most profoundly assert that the public spending on policing should be reduced. The funds would be diverted to improve other public agencies or services, such as public health, addiction treatment, and education, with the goal of improving communities and people’s general wellbeing (Cobbina-Dungy, & Jones-Brown, 2021; Eaglin, 2021). Consequently, determining the optimum staffing level for a police department based on a valid and reliable analytical strategy has become a prominent need for local political leaders and police administrators. However, developing and implementing an analytical approach to assess staffing needs can be a complex process resulting from a lack of information on how to conduct a staffing analysis.

For many of the generally small- and moderate-sized agencies, this may be out of reach or challenging, even if it is believed to be helpful

and needed by many police departments. Many police departments, therefore, have preferred adopting an intuitive rather than an evidence-based process to determine their staffing needs, primarily based on historical or regional comparisons or expert views of police administrators (see McCabe, 2013; Wilson & Weiss, 2012; 2014 for a review of commonly used methods to determine staffing needs).

Alternatively, some departments utilized more robust strategies to determine the optimum staffing level at their agencies. With this research note, we hope to shed more light on the implementation of one of those evidence-based strategies used for staffing analysis at police agencies, usually referred to as the “workload” or “performance-based” approach (Cathley & Guarin, 2012). This approach estimates future staffing needs by analyzing the current activities of a police department, especially the patrol unit. The workload approach uses calls for service (CFS) and actual workload information to determine police staffing needs, especially for uniform patrol units. In this model, the “workload” refers to the ratio of the total time spent on calls for services (CFS) to the total time available during a given shift (McCabe, 2016; Wilson & Weiss, 2012; 2014). Since the primary focus of this research note is on implementing this approach, the calculation strategy and analytical steps of its implementation are explained in further detail below.

The Workload Approach to Determine Police Patrol Staffing Level

While this approach is relatively recent and under-utilized (McCabe, 2013), it is accepted as superior to the other possible strategies for conducting a staffing analysis. This is due to its capacity to enable decision-makers to determine specific performance measures based on the current extent of the police work in a given jurisdiction, while other strategies may not account for local and agency-specific characteristics (Wilson & Weiss, 2012). A staffing analysis utilizing the workload approach is designed to determine the number of staff needed to accomplish specific tasks while considering the variety, complexity, and relative importance of these tasks to the agency's mission (Cathley & Guarin, 2012). For instance, a patrol staffing analysis using the workload approach should consider the variety of daily tasks carried out by patrol officers. These tasks performed by patrol officers can be classified under four categories: (a) reactive (e.g., responding to calls initiated by citizens), (b) proactive (e.g., self-initiated activities like traffic stops, field interrogations), (c) uncommitted (e.g., patrolling in the assigned beat without a special consideration), and (d) administrative (e.g., court time, breaks, report writing) (Northwestern University Traffic Institute, 1993).

In the past two decades, the number of departments using this strategy to determine and present their actual personnel needs has

increased. The International City/County Management Association (ICMA) - Center for Public Safety Management (CPSM), along with the International Association of Chiefs of Police (IACP) and the Commission on Accreditation for Law Enforcement Agencies, Inc. (CALEA), have promoted and implemented this approach for more than 60 agencies since 2009 (McCabe & O'Connell, 2017). In addition, numerous other studies have implemented the “workload approach” in determining the staffing needs for various police departments across the United States since 2010 (Cathey & Guerin, 2012; Corsaro et al., 2015; Corsaro & Akbas, 2017; McCabe, 2013; Matrix Consulting Group 2014; The International Association of Chiefs of Police, 2016. V2A, 2018; Vose, et al., , 2020; Weiss, 2010a; 2010b; 2015a; 2015b; Wilson & Weiss, 2014).

The workload approach utilizes information on recorded calls for service (CFS) through the computer-aided dispatch (CAD) data to understand the actual extent of police activities in a given area. As most of the CFS are responded to by uniformed patrol officers, the CAD data is the basis for determining the workload of patrol units in that approach. The “workload” in that approach refers to “a time measurement, recording the actual amount of police time required to handle calls for service from inception to completion” (Cathley & Guarin, 2012, p.10). Accordingly, a police patrol division should have sufficient staff to handle the CFS properly. However, managing the CFS is not the only task for the patrol officers- they are also expected to perform proactive duties, like activities related to community policing. These tasks can only be accomplished if they have sufficient unobligated or discretionary time.

Hence, the workload of a patrol officer in a given shift should not exceed a certain level and allow using discretionary time and completing proactive tasks. The question for the decision-makers, based on that approach, is, “what should be the ideal level of workload, and thus, how many officers should be employed to maintain that workload level on average?” In other words, the administrators need to determine performance objectives for patrol officers responding to CFS and maintain a staffing level to reach that objective and sustain that performance in the long run. That performance objective pertains to the ratio of the patrol officers’ time spent handling the CFSs (workload) to the discretionary or unobligated time they must use for proactive policing and other activities (Wilson & Weiss, 2012).

The determination of performance objectives indicates how much a local policymaker is willing to allocate patrol officers’ time to respond to CFS (workload) vis-a-vis how much of their time should be reserved unobligated for discretionary activities. Yet, there is no universally accepted standard in this regard, and it depends on various preferences and priorities at any given agency (Hollis and Wilson, 2015). However, previous studies utilizing a workload approach have developed some guiding principles. For instance, an essential component of the workload model, as implemented by the International City/County Management Association (ICMA), is a benchmark for the ideal workload level for patrol officers, which is presented as “The Rule of 60” (McCabe, 2013).

Per the Rule of 60, the average workload level (e.g., handling both citizen and officer initiated CFS, administrative time, directed patrol) should not exceed 60% of available patrol time. McCabe & O'Connell (2017) reiterated that rate as the “Saturation Index.” As such, when police officers are exposed to higher levels of calls for service, they are likely to conclude that patrol saturation is high, and their

responsive effectiveness is expected to reduce significantly (McCabe, 2013; Taniguchi & Salvatore, 2017). In addition, reaching that saturation level may diminish the quality of the work completed by a patrol officer, which is identified by attentiveness, reliability, responsive service, competence, manners, fairness (Terrill et al., 2013), and vigor (Taniguchi & Salvatore, 2017) of a police officer.

On the other hand, Northwestern University Traffic Institute’s (1993) Police Allocation Manual does not specify a particular performance objective but recommended not exceeding 50% for self-initiated and administrative activities. The Northwestern study was completed in a time that had already embraced community policing and began recognizing a much broader range of service functions expected of police. Wilson and Weiss (2014) also acknowledge that the policymakers need to decide the performance objectives - what percentage of the total patrol time should be reserved for responding to CFS and what percentage of that time should be spent on proactive policing.

Depending on the organizational structure of a police department, that ratio can vary. For instance, the availability of specialized units may decrease the time needed for unstructured proactive or community policing activities. They suggest determining the performance objectives based on citizen-generated CFS as those kinds of calls seem relatively easier to measure and better reflect demand for police services. Using the CFS generated by the community as the primary measure of patrol workload, Wilson and Weiss (2012) propose either a 50% or a 33% obligated time as a performance objective for the patrol officers.

Current Focus

As indicated above, in the past decade, many local law enforcement agencies adopted analytical strategies to determine their optimum staffing levels, especially in the uniformed patrol divisions, based on a systematic analysis of their workload and organizational structure. The Pensacola Police Department (PPD) was one of those agencies that invited the authors of this research note to conduct a staffing analysis to determine the agency's optimum staffing level. The results were shared with the Department as a technical report. PPD is a mid-size municipal law enforcement agency located in Northwest Florida. The Pensacola Police Department was established in 1821. According to the U.S. Census Bureau, as of 2020, Pensacola had 54,312 residents. The City of Pensacola’s budget was \$245 million in 2020, 18.41% of which was allocated for public safety (police and fire services combined).

As of July 2021, PPD had 162 allotted sworn positions, 14 of which were vacant. The Uniformed Patrol Division was allocated 60 officer lines (15 officers each for four shifts), and 9 of those lines were empty. According to the FBI’s Uniform Crime Report (2020) data, PPD employed 148 sworn officers in 2019, which meant 2.8 sworn officers per 1,000 residents. When compared with the other Southern police departments within the same population category (50,000 – 99,999), PPD’s sworn officer/population ratio was slightly higher (2.8 v. 1.95) (see Table 6). We note that the FBI and others appropriately caution against comparing the officer/citizens ratio without context (FBI, Crime in the United States).

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In the state of Florida, of the police departments serving at least 1,000 residents, there was an average of 2.67 officers per 1,000 residents, slightly below the PPD's rate of sworn officers. However, per capita indicators of the staffing level are usually misleading (see also McCabe, 2013; Wilson & Weiss, 2014). More specifically, in the case of PPD, at least, it could not account for daily and seasonal population mobility that affects the workload of PPD officers. The Pensacola Downtown area attracts many tourists and locals who are not residents of the City of Pensacola but come to the PPDs jurisdiction for entertainment, business, and official procedures in the government buildings (i.e., state and federal courts, the county offices). In turn, these visitors, who are not accounted for in per capita estimations, create a demand for police services and thus, increase the patrol workload for PPD.

The PPD patrol staffing analysis study employed a “workload approach” following the guidelines established by ICMA (McCabe, 2013). As discussed in further detail below, this approach first requires understanding the agency's “work ” or the unit subject to the staffing analysis. Following the fragmented nature of police agencies, “the work” of patrol units and other police divisions may vary. Likewise, administrative performance objectives, data collection strategies, field tactics, data entry and collection practices, and many other policies may differ across agencies. Therefore, a universal application of this approach may not be possible. Thus, conducting a workload-based staffing analysis may require overcoming various hurdles and shortcomings related to the available data, policy, and practice (Wilson & Weiss, 2012). Understanding those possible challenges and discussing possible overcoming strategies is needed to improve the implementation of the workload approach in conducting staffing analysis for many police scholars and administrators.

During the PPD patrol staffing analysis, the authors experienced particular methodological challenges regarding implementing the approach. This was expected, and we utilized specific strategies to overcome those challenges. In this research note, the “lessons learned” during that experience are shared to improve the “workload approach” for forthcoming police staffing analyses. In short, this research note aims to share the analytical strategy followed during that patrol staffing analysis based on a “workload approach.” It strives to address various methodological challenges recognized during this particular study but not necessarily thoroughly addressed during the earlier implementations, discuss potential overcoming strategies implemented to overcome those challenges, and indicate possible considerations for improving the implementation of the “workload approach.”

Implementation of the Workload Approach During the PPD Patrol Staffing Analysis

As noted earlier, the application of the workload approach may vary across police agencies, but earlier studies established common steps to be followed during the implementation of the approach (McCabe, 2013; Wilson & Weiss, 2012). Following those guidelines and making adjustments and expansions as needed, the analytical strategy followed to conduct the patrol staffing analysis at PPD included the steps described below. Along with the description of the implementation of those steps, the challenges and adopted overcoming strategies at each stage of the analysis are also

discussed in further detail in this section of the research note.

Step 1. Conducting A Contextual Evaluation

As indicated earlier, the implementation of the workload approach requires understanding the agency- and community-specific context to identify appropriate measures, data sources, and performance objectives. Therefore, a series of field observations, one-on-one interviews, and focus group interviews were conducted to understand the agency structure, patrol strategies, data sources, and other policies affecting the patrol work at the agency. The field observations were conducted through ride-along with patrol officers and field supervisors, where the authors systematically observed how the CFS were processed and recorded on the CAD system.

The interviews and focus groups were conducted with the top administrators (i.e., Chief and the Deputy Chief), mid-level managers (i.e., Patrol Commander, Records Commander), data specialists, dispatch supervisors, and patrol officers. How the outcomes of that early qualitative evaluation of the agency context contributed to the following steps and the interpretation of the study outcomes are pointed out in the subsequent sections.

In short, at the end of this step, the authors comprehended how the patrol division worked (i.e., in four groups of 15 officers and 12-hours shifts) in relation to other divisions of the PPD (i.e., how specialized patrol units were tasked compared to the patrol units in handling CFS), what kinds of variables were available through the CAD data, what alternative data sources were available and needed to be utilized to complete specific estimations in the following steps, and what kinds of daily operational practices (i.e., field supervisors handling CFSs and other routine patrol procedures, over-time use, off-duty officers and their role) need to be accounted for when estimating the optimum patrol staffing levels at PPD. This process also resulted in identifying the performance objectives to be utilized in estimating the optimum staffing levels, as discussed below.

Step 2. Determining the Study Time Frame

The ICMA (McCabe, 2013) recommends sampling one of the summer months and one of the winter months to capture the highest and lowest call volumes, eventually informing the minimum and maximum patrol staffing needs. Since the PPD staffing analysis was started at the beginning of 2021, the authors first considered analyzing the CAD data from 2020. However, due to the impact of the COVID-19 pandemic, there was a considerable difference between the call volumes in certain months of the years 2019 and 2020. The total number of calls in 2020 was 75,872, while it was 90,156 in 2019, which indicated almost a 16% decrease in 2020. Hence, it was decided to conduct the analysis based on 2019 data to accurately represent the typical workload for PPD. Per the raw CAD data, September (2019) was chosen as the month with the highest number of calls, and December (2019) was selected as the month with the lowest number of calls to be analyzed. For both months, the estimations were made for both 12-hour-long day and night shifts.

Step 3. Initial Analysis and Data Cleaning

At this stage, we conducted an initial analysis of the CAD data for the selected months. The data included almost all incidents, which may not necessarily represent the typical patrol “work” responded to by patrol units. In addition, it was recognized that certain incidents

did not include essential information or actual values needed to make calculations for essential variables. To overcome that initial challenge, the incidents that were not typically responded to by a patrol officer (recorded as PPD, Engine for the responding unit), and the complaint types referring to a non-typical call (e.g., K-9, training, test, job off duty), were initially removed from the study data. Second, the incidents for which the missing information did not allow an estimation of the service time (i.e., the time the officer arrived and the time incident was complete) were removed. Lastly, the calls that took less than a minute or were inexplicably long (e.g., 10 hours or longer at an airport foot patrol assignment) were removed from the data to increase the accuracy of the estimation of the typical workload of the patrol units (see McCabe and O’Connell, 2017, for a similar approach and see Wilson and Weiss, 2014, where they discussed incompleteness of information on such data sources should be expected). That process required a thorough examination of each incident recorded on the CAD data with the key informants from the agency to understand if those atypical cases were actually representing daily patrol activities. At the end of that exclusion process, the number of incidents in the final data sets came down to 5,883 in September (from 8,158) and 5,220 in December (from 7,183).

Step 4. Estimation of the total service time

The estimation of the total service time for each CFS poses a significant challenge for workload analysis, in general, as the practices of the police departments vary in dispatching the calls and identifying essential time points in that process (Wilson & Weiss, 2014). Figure 1 displays how the PPD dispatch process works and how significant points are identified. The formula authors used to calculate the total service time for each CFS was as follows:

$$(T6 \text{ Incident Complete} - T5 \text{ First Unit On Scene}) \times n \text{ of Responding Units}$$

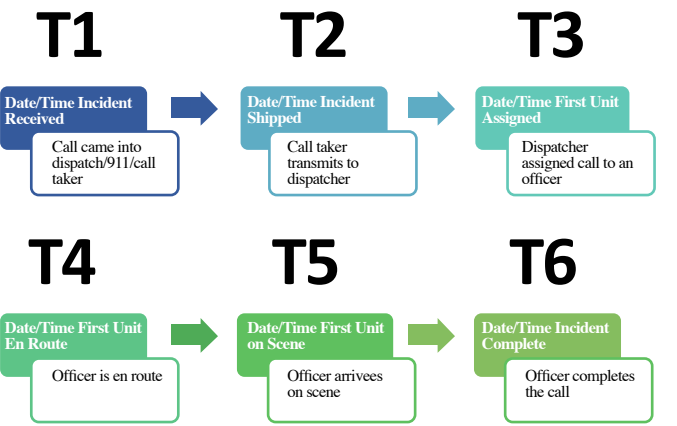


Figure 1. PPD's Call Dispatch Process

Several challenges were experienced during the PPD study in estimating the total service time, which should be considered in interpreting the results and improving the implementation of the workload analysis in the future, and in varied locations. First, the difference between the time a unit was assigned to a call (T3), and they were on the scene (T5) could be considered “committed” for service or “available” to respond to calls, depending on the nature of the calls.

For instance, in a non-emergency complaint (e.g., fraud), a patrol unit would be assigned to a call, and the assigned unit could still respond

to an emergency call or conduct a traffic stop if they witness a threatening violation before reporting “on scene” for the assigned call. However, for an emergency call (or a call initiated by an officer), the amount of time during the same time frame would be considerably less, and the officers should be considered occupied for service during that time.

After analyzing the study data for the time officers spent in that timeframe, it was determined that typically officers spent less than two minutes (in almost 70% of the incidents) between T3 and T5. However, in atypical (usually non-emergency) incidents, the time could go up to 60 minutes. Had that time been added to the total service time, the final estimates would have been skewed. Thus, it was decided to take the time the first unit was on the scene (T5) as the starting point for estimating the service times for each incident.

The second challenge in this regard was accounting for the time an officer spent on report writing. Like other issues, across the police departments and even across individual patrol officers, there might be slight differences in the timing of completing the paperwork and writing the reports for an incident (McCabe & O’Connell, 2017). Per observations conducted at Step 1, PPD patrol officers usually preferred completing the report writing, if needed, after closing a call. They could also “call out” as “admin” and therefore show a busy status in the CAD system during that time if the incident was complicated and required more attention and time for report writing.

Report writing and completing other paperwork could even exceed the shift time, especially if the officers made an arrest or responded to a more complicated case towards the end of their shift. This over-time use is separately discussed below. Hence, the estimation of the total service time neither included travel time, nor the time spent on report writing unless it was called “admin” in the CAD data. When interpreting the targeted uncommitted time (40%), this should also be taken into consideration.

The third challenge related to estimating the total service time was about determining the number of units responding to a call. For the workload analysis, it is essential to know how many officers spent how much time for a given incident. Ideally, this would have been possible by recording when each unit arrived at the scene and when each of them became available to receive another call. However, this level of detailed recording is available in only some agencies. The number of officers backing up the primary unit and how long they spend for a given call may not be appropriately recorded to accurately calculate the total service time for the calls (Wilson & Weiss, 2014). The field observations and interviews pointed to similar limitations in CAD data for the current analysis.

For instance, the PPD officers could self-dispatch themselves to an incident as backup units and not report that to the dispatch center. Even for the incidents where the CAD data indicated the availability of a backup unit at the scene, the actual number of backup officers and the exact time they spent at an incident were not accurately recorded in the CAD data and in the incident reports. Accordingly, it was necessary to estimate the number of units responding to a call to estimate the total service time practically and most accurately.

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To this end, first, the calls for which the CAD records indicated the availability of a backup officer (through a unique dispatch code) were identified. This initial review pointed out that in 2,540 out of 5,883 cases in September, the specific dispatch code indicated the availability of a backup officer (in about 43% of the incidents). Recall that in certain incidents, officers could dispatch themselves to the scene but not report that to the dispatch center and, thus, fail to create a record in the CAD system. Hence, the actual rate of calls backed up with additional units (along with the primary unit) could be more than 43% of all incidents.

On the other hand, the authors find it reasonable to omit the fact that more incidents could have backup units while estimating the total workload (occupied time) in a shift. This is due to the fact that when officers self-dispatch themselves to an incident, they mostly remain available to take another call in the CAD system. While the total service was estimated with this consideration for the PPD study, other possible inefficiencies emanating from “self-dispatching” practice should be further assessed in a given police department during a staffing analysis.

Even if the authors could identify the incidents with a backup unit in CAD data, the number of backup officers was not recorded. The ideal option to determine the actual number of backup officers was to review the Incident Reports manually and transfer the entered number of backup officers in those reports to the digital spreadsheets.

However, reviewing about 5,000 incident reports (for both September and December data) and manually entering that information into the data sheets would not be practical considering the limited time and resources available for this particular study. In order to overcome that challenge, a random sample of backed-up incidents (Group 1) was selected to calculate the average number of backup officers in that group and substitute the missing information in the rest of the incidents (Group 2) with that value.

This process of “regression imputation” is used to replace the missing values in a data set (Kang, 2013). To this end, the authors first randomly selected 393 backed-up incidents (exceeding the needed number of cases for 95% confidence level and 5% margin of error) from the September data. This data indicated that the average number of backup officers in those incidents was 1.416 (Range: 1-8, SD: 0.81). Hence, if the CAD data suggested that an incident was backed up, but the actual value for the number of backup officers was missing, the authors replaced that missing value with 1.416.

After replacing the missing values for the number of backup officers, the reliability of the data imputation process the authors implemented was checked using an independent samples t-test to compare the average total service time for the incidents in the sampled group (Group 1, n=393, estimated with the actual number of backup officers) with the total service time for incidents in the non-sampled group (Group 2, n=2,174, estimated with replaced values for the number of backup officers) in the September data. The average total service time in Group 1 (M=104.74, SD=214.2) demonstrated no significant difference, $t(2,538) = -.370$, $p=.712$, from the average total service time in Group 2 (M=108.56, SD=183.5). These results suggested that using data imputation to replace missing values for the number of backup officers in an incident did not create a statistically significant difference in estimating the total service time. In order to address the last two challenges indicated above (lack of

reliable information on the CAD data and the actual number of officers responding to a call), Wilson and Weiss (2014) suggested increasing the total number of calls by 25% in each shift. Similarly, Vose, et al., (2020) increased the number of calls by 5% in each shift to account for the calls responded to by more than one officer.

The last caveat about estimating the total service time was about accounting for the time each responding unit spends on an incident. In general, the service time (T6-T5) accurately represents the actual time the primary unit spends on an incident. If there were backup units along with the primary unit, on the other hand, they might have arrived later and left the scene earlier than the primary unit. Since the CAD system did not capture how much time unreported backup unit(s) spent for an incident, the authors initially needed to assume the primary unit and the backup units spent equal time for a given incident. After completing the estimations with this assumption, the authors recognized that in one shift (September, Saturday nights), the total service time exceeded the whole available time by about 17%. One reason for exceeding the recorded available time could be estimating longer service times for the backup units. To address that issue, the total service time was decreased by 5% with a conservative estimate to increase the reliability of the final estimates.

To further explore the reason for that excessive time use, the unit-level information from the September CAD data was analyzed. During that analysis, it was recognized that a certain number of officers, who were not actually in the patrol division (like K9 units, traffic units, etc.), were also responding to calls either as primary units (in calls like a follow-up, foot patrol, alarm, etc.) or backup units due to the personnel shortages in the patrol division to handle all CFS especially when the call volume was relatively higher (i.e., weekend night shifts). However, those units were not included in the estimated available patrol time (n available patrol officers X 720 minutes). Hence, the total service time exceeded the available patrol time at some point. The issue of ancillary (non-patrol) units responding to CFS is discussed further below.

Step 5. Estimation of the Workload Level (Saturation Index)

The level of workload was estimated by taking the ratio of the total service time (in officer-minutes) to the total available patrol time in a given 12-hour (720 minutes) shift with the following formula:

$$\frac{\Sigma \text{ (service time } X \text{ n of responding officers)}}{\text{n of available patrol officers } X \text{ 720}}$$

According to the determined performance objectives adopted in the PPD study, this rate should be around 0.6 to remain below the workload saturation. Thus, the authors estimated the SI for each day/shift in high and low call volume months at this stage, and then calculated the average SI values for each weekday/shift (i.e., Monday Night Shift Average SI) to inform the next step where the needed number of officers to remain on or below that saturation level was estimated.

One challenge in this estimation was that the calls initiated by officers and the calls initiated by citizens were combined in determining the SI. These two types of calls could have created varying levels of loads and, thus, be separated from each other, as some other studies (McCabe & O'Connell, 2017; Wilson & Weiss, 2014) suggested.

***365 x shift length
(365 x shift length)- total time off***

This approach presumes that the officers will use all of their available leave time. However, the actual amount the officers use their leave might vary for several reasons (e.g., varied use of sick time, varied hours in training). To address that variation, an alternative approach would be assessing the actual leave time and utilizing that in the estimation of the shift relief factor (Wilson & Weiss, 2014). In the PPD study, the authors relied on the actual personnel rosters where the assigned number of personnel (and, thus, theoretically available time) and the number of personnel using leave time (time off) were available for every shift.

Using those numbers, the authors estimated that, on average, 24.2 % of the assigned officers in September, and 23.2% of the assigned officers in December were not available (time off) in a typical shift. These ratios were comparable with the ICMA's standard 25% adjustment rate for the expected loss in a shift based on The Police Executive Research Forum's (PERF) contention (McCabe, 2013). Likewise, with a similar approach (estimating the actual average lost time), IACP (2016) estimated a 21% loss rate, and Matrix Consulting Group (2014) estimated a 25% loss rate, which was comparable to what the authors found for PPD. Subsequently, the estimation for the number of officers for each shift was adjusted with an increase by those rates.

Established guidelines (McCabe, 2013; Wilson & Weiss, 2012) usually suggest ending the staffing estimation process at this point. However, during the contextual analysis (Step 1) the authors recognized several other issues pertaining to the workload of the patrol division at PPD, which needed to be considered at this step. Therefore, the final stage of this estimation for the optimum staffing level at the PPD patrol division accounted for those issues before suggesting the optimal number of needed officers.

The first of those issues was that a certain number of CFS or other procedures (e.g., transporting an arrestee to the local jail) were handled by the supervisors since the patrol officers were handling other CFSs or procedures at that time. Consequently, the supervisors could not oversee the field officers during those times, which was their essential responsibility, working to assure the quality of the procedures and improve the patrol officers' professional capacities. In order to allow the field supervisors to fulfill their actual obligations, the number of patrol officers should be sufficient to handle all calls and procedures without relying on the supervisors' time.

At an optimum level, the patrol officers should maintain their performance objectives (60% SI) without substantial support from the field supervisors or ancillary units such as K-9 or traffic in responding to regular calls for service. To estimate how many more officers should be assigned to the patrol unit to allow field supervisors to focus on their essential managerial functions, the authors first found out the total number of regular CFS responded to by supervisors and the total time they spent for these calls. Then, a unit-based analysis was conducted to find out a typical patrol officer's total service time within the same time frame.

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Lastly, the authors divided the total service time of the supervisors by the median value of the total service time of patrol officers. Accordingly, the authors could identify 338 regular incidents handled by supervisors in the highest call volume month, which took 10,125 minutes in terms of service time. The median total service time of patrol officers (excluding the officers on special assignments) was 2,786.55 minutes in that month. In conclusion, the value of supervisors' work in handling regular CFS was equal to 3.63 patrol officer manpower for the entire patrol division (all four shifts combined).

In other words, supervisors produced service that was equivalent to the service produced by 3.63 patrol officers throughout the month. By adding this many officers to the estimated optimum staffing level of the patrol division, the authors suggest that the field supervisors will be able to fulfill their essential managerial responsibilities more effectively, like overseeing the critical duties and proper documentation of the procedures, as well as providing on-site training for officers' professional development.

The second challenge the authors needed to address during the PPD study was the overtime use by patrol officers. Since the time of a regular shift (12 hours) was not sufficient to complete some of the calls or the administrative work resulting from those calls, there was a certain amount of time spent by various officers after their shift ended.

While it is expected that for some CFS, towards the end of a shift, officers might need to use extra time after their shift to close those calls, the amount of overtime recorded in the personnel rosters the authors examined was substantial. The median overtime use was 7 hours (420 Minutes) in every shift during the high-volume season. Compared with the median service time of a typical patrol officer (2,786.55 minutes) during that time, the workforce value of the overtime use was equal to .15 of the regular patrol officer's service time.

All in all, the estimation of the needed number of patrol officers accounted for the recorded workload through the CAD system against a particular performance goal (60% SI), an expected rate of loss of assigned officers, and the other workforce used to support patrol activities (supervisors' work, and the overtime work). Table 1 presents the main variables used to estimate the base patrol staffing levels at PPD in the highest and lowest call volume months, along with a range of suggested average number of patrol officers stemming from the primary workload analysis (base estimate). The table presents information on the days for four different time frames: September day, September night, December day, and December night. Each column of data represents the average value for the given day/time. For instance, the number of incidents (the first column of the daily average values) on the first line is the average value of all Monday night shifts in September.

Table 1. Estimates of the base number of needed officers

		DAILY AVERAGE VALUES							
Month / Shift	Day	n of incidents	n of Officers	Service Time (Min.)	Available Time (min.)	Time Use Ratio (%)	Needed Time	Need n of officers (w/SRF)	
SEPTEMBER NIGHT	Monday	86.00	11.20	6122.02	8064.00	75.92	10203.36	17.60	
	Tuesday	89.25	10.50	6552.26	7560.00	86.67	10920.44	18.84	
	Wednesday	93.75	11.50	5617.49	8280.00	67.84	9362.48	16.15	
	Thursday	100.00	11.00	6409.80	7920.00	80.93	10683.00	18.43	
	Friday	107.00	10.75	6949.83	7740.00	89.79	11583.06	19.98	
	Saturday	81.40	10.75	8844.91	7740.00	114.28	14741.52	25.43	
	Sunday	97.20	10.40	6153.35	7488.00	82.18	10255.58	17.69	
	Descriptive Statistics	MEAN	93.51	10.87	6664.24	7827.43	85.37	11107.06	19.16
		Minimum	81.40	10.40	5617.49	7488.00	67.84	9362.48	16.15
		Maximum	107.00	11.50	8844.91	8280.00	114.28	14741.52	25.43
		Stand. Dev.	9.35	0.41	1168.44	296.30	16.38	1947.40	3.36
SEPTEMBER DAY	Monday	108.60	12.00	5655.42	8640.00	65.46	9425.70	16.26	
	Tuesday	113.50	12.50	5499.06	9000.00	61.1	9165.10	15.81	
	Wednesday	117.25	12.75	6710.22	9180.00	73.1	11183.71	19.30	
	Thursday	115.25	12.25	7073.59	8820.00	80.2	11789.31	20.34	
	Friday	101.25	12.25	6607.94	8820.00	74.92	11013.24	19.00	
	Saturday	66.00	11.00	4096.09	7920.00	61.03	8161.40	14.00	
	Sunday	66.60	11.20	3913.55	8064.00	48.53	6522.59	11.25	
	Descriptive Statistics	MEAN	94.48	11.99	5765.24	8634.86	66.45	9608.73	16.58
		Minimum	66.60	11.00	3913.55	7920.00	48.53	6522.59	11.25
		Maximum	117.25	12.75	7073.59	9180.00	80.20	11789.31	20.34
		Stand. Dev.	22.32	0.66	1124.03	471.87	10.62	1873.38	3.23
DECEMBER NIGHT	Monday	82.40	10.60	4577.99	7632.00	59.98	7629.98	13.05	
	Tuesday	76.00	9.60	4996.40	6912.00	72.29	8327.33	14.25	
	Wednesday	77.75	11.25	4196.58	8100.00	51.81	6994.31	11.97	
	Thursday	85.00	10.25	4741.55	7380.00	64.25	7902.59	13.52	
	Friday	88.00	10.25	5920.93	7380.00	80.23	9868.22	16.88	
	Saturday	89.00	11.50	5727.96	8280.00	69.18	9546.61	16.33	
	Sunday	105.00	10.00	6380.54	7200.00	88.62	10634.23	18.19	
	Descriptive Statistics	MEAN	86.16	10.49	5220.28	7554.86	69.48	8700.47	14.89
		Minimum	76.00	9.60	4196.58	6912.00	51.81	6994.31	11.97
		Maximum	105.00	11.50	6380.54	8280.00	88.62	10634.23	18.19
		Stand. Dev.	9.62	0.68	799.44	488.07	12.38	1332.40	2.28
DECEMBER DAY	Monday	90.60	10.20	6236.80	7344.00	89.39	10394.66	17.78	
	Tuesday	91.60	10.40	4685.23	7488.00	65.86	7808.72	13.36	
	Wednesday	64.50	11.25	4968.81	8100.00	64.57	8281.35	14.17	
	Thursday	91.50	10.75	5114.29	7740.00	69.65	8523.82	14.68	
	Friday	85.75	10.75	6032.26	7740.00	82.04	10053.76	17.20	
	Saturday	74.75	11.25	4471.27	8100.00	58.11	7452.12	12.75	
	Sunday	66.40	10.40	4771.45	7488.00	67.07	7952.41	13.61	
	Descriptive Statistics	MEAN	80.73	10.71	5182.87	7714.29	70.94	8638.12	14.78
		Minimum	64.50	10.20	4471.27	7344.00	58.11	7452.12	12.75
		Maximum	91.60	11.25	6236.80	8100.00	89.39	10394.66	17.78
		Stand. Dev.	11.98	0.42	683.86	299.55	10.89	1139.77	1.95

In conclusion, the analysis indicated that the PPD should employ 16 (rounded from 15.63 and 15.75) officers in every 12-hour shift for optimum performance (60% SI) during a low call volume season. On the other hand, for a high call volume season, the night shift should be staffed with 21 (rounded from 20.27) officers, and the day shift should be staffed with 18 (rounded from 17.54) officers (Table 2). In total, the number of officers assigned to the patrol division should be 71 by adding 11 more officers to the existing 60 personnel lines. With this level of staffing and flexible distribution of officers between the high and low seasons and day/night shifts, the PPD patrol division will be highly likely to stay around a 60% SI without relying on supervisors' and non-patrol units' extra support to handle its regular responsibilities and minimize the patrol officers' overtime use.

Shift	Base Estimate	Adjustment for Supervisory Work	Adjustment for Overtime Use	Total	Total Rounded
September Day	16.58	0.92	0.04	17.54	18
September Night	19.16	1.06	0.04	20.27	21
December Day	14.89	0.83	0.03	15.75	16
December Night	14.78	0.82	0.03	15.63	16
GRANT TOTAL	65.41	3.63	0.15	69.19	71

Table 2. Estimation of the Needed Number of Patrol Officers in the PPD study

Conclusion

Based on a recent implementation of the workload approach to patrol staffing analysis in one municipal police agency, PPD, this research note presents the implementation steps in this particular case and discusses the possible challenges and overcoming strategies to improve this specific approach. It is deemed essential to shed more light on the timely need to improve evidence-based strategies to determine the optimum level of staffing in police departments amidst criticism on the role and functions of police in the US and beyond. This particular experience pointed out that the workload approach in conducting a patrol staffing analysis can be implemented more efficiently if specific challenges and issues are considered and addressed.

First of all, as previous literature also indicated (Wilson & Weiss, 2012), the PPD study also pointed out that the workload approach should be implemented with special consideration of the contextual factors. In the PPD study, the first step of the implementation, a qualitative evaluation, allowed the authors to comprehend those factors about the particular department's structure, operations, data sources, and general personnel allocation policies. Without that initial step, the authors would not have been able to address and account for the particular challenges described above in estimating the optimum staffing level.

Second, it is essential to note that while the established guidelines (i.e., McCabe, 2013; Wilson & Weiss, 2012) about the workload approach provided formulas for certain calculations, during the implementation, using those formulas verbatim might not be possible due to the data limitations and other reasons. As such, the estimations require flexible adaptations by using and corroborating available data sources. The measure of the total service time, for instance, required utilizing additional information and calculations during the PPD study as presented above. Lastly, this experience

required specific considerations in the final estimate of the optimum staffing level for patrol division that was not addressed in detail in the previous literature. Those included the concerns about the number of responding units, supervisors' and non-patrol units' time in responding to CFS, and substantive overtime use. Future studies should consider the strategies proposed in this note to improve the reliability of the estimations in workload/performance-based staff analysis at police agencies.

While various challenges were addressed during the PPD patrol staffing analysis, one important issue related to the optimum staffing level estimation was observed but could not be addressed effectively due to the limitations in time and resources. This issue was the "job off duty" by uniformed patrol officers. The PPD patrol officers were working on special assignments (e.g., event security, loss prevention, business security) in their law enforcement capacity during their off times to supplement their income, which was a legitimate and agency-facilitated practice.

During those off-duty work assignments, they were visible and technically available as uniformed law enforcement officers. As such, they patrolled (in a vehicle or on foot) the area they were working at, prevented possible disturbances, helped citizens or business owners, and handled some other issues. Furthermore, they extended occasional help to responding units as a backup when there were no on-duty units available for additional support for an incident. Had those off-duty officers not handled those incidents, they would have possibly come as a CFS for an on-duty patrol officer.

Hence an ideal workload (and ensuing staffing needs) analysis should have accounted for the work handled by those off-duty officers. Due to the limited time and available resources and the complicated nature of the matter (concerning the other aspects of our analytical approach), the PPD study could not address these issues in the analysis. However, the future implementation of the workload approach should consider possible strategies to estimate the impact of "off duty" officers on the functions of patrol units and thus how this should be accounted for in calculating the optimum staffing levels.

While the primary purpose of a staffing analysis is to identify the optimum staffing level, a specific suggestion to augment the staffing level would be too abstract and impractical for many police agencies across the US as they have been going through a recruitment crisis (IACP, 2020). Hence, the future utilization of the workload approach should provide respective police agencies not only with abstract recommendations pertaining to the optimum staffing levels but also with possible strategies they should consider to manage the ongoing recruitment and retention crisis with possible changes they can make in their staff allocations and other operations.

For instance, the PPD staffing analysis report included recommendations regarding re-allocating or de-prioritizing some of the patrol duties, developing policies to prevent over-responding to low-risk calls (see also IACP, 2016, for a similar recommendation), and switching to a 10-hour shift system, among others, based on the study results. In conclusion, a staffing analysis should not leave the police administrators with impractical recommendations but possible strategic steps they can pursue in reaching and maintaining an optimum staffing level.

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Welcome to the first edition of **The Evidence Brief**, an opportunity for the Evidence Based Policing Centre to keep you updated with everything happening nationally and internationally in the world of Police Science

About EBPC

The New Zealand Evidence Based Policing Centre (EBPC) was established in December 2017 as a joint partnership between New Zealand Police, the University of Waikato, The Institute of Environmental Science and Research (ESR), and New Zealand Police's strategic partner, Vodafone New Zealand.

The EBPC uses practitioner-based research, data and information, crime science, theory, service design and problem solving methods to inform police practice, implement measures to prevent crime, and improve the allocation of police resources to better protect the public, helping make New Zealand the safest country.

In coming issues we will profile different EBPC teams, team leaders and the work they do in the *People* section.

What's New?

Books



Articles

Collaborative practitioner – researcher partnerships in policing: Two researchers' reflections

Evidence-based policing: A review of its adoption and use by police agencies in the United States of America

Police perceptions of problem-oriented policing and evidence-based policing: evidence from England and Wales

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**Edition 1
August 2022**

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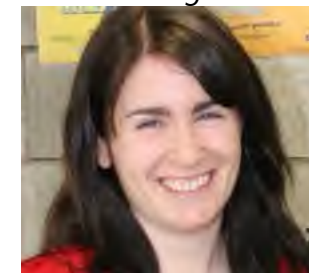
People – EBPC Teams

In each issue we will profile several EBPC teams and team leaders



Kate Mora

Team Manager Research Insights



I predominantly work with our Research Coordinator on the day to day running of the NZ Police Research Panel (which manages all requests for Police data and resources for external researchers or Police staff undertaking research for study purposes), as well as co-chairing the NZ Police Survey Panel (which provides a whole of system approach to surveying across NZ Police). Within the Research Insights team I manage the more junior Research Insights Advisors as well as short-term interns working in the Centre. The Research Insights Team provides products and advice on what works for policing, currently focussing on methamphetamine harm, organised crime harm and evaluating the impact of the Tactical Response Model. Finally, our team owns the Strategic Research Agenda which will be re-launched in the new year.

Deane Searle

Manager, EBP Network Groups



The Network Leads are police officers with over 100 years of combined experience. They have served in PSU, RP, youth and community, CIB, Intelligence, AOS, STG, Protection Services, other specialist squads and overseas deployments. They know your reality. The Network Leads have all completed the Evidence-Based Policing leadership course through Cambridge University. Joining the team is Deane Searle, as Manager and lead in Waikato. Deane performed a key role in working with the University of Waikato to establish the New Zealand Institute of Security and Crime Science. Deane also led the Waikato community's establishment of the local Alcohol and Other Drug Treatment Court. Leverage and partnered inclusion are the concepts Deane wants to bring to evidence-based policing, whereby research communities and the public can be engaged to collaboratively deliver *Our Business*. That is, growing our collective capability to improve. The team looks forward to engaging with you in the future, to enable deliberate, constant and incremental progress in your area of interest. Kia kaha, kia maia, kia manawanui (Be strong, be courageous, be steadfast).

People

Profiles of EBPC people and the work they do to support *Our Business*

Brian Williamson



Brian is the Network Lead for Northland & Tamaki Makarau. He joined NZ Police in 1998 and worked frontline and investigative roles in Auckland city district, before heading to Waikato District where he worked in Road Policing and then spent the next 14 years in CIB. Brian then moved into Intelligence as supervisor before taking up a role as Intelligence Collections Coordinator at the National Intelligence Centre. Brian was also a specialist level 3 interviewer for 12 years, investigative interview trainer and national assessor, and was a Protection officer for 13 years. He commenced his current role as Network lead north at the Evidence-Based Policing centre in 2020 and has a passion for evidence-based practice. Whilst working in CIB, Brian used the SARA problem solving model in a sexual assault prevention initiative which was entered into the Evidence-based Problem Orientated Policing awards.

Inspector Karen Smith



Karen is on secondment to the EBPC this year and brings with her a wealth of experience in her 28 years in Police. Karen is currently undertaking doctorate study into Wāhine Toa, a Police/Bluelight programme for sexually abused teenage girls.

"I am fortunate enough to be

doing doctorate study through Otago Polytechnic / Capable NZ, with assistance from the Guild while working. My research will see me looking at a Police/Bluelight programme for sexually abused teenage girls commonly known as, 'Wāhine Toa', which originated in Eastern District in 2003. As a core part of my research I have established a rōpū made up of recognised Māori advisors from Ngāti Kahungunu, who I will work alongside to review and where appropriate re-design the content of the programme to ensure it is culturally appropriate and meets the needs of participants.



Steph Dow

CheckPoint Coordinator

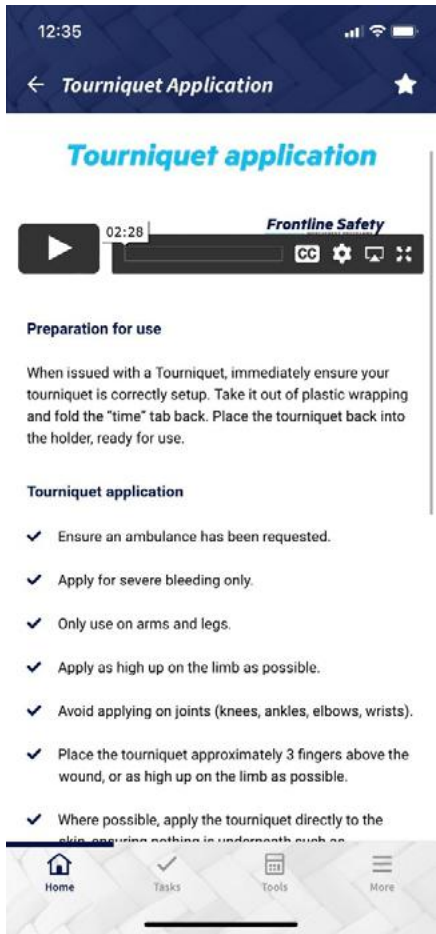


The CheckPoint app is EPBC's direct link to the front line and is one of the most utilised apps by frontline staff. My role is to identify useful pieces of content, guide business owners, and to follow up ensuring everything remains current and applicable. The

analytics regularly show that on a monthly average, there are 24.1K screen views from 4.5K users.

Recently, I went to the bi-annual First Aid refresher training. You know the one where you re-learn all the skills you need but hope to goodness that you don't have to use them because in the heat of the moment, you don't think you will remember! We got to the stage of the day where the tourniquets were brought out. We all had a chance to practice how and where to place the tourniquet in order to effectively control substantial bleeding. "Have you seen the video on Checkpoint?" the Instrutor asked. Under the operational tile, there is both a video (for when there is time) and a bulleted list (for when there isn't) that users can follow to ensure the correct and effective application of a tourniquet.

This is a perfect example of how Checkpoint can, and does, assist our frontline. There are over 280 of these memory joggers on the app with more being added all the time, some as a result of EBPC projects. Recently, we added information about the Lumi kits that have been introduced after an EBPC trial and evaluation.



Publications

Recently released EBPC reports

Tactical and Safety Training: Review of Evidence

Lauren Cloutman, Clara Cantal, Sarah Czarnomski, & Femi Abikanlu

Wellington: Evidence Based Policing Centre, 2021
In September 2021 the Frontline Safety Improvement Programme (FSIP) tasked the Evidence Based Policing Centre (EBPC) with a review of tactical and safety training. The review takes a broad look at tactical and safety training in the literature and in other jurisdictions; and covers areas such as skills included in the training, learning theories, skill decay and training evaluation. The purpose of this report was to gather and assess current literature of tactical and safety training in order to inform the new FSIP Tactical Response Model.

Whāriki Haumaru: Partnering with Māori Wardens to Reduce Warrants to Arrest

Kaori Takenaka, Matthew Davies, Mahinarangi Hakaraia, Caitlin Spence & Lance Tebbutt

Wellington: Behavioural Science Aotearoa / Evidence Based Policing Centre, 2022

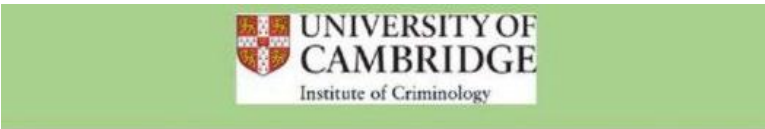
Failing to appear at court (FTA) leads to a cascade of negative consequences for individuals, their whānau and the criminal justice system. The problem is particularly marked in the east coast of New Zealand's North Island. To address this, New Zealand Police's Eastern District and the Ministry of Justice worked with Ahuriri Māori Wardens to develop a new intervention named Whāriki Haumaru. The wardens made phone calls to people with active WTAs, using a script that was designed based on a combination of behavioural science and Te Ao Māori principles. This article presents results from a five-month trial to evaluate the impact of the initiative. We find encouraging evidence that wardens were able to contact over a quarter of participants.

Want to collaborate with the EBPC?

Priya Devendran, Partnerships Manager would love to hear from you!
priya.devendran@police.govt.nz



Conferences



2022 Cambridge Evidence Based Policing Conference

Monday 11 July - Wednesday 13 July

'Just Right' Policing

The 2022 Cambridge Evidence Based Policing Conference was held 11-13 July

It included:

- ❖ Keynote address by Commissioner Andrew Coster
- ❖ Presentation by Assistant Commissioner Bruce O'Brien & EBPC Director Simon Williams.

Some recordings can be accessed on the Cambridge [site](#). NZP staff will be provided a link to access the Conference proceedings.

Coming soon...

Exceptional Policing - the Evidence-Based Way

The inaugural Conference of the Global Collaboration of Evidence Based Policing

Oct 11 - 12 UK, US, Canada | Oct 12 - 13 Australia, NZ

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The inaugural Conference of the Global Collaboration of Evidence Based Policing takes to the virtual stage on Oct 11 – 12 (in UK, US and Canada) and Oct 12 – 13 (in Australia and NZ). This is a fully online live 24 hours of Exceptional Policing the Evidence Based Way – operationally relevant EBP stories and studies coming live, via your desk or phone, wherever you are.

Evidence-Based Policing (EBP) is growing globally, ensuring that policing strategy, operations, and tactics are based on what works, according to evidence and research. Rather than being guided by assumptions, tradition, convention, or subjective impressions, EBP combines the existing skills, knowledge and experience of police with research, crime science, problem-solving and testing.

This inaugural global conference brings together world-leading criminologists, academic thinkers and police professionals to look at the role that evidence, its legitimacy, and our policing leadership have in everyday policing – shaping "exceptional" policing, the evidence-based way.
<https://globalebpconference.com>

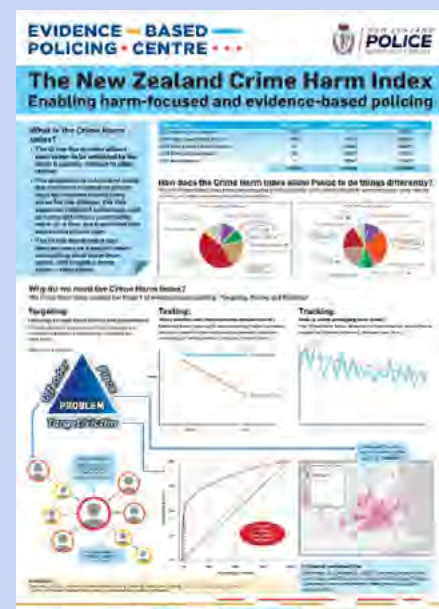
Projects

Spotlight on current and completed initiatives

NZ Crime Harm Index

The New Zealand Crime Harm Index (NZ CHI) is a measure of crime harm that can be used in addition to traditional measures using offence counts (where each offence is counted equally). The NZ CHI provides a score for each 4 digit offence code based on a proxy for the relative harm it causes, expressed as an estimation of the minimum number of days in prison a first time offender would serve for that offence. These scores can be used to weight counts of crime to produce an overall estimate of crime harm. The scores are derived from actual sentencing outcomes. This open access [article](#) describes its development.

For NZ Police staff, a short course on the provenance of the NZ CHI and how it used to estimate harm can be accessed from the [Operational Performance Framework](#) page on the EBPC Portal.



Operational Performance Framework

The Performance Team in the EBPC in collaboration with subject matter experts is developing the Operational Performance Framework (OPF) to track our impacts and outcomes against Our Goals of Safe Homes, Safe Roads, and Safe Communities, and Our Vision to be the Safest Country. The aim of the OPF is to provide performance information and insights to support operational decision making and drive continuous improvement. It includes, for the first time, harm-based measures.



Contact performance.ebpc@police.govt.nz to find out more.

Tactical Response Model

Over 2020-2021, the Frontline Safety Improvement Programme (FSIP) sought opportunities to improve our frontline's capability and capacity so we can operate safely in the complex environment in which we police. A new [Tactical Response Model](#) (TRM) is the result of this programme of work. A key part of the FSIP programme was reviewing the literature on the routine arming of police.

The report [Appropriate Tactical Settings: Insights and Evidence Brief](#) was released in August 2021 by the EBPC.



It provides a rapid review of general arming of Police and potential impacts any change in tactical settings might have for New Zealand.

Partnerships

ArcGIS Mapping in Action in Canterbury

Being in the right place, at the right time, doing the right thing is a leading mechanism to create safer communities. Senior Sergeant Mike Jones, who manages Road Policing for Christchurch City, has partnered with Canterbury University to build knowledge on where to be and when. Josiah Millar and Reuben Painter are geography students who have built an impressive ArcGIS (mapping and deployment dashboard) to enable more efficient deployment, that has led to fewer deaths and serious injury crashes. Staff and students from the New Zealand Institute of Security and Crime Science, Waikato University, have similarly been working on predictive analytics and dashboards since 2014. A mini conference was held between the two Universities and Police Districts in March 2022, so as to join these subject matter experts. Dr Paul Brown and Dr Lisa Tompson spoke about such topics as how to introduce real environmental factors (like rivers) into offence prediction and how to test the application of new technologies to real decision making. The joint interaction will lead to better knowledge about risk being provided to the frontline and other decision makers.

If you are interested in ArcGIS mapping, predictive analytics or testing the effectiveness of new systems, get in touch with the [EBPC](#).



Cyber Security Training



Cyber insecurity is a difficult concept to get your head around. Cyber is an information terrain, just like land and sea. There are many and complex threat actors in the cyber landscape, from pirates to criminals to state actors. Cyber security is an invisible risk to many of us. But our future is likely to be defined by this asymmetric risk.

These threats could feel insurmountable, but they are not. We need to break them down into pieces, then problem-solve a possible solution. This solution then needs to be measured to make sure that it helps. Testing solutions can be hard to construct because the inclusion of people makes measurement tricky. That is why we make friends with researchers at universities. Measurement of tricky things is their bread and butter. New Zealand Police (Deane Searle) and University of Waikato are looking to collaborate with the University of Queensland and Queensland Police on building and testing cyber security actions. Our Australian colleagues are designing a training package for the public, which will then be tested through friendly phishing. If the training package is proven effective, it can then be spread. Our focus is to enable New Zealand to benefit from, replicate and help with, this work. If you are interested in improving Cyber Security in partnership, contact [EBPC](#).

Behavioural Science Aotearoa has moved

The BSA team has moved from the Ministry of Justice to the High Impact Innovation Programme at Department of Corrections. BSA's role to work across the justice sector to understand people better so we can make our justice system work for them, remains unchanged.



BSA reports can be accessed from this [page](#).

Project Follow Up: Using Procedurally Just Correspondence to Reducing Repeat Victimisation

Author: Darren Green, Queensland Police

Abstract

Burglary repeat victimisation represents up 26% of all burglary offences reported in Australia. This represents a considerable amount of harm in the community. Previous research has identified that engaging victims can have a positive impact on subsequent victimisation. However, these engagements are often resource intensive. The current study sought to address this issue by developing a procedurally just email to engage burglary victims. Victims were randomly assigned to receive the email or a business as usual approach over a 12 month period. While limited by sample size, the results from this study support an expansion of the trail following a reduction in repeat victimisation for the experimental group ($p < 0.1$).

Introduction

It has been estimated that 57,400 households across Australia were subjected to two or more burglary offences during the 2019-20 period (Australian Bureau of Statistics, 2021). In addition to this, 48,300 households experienced two or more attempted burglary offences (Australian Bureau of Statistics, 2021). These households account for 24.1% and 26% of all burglary and attempted burglary incidents in Australia (Australian Bureau of Statistics, 2021). Proactively addressing repeat victimisation provides an opportunity for law enforcement agencies to have a considerable impact on annual reported rates (Townesley et al., 2000).

However, there are two key challenges for police to address this issue. Traditional methodologies of engaging and educating victims is resource intensive, inhibiting the ability of police to proactively address every address before repeat victimisation can occur. The second issue lies in engaging victims in a manner that results in behavioural changes such as having victims lock their doors in the future. This trial sought to address these two issues by using a procedurally just email to engage burglary and attempted burglary victims to reduce repeat victimisation through behavioural change.

Project Follow Up was implemented in Ipswich Police District Queensland as a randomised controlled trial. The procedurally just script was based on the IM-PACT framework which had positive impacts on public perceptions of police, awareness of the crime problem and intentions to enact crime prevention behaviours (Bennett et al., 2019). Project Follow Up sought to identify if a procedurally just email could reduce the rate of repeat victimisation.

Background Literature Repeat Victimisation

Internationally a number of studies have looked at the occurrence of repeat victimisation with some focusing on how to prevent it (Farrell & Pease, 2001; Grove 2011). Within Australia, the occurrence of repeat victimisation has been assessed in several states including Queensland, Victoria and Western Australia (Townesley et al., 2000; Sagovsky & Johnson, 2007; Stokes & Clare, 2018). Reviewing burglary repeat victimisation in Brisbane, Townesley et al (2000) identified that if all repeat victimisation could be eliminated the reported rate would reduce by at least 25%.

Similar results were also found in Victoria where the probability of further victimisation was six times that of residences that had not been victimised (Sagovsky & Johnson, 2018). In total 11.3% of residences in Victoria experienced repeat victimisation (Sagovsky & Johnson, 2018). Whilst complete elimination is unlikely these studies highlight how much repeat victimisation contributes to the overall crime environment.

Research has also considered when residences are more likely to be repeat victimised, with 12 months appearing to be a common time period used by researchers (Bowers et al., 1998; Robinson, 1998; Sidebottom, 2012). However, there is evidence that repeat victimisation is more likely to occur soon after the initial incident (Robinson, 1998). In a study of repeat victimisation in Florida between 1992 and 1994 it was identified that 25% of all repeat

victimisations occurred within one week of the initial offence while 51% occurred within the first month (Robinson 1998).

Robinson (1998) also found that less than 10% of all repeat victimisations occurred between six and twelve months after the initial offence. In addition, researchers have identified that in the months immediately proceeding an initial offence there is a greater likelihood of repeat victimisation occurring, compared with the expected rate of victimisation (Johnson et al., 1997; Bowers et al., 1998; Townsley et al., 2000). These results suggest that repeat victimisation interventions need to be swift, timely and efficient if they are to be successful.

A number of interventions have been tested targeting repeat victimisation and burglary offences generally (Madsen & Skubak, 2005; Stokes & Clare, 2018; Groff & Taniguchi, 2018). Madsen and Skubak (2005) found that leaving information cards containing generalised advice on home security could reduce the incidence of burglary. In 2018 a study was conducted in Western Australia seeking to reduce repeat and near repeat burglaries by posting or hand delivering crime prevention packs to victims and their neighbours (Stokes & Clare, 2018). The results for repeat victimisation were limited due to the small sample size, however, near repeat offences were reduced (Stokes & Clare, 2018).

In 2017 a target hardening strategy was implemented by West Midlands Police Department using the near repeat phenomenon as a risk identification method (Groff & Taniguchi 2018). This intervention involved the use of highly staffed and motivated policing volunteers who would attend a burglary victim and eight of their neighbours to deliver pre-made packs to persons located at home and information cards for those who were not (Groff & Taniguchi, 2018). The cost to deliver this intervention was 115,000 pounds over a 12-week period (Groff & Taniguchi, 2018). Results from this study still showed a modest decrease in burglaries (Groff & Taniguchi, 2018).

Within all of these studies the posting or provision of cards and information packs requires considerable logistical efforts. This includes the officer hours required to collate the packs, identify the target addresses and the cost of postage or having them hand delivered. This study seeks to overcome this issue through the development of a procedurally just email that can be distributed by an administrative officer on a daily basis.

Procedural Justice

Procedural justice is "...an authority or institution that leads people to feel that that authority of institution is entitled to be deferred to and obeyed" (Sunshine & Tyler, 2003). The current trial attempts to leverage a procedurally just engagement to increase the likelihood that recipients will follow the crime prevention advice provided. Previous studies have successfully used the elements of procedural justice to improve perceptions of police, compliance with police instructions and cooperation with requests (Mazerolle et al., 2012; Bennett et al., 2019). The elements included are an opportunity for the community to participate, a neutral presentation of the facts by police, treating community members with dignity and respect and demonstrating trustworthy motives (Mazerolle et al., 2012).

Within Queensland the first major study using procedurally just engagements was the Queensland Community Engagement Study (QCET) which provided a procedurally just script for police to implement at RBT sites (Mazerolle et al., 2012). RBT sites were randomised to receive a Business as Usual (BAU) RBT or a procedurally just RBT (Mazerolle et al., 2012). Drivers were provided a voluntary survey to assess the impact of the engagement (Mazerolle et al., 2012). The results from this study highlighted that procedurally just engagements had a positive impact on driver perceptions of drink driving, improved satisfaction with police and increased willingness to comply with police instructions (Mazerolle et al., 2012).

QCET was subsequently amended for the IM-PACT study which sought to identify if procedurally just engagements at Random Breath Test (RBT) sites could be used to not only impact road safety but crime within the area they were conducted (Bennett et

al., 2019). A script was developed to raise driver awareness of theft from motor vehicle offences surrounding the interception site. Officers were provided the Purpose, Acknowledgement, Crime message, Thanks (PACT) framework to guide their interaction which, on average, took an additional 39 seconds to deliver (Bennett et al., 2019).

RBT sites were randomised to receive the PACT message or a BAU RBT. Drivers were provided a voluntary survey assessing the impact the engagement had on their perceptions of police, awareness of the crime issues and their intent to follow the crime prevention measures recommended by police (Bennett et al., 2019). The results from this survey data demonstrated that the PACT framework improved public perceptions of police, raised awareness of the relevant issues and increased the likelihood that survey respondents would engage in the crime prevention activities suggested (Bennett et al., 2019). Within the current study the PACT messaging framework provided a simple process to easily incorporate the components of procedural justice into an email format.

Research Site

Ipswich Police District is located just west Brisbane in Queensland with a residential population of 212,890 across three Local Government Areas (LGA) (Queensland Police Service [QPS], 2021a). Unemployment across the LGAs within the district is high at 8.2% (Queensland Government Statistician's Office [QGSO], 2021a). Ipswich District also contains the fastest growing population in Queensland, rapidly increasing the number of potential victims (QGSO, 2021b).

This trial sought to take advantage of changes to reporting methodologies in Queensland that requested the email addresses of persons reporting burglary offences. With the implementation of online reporting all victims are requested to provide an email address and or a mobile phone number to receive their unique crime report number (QPS, 2021b). While voluntary, this ensures that updated contact details are provided on each occasion a victim contacts police.

Data

The data for this trial was obtained from the

Queensland Police Records and Information Management Exchange (QPRIME). The variables used included, the address ID (a unique ID for each address), reported date and time, offence start date and time, the informants name, the informants email address, and the unique occurrence number. Address ID was used to uniquely identify each address within the study while the occurrence number identified unique crime reports. Occurrence numbers were converted to a count variable and aggregated by the Address ID to identify repeat victimisation counts.

Methods

The study ran from April 2020 to April 2021, when it had to be concluded due to competing operational requirements. During this time Ipswich Police conducted a daily review of the reported burglary offences from the previous day or previous three days (Friday to Sunday) on Mondays. The offences were exported from QPRIME into a randomisation template which determined if the informant would receive a templated, procedurally just, email or be assigned to the control response. To maintain methodological rigour each address ID was only assigned to a single condition once.

Two weeks after an address was assigned to a condition an email with a survey link was sent out for the control and experimental groups to assess the impact of the engagement on perceptions of police, reasons for reporting the offence, intent to engage in crime prevention strategies and preferred methods of contact. Due to this it was possible to identify victims from both the experimental and control group who had active email addresses. Only victims with active email addresses were included within the current study.

Three months after the trial concluded all burglary offences within Ipswich District reported between April 2020 and July 2021 were downloaded. Three months was selected as a suitable time period to allow for delayed reporting of offences. Using R this data was merged with the data collection sheet to identify addresses that had been subjected to repeat victimisation up to three months post engagement. It is assumed that the engagement used for this study would be short lived.

Continued

As a result, repeat victimisation within the first two months was considered. Shorter time periods such as seven days and one month were also considered but were not used due to the sample size.

Consistent with the extant literature it was observed that a number of addresses were subjected to victimisation prior to their inclusion in the current study (Townsend et al., 2000; Bowers et al., 1998). Due to the increased risk of repeat victimisation for these addresses, the date range was extended to include 12 months of victimisation before the trial commenced and dummy variables created to indicate if the address had been previously victimised (Townsend et al., 2000; Bowers et al., 1998). While previous research has identified ‘at risk’ time periods that place an address at an increased risk of repeat victimisation the time period for the area of the current study was not known. To address this issue, multiple time frames identified in the existing literature were used to develop models with dummy variables for the previous 7 days, previous month, previous three months, previous six months and previous 12 months. Due to the small sample size previous victimisation within this study was identified through a dichotomous variable that identified if previous victimisation existed (“Yes”) or not (“No”).

With the inclusion of additional variables, multivariate regression analysis was used to complete this assessment. Repeat victimisation counts were used as the dependent variable while the assigned condition and pre victimisation dummy variables were used as independent variables. Due to zero-inflation within the data set, negative binomial regression was used to analyse the data (Andresen & Hodgkinson, 2018). Several models were generated with each of the pre victimisation variables and Akaike Information Criterion used to identify the model with the best fit (Agresti, 2018). The MASS package in R was used to complete the analysis (Venable & Ripley, 2002).

Results

Throughout the trial period 505 addresses were assigned to the experiment group and 502 assigned to the control group. Two hundred and eighty-seven (58.7%) of victims from the

experimental group provided a valid email address. Three hundred and twenty (63.7%) of victims from the control group provided a valid email address.

Akaike Information Criterion identified that the model including the dummy variable for victimisation in the previous three months provided the best fit. Within this window of time, 10 addresses were subjected to repeat victimisation from the experimental group.

Representing 3.6% of all addresses involved in the experimental condition. Within the control group, 21 addresses were subjected to repeat victimisation, representing 6.6% of the addresses involved.

Table 1: Repeat Victimization by Condition

	Repeat Victimized	Not Repeat Victimized	Total
Control	21	299	320
Experimental	10	277	287

The results from the negative binomial regression identified that the experimental condition was associated with a decline in repeat victimisation, however, this result was not significant ($p < 0.1$). Victimization in the previous three months was associated with a statistically significant ($p < 0.001$) increase in repeat victimisation.

Table 2: Negative Binomial Regression Results

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-2.67	0.23	-11.52	0***
Condition	-0.68	0.39	-1.73	0.08.
Previous Victimization (3 months)	2.91	0.78	3.74	0.0002***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

Discussion

The results from this study provide some support for the use of procedurally just emails to reduce the rate of repeat victimisation. They also suggest that a more complicated relationship exists between reported crime and repeat victims. The identification of previous victimisation as a control variable within the current study suggests that there are two types of repeat victims, chronic and acute. Further research involving a larger sample size is required to confirm these findings and understand how these two groups differ.

The current study is limited by the sample size which was impacted due to declining property offences during COVID19 lockdowns and only being conducted within a single police district. The reduced sample size also had an adverse impact on the survey results. Despite this limitation the results from this study warrant further investigation. Of particular interest for future research is the consideration that there may difference between victims (chronic and acute). A larger sample size will also increase the analytical strategies available to assess the data. Given the assumption that the impact of the email would not last, survival analysis may be one such strategy. Investigation of repeat victimisation during shorter time periods such as one week and one month would also warrant further investigation with a larger sample size.

The potential these results have within the operational environment are considerable. If a simple email contact proves to be sufficient for an acute repeat victim, then further resources can be made available for chronic repeat victims. The current study provides sufficient evidence to warrant an expansion of the trial which can be readily implemented with minimal impact on law enforcement agency operating costs and resourcing.

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Multiagency programs with police as a partner for reducing radicalisation to violence: Summarizing Some Key Findings from the Campbell Systematic Review

Authors: Lorraine Mazerolle and Lorelei Hine

On May 5th 2021 Mazerolle and her colleagues published a Campbell Collaboration systematic review titled “Multiagency programs with police as a partner for reducing radicalisation to violence” (Mazerolle et al., 2021). The review was funded by Public Safety Canada through a five-year program spearheaded by the US Department of Homeland Security. The goal was to conduct five Campbell Collaboration reviews every year for five years to learn as much as possible as to what the Five Eyes (US, Canada, UK, Australia, and New Zealand) might be able to do better to prevent and control radicalization, extremism and terrorism. Other reviews published as part of this program of work include:

- Counter-narratives for the prevention of violent radicalisation: A systematic review of targeted interventions (Carthy et al., 2020);
- Police programmes that seek to increase community connectedness for reducing violent extremism behaviour, attitudes and beliefs (Mazerolle et al., 2020);
- Cognitive and behavioral radicalization: A systematic review of the putative risk and protective factors (Wolfowicz et al., 2021);
- What are the effects of different elements of media on radicalization outcomes? (Wolfowicz et al., 2022); and
- Online interventions for reducing hate speech and cyberhate (Windisch et al., 2022).

Other reviews that are in progress as part of this program of work include:

- Is radicalization a family issue? A systematic review of family-related risk and protective factors, consequences and interventions against radicalization (Zych & Nasaescu 2021);
- Mental disorder, psychological problems and terrorist behaviour: A systematic review (Sarma, Carthy, & Cox, 2022);
- Hate online and in traditional media: A systematic review of the evidence for associations or impacts on individuals, audiences, and communities (Hassan et al., 2022);
- Mapping the scientific knowledge and approaches to defining and measuring hate crime, hate speech and hate incidents (Vergani et al., 2022);
- Case management interventions seeking to counter radicalization to violence: A systematic review of tools and approaches (led by Sarah Marsden at the University of St Andrews);
- Government-led communication-based interventions for reducing violent extremism (led by Kurt Braddock at American University);

- Are tools that assess risk of violent radicalization fit for purpose? (led by Ghayda Hassan at Université du Québec à Montréal); and
- Criminal justice interventions for preventing terrorism and radicalization: An evidence gap map (led by Michelle Sydes at Griffith University).

The review by Mazerolle and her colleagues (2021) sought to better understand the effectiveness of multiagency partnerships involving police that aim to foster collaboration and reduce radicalisation to violence. The review also sought to synthesise evidence regarding ‘what works’ in terms of implementation, costs, mechanisms, and moderating factors of police multiagency partnerships. From the outset, the review team argued that police could and should play a central role in partnership approaches in the counter terrorism domain “because they are often one of the first points of contact with individuals who have radicalised to extremism” (Mazerolle et al., 2021, p. 1). Mazerolle and her colleagues (2021) defined multiagency interventions as “...two or more entities partnering to solve a shared problem” (2021, p. 4).

The review team used the EMMIE framework developed by the UK’s What Works for Crime Reduction Centre (Johnson et al., 2015; Thornton et al., 2019) to examine the Effects of an intervention, the Mechanisms by which the intervention is believed to work, the Moderators that may vary intervention effectiveness (e.g., characteristics of target people or places), Implementation considerations (e.g., required resources, training), and Economic implications for the intervention in terms of costs and benefits (Johnson et al., 2015; Thornton et al., 2019).

The search for the review used the Global Policing Database (GPD). The GPD is a web-based and searchable database designed to capture all published and unpublished experimental and quasi-experimental evaluations of policing interventions conducted since 1950. There are no restrictions on the type of policing technique, type of outcome measure or language of the research (Higginson et al., 2015). The GPD is compiled using systematic search and screening techniques, which are reported in Higginson and colleagues (2015). The team searched the title and abstracts within the GPD for published articles between 2002 and 2018 using the following search terms: *terror* OR extrem* OR *radical* (see Mazerolle et al., 2021).

The systematic search identified 7,384 potential studies, of which five assessed the effectiveness of police-involved multiagency interventions, and 181 examined how the intervention might work (mechanisms), under what context or conditions the intervention operates (moderators), the implementation factors, and economic considerations. Of the 181 studies, 26 studies met the threshold for in-depth qualitative synthesis to understand the mechanisms, moderators, implementation and economic considerations for police-involved multiagency interventions.

The types of multi-agency interventions in the review included police engaging with community and other agencies to identify terrorist threats (Innes et al., 2011; Ramiriz et al., 2013), partnerships that involved referrals, assessments and case-management of at-risk individuals (Cherney & Belton, 2019), as well as police involved in task forces aimed at reducing radicalisation or extremism (Koehler, 2016).

In terms of assessing the effectiveness of multiagency partnerships involving police, the general finding from the five included studies is that “there is not enough evidence to assess whether these programmes work to reduce radicalisation to violence” (Mazerolle et al., 2021, p. 3). Just one study – the World Organisation for Resource Development Education (WORDE) programme -- assessed the impact of a police-involved multiagency partnership on radicalisation to violence (Williams et al., 2016). The four remaining studies met the inclusion criteria to assess the impact of a police multiagency partnership on interagency collaboration (Baldwin, 2010; Burruss et al., 2012; Carter et al., 2014; Stewart & Oliver, 2014). Namely, this included the US Target Capabilities List (TCL) approach that examined the impact of agency alignment.

"This study revealed that the TCL was associated with better working relationships, more intelligence sharing, and more engagement with the U.S. Federal Bureau of Investigation (FBI), other law enforcement agencies, and fusion centres"

(Carter et al., 2014).

Another of the included studies found that a larger number of collaborative partners was associated with better understandings of missions, responsibilities, and goals at the state and local/ departmental level, but not at the federal level, where more partners was associated with less understanding (Baldwin, 2010). Finally, two studies examined the impact of grants from the U.S. Department of Homeland Security (DHS) on multiagency partnerships, finding that there was a negative direct relationship between the perceptions of the influence of DHS grants, and homeland security preparedness (Burruss et al., 2012) and that the receipt of DHS funding did not significantly predict whether an agency engaged in at least one form of homeland security innovation (Stewart & Oliver, 2014).

Mazerolle and her colleagues (2021) identified 26 studies that were used in the qualitative assessment of how the partnerships worked using the EMMIE analysis. This analysis revealed that it was important for multi-agency teams to take some time to build trust and shared goals among partners (Mazerolle et al., 2021). The review also pointed to not overburdening staff with administrative tasks, having targeted and strong privacy provisions in place for intelligence sharing, and the importance of agency access to ongoing support and training for multiagency partners (Mazerolle et al., 2021). In terms of enablers of program success, the review found that it was important to have a dedicated coordinator to drive a multiagency initiative (Department of

Homeland Security, 2016; Knight, 2009), and partnerships worked well when agencies were co-located (Department of Homeland Security, 2015; Williams et al., 2016). Similarly, the review found that ensuring all agency participants had a clear understanding of program goals that aligned with government priorities (Kerry, 2007; Schanzer et al., 2016), as well as police organisational leadership to facilitate partnership working were important factors (Australian National Audit Office, 2010; Braziel et al., 2015; Department of Homeland Security, 2015; Kerry, 2007; Knight, 2009; Lewandowski, 2012; Schanzer et al., 2016).

The qualitative synthesis of the 26 studies also found that good quality training that directly aligned with end-user needs and priorities and allowed for participant follow-up or ongoing sessions (not one-off) was critical to the partnerships (Carter, 2006; Davis et al., 2016; Department of Homeland Security, 2016; Mabrey et al., 2006; Schanzer et al., 2016). Costs to initiate partnerships and provide products should also be kept low (Mesloh et al., 2003). The synthesis showed that it is important to have intelligence gathering activities separate and distinct from any community outreach activities (Lamb, 2013; Schanzer et al., 2016; Williams et al., 2016; Weine & Younis, 2015). The facilitators for successful implementation were identified as access to funding, increased information sharing (two-way process) and access to applicable intelligence databases and technology (Mazerolle et al., 2021).

Finally, Mazerolle and her colleagues (2021) found that partnerships that have strong privacy, civil rights, and civil liberties policies and protections in place are considered crucial to success, especially in partnerships with many organisations such as in the case of Fusion Centres (Department of Homeland Security, 2015, 2016). Law enforcement needs to be transparent in their engagement, open-minded and offer confidential spaces so partners can talk openly (Williams et al., 2016; Weine & Younis, 2015).

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The advertisement features a background image of a rural landscape with trees and a fence. Overlaid on this are several blue and white text boxes. At the top, a large blue box contains the text 'CRIME STOPPERS VICTORIA'. Below this, three smaller blue boxes contain the words 'IS', 'A', and 'NOT-FOR-PROFIT' in white. In the center, a large blue box with a white checkered border contains the text 'CRIME STOPPERS .com.au' and the phone number '1800 333 000'. Below this, the word 'VICTORIA' is written in large blue letters. At the bottom, a large blue box contains the text 'DONATE ONLINE'. The text 'HELP KEEP YOUR FAMILY AND COMMUNITY SAFE' is written in white across the middle of the advertisement.

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