How can we use Realist Evaluation to better inform research into Alcohol-related Assaults in Night-time Economies? A Case Study using CCTV.

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Figure 1.

Cairns at Twilight

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List of Acronyms used in this Thesis.

ABC	Australian Broadcasting Corporation
ABS	Australian Bureau of Statistics
ACCD	Australian Consortium for Classification Development
AIC	Australian Institute of Criminology
ANZAC	Australian and New Zealand Army Corps
ARA	Alcohol-related assault
ATODS	Alcohol, Tobacco and Other Drugs Service
CBD	Central Business District
CCCSP	Collaborating Centre on Community Safety Promotion
CCLSA	Cairns City Licensee Safety Association
CCTV	Closed Circuit Television
CRC	Cairns Regional Council
DABIT	Drug and Alcohol Brief Intervention Team
ED	Emergency Department (this term includes *Accident & Emergency Department* [United Kingdom] and *Emergency Room* [United States of America])
EDIS	Emergency Department Information System
ICD	*International Classification of Diseases and Related Health Problems* codes
JCU	James Cook University
km	Kilometres
MOU	Memorandum of Understanding
NSW	New South Wales
NTE	Night-time Economy
OLGR	Office of Liquor and Gaming Regulation
POP	Problem-oriented policing
QAS	Queensland Ambulance Service
QH	Queensland Health
QHVSG	Queensland Homicide Victims Support Group
QPRIME	Queensland Police Reporting Incident Management Exchange
QPS	Queensland Police Service
SIMS	Security Incident Management System
WHO	World Health Organisation

Abstract

The problem of alcohol-related assaults (ARAs) in night-time economy (NTE) precincts is an ongoing issue of policy concern and research interest. One punch truly can kill. This thesis examines the feasibility of a multi-agency linking method to more accurately count these kinds of assaults in close to real-time in order to inform suitable responses by Queensland liquor accords. This can provide more timely evidence to evaluate interventions. This thesis was the first Australian research to achieve this. The Cairns Hospital Emergency Department, the Queensland Police Service and the Cairns Regional Council *Closed Circuit Television* (CCTV) system are capable of providing relevant data regularly. Venues can provide relevant data but capacity to do so regularly is limited. Results support previous research regarding prevalence and time of occurrence of NTE ARAs. The thesis also uses *Realist Evaluation* to examine how an urban, open-space CCTV system responds to, and reduces, these NTE ARAs. The realist evaluation approach explains why quasi-experimental studies have found CCTV has no effect on this type of offence, but practitioners see CCTV as vital. The thesis shows why the theory of deterrence through CCTV does not apply to NTE ARAs. Conflicting empirical results regarding the efficacy of CCTV in broader crime reduction are explained. A case study analysis of CCTV to address NTE ARAs identifies initial context-mechanism-outcome configurations. The thesis provides evidence that suggests realist evaluation is an appropriate approach to address ongoing methodological problems in studying ways to reduce NTE ARAs.

Chapter 1. Introduction

Assaults in and around venues licensed to serve alcohol can be a sudden killer (Rossow, 2001; Schumann, 2019). This is reflected in a multi-year public awareness campaign by the Queensland Police Service and homicide victims support groups, with the message that "One Punch Can Kill" (QHVSG, 2020). There were 127 of these deaths in Australia between 2000 and 2016; 73% involved alcohol; each one was preventable (Schumann, 2019). The community of Cairns has experienced a number of such incidents since 2008, most recently one death in 2019 (ABC, 2019).

Cairns is a regional tropical city in the far north of Queensland, Australia. At the time of this study the city had an estimated residential population of approximately 163,000 at (ABS, 2011). Cairns is also an international and domestic tourist destination, then hosting over 550,000 visitor nights, including a significant 'backpacker' component, young people travelling on a tight budget (TTNQ, 2010). As a popular place for domestic and overseas travellers to visit, the inner-city of Cairns has a vigorous night-time economy (NTE). Cairns' central business district (CBD) comprised an area of around 0.6km^2. The CBD contained numerous day-time economy businesses, and 26 venues licensed to sell liquor after midnight in its night-time economy. Eight of these venues were licenced to trade beyond a *lockout* time at 3am (Pointing, Hayes-Jonkers & Clough, 2013). The lockout means that patrons who leave these particular premises after 3am cannot re-enter (Palk, Davey & Freeman, 2010) prior to these venues closing at 5am. The CBD is continuously monitored by a *closed circuit television* (CCTV) system owned and managed by Cairns Regional Council (CRC), and staffed by a private security contractor. One of the stated aims of the system was to reduce assaults in the inner city (CRC, 2009). The technology comprised 81 late-generation pan-tilt-zoom digital cameras and related computer infrastructure. These were actively monitored by at least one camera operator at all times, who could direct the camera's field of view. Operators had constant radio contact with street security contracted by Council, and with licensed venue security during their hours of operation. Operators also had telephone contact with police and fed live footage from any given selected camera directly to the police communications room.

According to police statistics, 46% of assaults in Queensland between 2004 and 2014, were alcohol related (Nepal, Kypri, Attia, Chikritzhs et al., 2019). Publicly available police statistics did not disaggregate the number of offences to a divisional or station level sufficiently narrow enough to estimate the number of assaults in Cairns city (QPS, 2010). The Cairns District of the Far Northern Region, incorporating the entire city, had assaults 1.95 times higher than the Queensland average (QPS, 2010). One hospital Emergency Department (ED) located within two kilometres of the NTE

precinct, services the city (Smith, O'Hagan, & Gole, 2006; QH, 2013). An increasing number of presentations had been recorded for the Cairns ED (QH, 2013), although the data capture system that recorded ED presentations did not identify or report alcohol-related events in a systematic or standardised way (Barker, Swaminathan, Aaora et al., 2011). Assault was a common cause of eye injury presentations to the Cairns emergency department, with alcohol use documented in 76.2% of assault-related presentations (Smith, O'Hagan & Gole, 2006).

Cairns was an accredited *International Safe Community* (CCCSP, 2009) at the time of this study, meaning formal networks aiming to improve community safety and reduce injuries had been established and were operating. The inner city liquor accord, a stakeholder network mandated to reduce the number of alcohol-related assaults (ARAs) and other related issues in the Cairns NTE, was established in 2003. The liquor accord membership aimed to improve a number of communication and operational procedures, and assign associated resources (Hayes-Jonkers, Pointing, & Clough, 2012).

1.1 Identification of the problem

Non-sexual, physical assault is the most commonly reported violent crime in Queensland with 34,150 Queenslanders aged 18 years and over estimated to have experienced at least one assault incident in the preceding 12 months (ABS, 2015). Of these assaults, 8.9% were reported as occurring in a *licensed entertainment/recreation venue* (ABS, 2015). Where alcohol contributed to the assault, two-thirds of victims stated they were injured in the incident, and almost 60% sought medical treatment (ABS, 2015). More generally, an estimated 38% of Australians reported being affected by ARAs in the previous 12 months, including 18% who were direct victims (FARE, 2019). A significant proportion of Australians aged 18-34 drink to get drunk (FARE, 2019), and report visiting NTEs with this intention (AERF, 2011).

In NTEs, assaults most commonly occur near the end of the week, in the late night and early morning hours (Doherty & Roche, 2003; Miller, Coomber, Ferris et al., 2019; Palk, Davey & Freeman, 2007). The proportion of women involved in this type of violence is growing, but young adult males still comprise the majority of presentations to hospital EDs (Cherpitel, 2007; Cherpitel, Ye, Bond et al., 2015), the majority of offenders and victims recorded by the police (Donnelly, 2018), and 93% of deaths caused by this type of offence in Australia (Schumman, 2019). One study across five Australian NTEs found a linear increase in blood alcohol concentration among patrons as the night wore on, with a statistically significant number of more highly intoxicated people after midnight compared with earlier evening hours (Miller, Pennay, Droste et al., 2014). Accordingly, in Australia and numerous

other jurisdictions, interpersonal violence related to licensed premises in NTEs is a topic of government and public concern (Gmel, Holmes & Studer, 2016, Morgan, Lyneham, Davy et al., 2018; Miller et al., 2019).

1.2 Definitions

Alcohol-related assaults (ARAs) occurring in the NTE of Cairns city comprise the focus of this study. Alcohol is widely used in most cultures despite knowledge of its behavioural impairment, physical, psychological, and social problems associated with its abuse (Babor, Caetano, Casswell et al., 2010). Alcohol consumption often takes place in social settings within geographically small, inner-city precincts with high densities of licensed premises (Miller et al., 2019; Palk, Davey & Freeman, 2010). People aged 18-34 are more likely to drink in NTE venues (FARE, 2019; Hadfield, 2009). The existence of NTEs is predicated on people in this age group congregating to consume alcohol and engage in related recreational activities (Graham & Homel, 2008; Babor et al., 2010). Nearly half the drinking population of Australians drink to get drunk (FARE, 2019). Consumption of alcohol within NTEs (Miller, Pennay, Droste et al., 2014) has been recognised as a significant risk factor in assaults (Graham & Homel, 2009; Rowe, Wiggers, Kingsland et al., 2012).

Early in this study a decision was made to exclude sexual assaults due to the distinct underlying pathology of that form of violence (Jespersen, Lalumiere & Seto, 2009). This research thus used the definition of assault in the Queensland *Criminal Code Act 1899* (QG, 2013) [Section 245]:

> *A person who strikes, touches, or moves, or otherwise applies force of any kind to, the person of another, either directly or indirectly, without the other person's consent, or with the other person's consent if the consent is obtained by fraud, or who by any bodily act or gesture attempts or threatens to apply force of any kind to the person of another without the other person's consent, under such circumstances that the person making the attempt or threat has actually or apparently a present ability to effect the person's purpose, is said to assault that other person, and the act is called an assault* (QG, 2013).

Research both in Australia and overseas has consistently found that a significant proportion of assaults occurs in the vicinity of a small number of problematic licensed premises in inner-city areas (Martin, Freeman & Davey, 2012) in geographically small, urban, precincts with concentrated high densities of licensed premises (Donnelly, Menendez & Mahoney, 2014; Palk et al., 2007; Pascal, Chikritzhs & Jones, 2009). Research has repeatedly found a higher number of reported alcohol-related assaults in and around these places than in other public spaces (Briscoe & Donnelly, 2003; Morgan, Lyneham, Davy

et al., 2018; Shepherd, 2007; Trolldal, Brännström, Paschall et al., 2013; Wallin, 2007; Wallin, Norström & Andréasson, 2003). Numerous interventions have been identified (Graham & Homel, 2008). Reducing alcohol availability and community action interventions to reducing NTE assaults have been widely implemented, as have enhanced policing efforts, and improving the social environment and built environment at both premise and precinct level (Morgan & McAtamney, 2009). The use of CCTV is also widespread to address assaults and disorder offences in NTEs (Hulme, Morgan & Browne, 2015; Piza, Welsh, Farrington et al., 2019), with mixed findings regarding its effectiveness (Welsh & Farrington, 2009), and suggestions it does not work for this crime type (Piza et al., 2019). These interventions are often based on empirical evidence compiled from research with variable methodological rigour (Jones, Hughes, Atkinson et al., 2011; Liu, Ferris, Higginson et al., 2016; Moore et al., 2011; Philpot et al., 2016), and little theoretical examination of the underlying causes (Graham, 2011). Theories underpinning these approaches are explored in Chapter 2, and measurement problems and other methodological issues are examined in Chapter 3. The next section explores what has been found to work to reduce NTE ARAs, and what does not, beginning with an examination of policy responses.

1.3 Tackling violent crime in the NTE: what works and what does not.

Policy approaches

In Australia, between 2007 and 2013 all state governments revised policy regarding alcohol and implemented new policies to reduce alcohol-related violence linked to licensed premises in the NTE (Miller et al, 2019; Morgan, Lyneham, Davy et al, 2018; Chalmers, Carragher, Davoren, & O'Brien, 2013). Alcohol policy in Australia generally aims to regulate the supply of alcoholic beverages in a population (supply reduction), modify the demand for these beverages (demand reduction), or to reduce the harms associated with alcohol consumption, known as harm minimisation (Lancaster & Ritter, 2014; Loxley, Gray, Wilkinson et al., 2005). Four types of restriction in alcohol availability have been documented in Australian policies: closing time; hours of service or, 'last drinks'; hours in which alcohol can be consumed on the premises; and lockouts (Kypri, 2015). The effectiveness of the first three are examined in the sub-section on alcohol availability below, while lockouts are examined separately.

Historically, the majority of policy responses by Australian governments to reduce alcohol-related harm, and ARAs specifically, focused on environments in and around licensed premises (Loxley et al., 2005; Wardle, 2015). The policy interventions to reduce NTE ARAs have been broadly categorised as educational and situational, and as either targeted, or population-wide (Morgan & McAtamney, 2009). Some research has found that provision of pertinent information to the liquor industry and venue

clusters will be adopted and adapted by managers and practical changes implemented (Hauritz et al., 1998; Hawkins, Sanson-Fisher, Shakeshaft et al., 2009; Homel, Carvolth et al., 2004). This intervention has been found to be associated with substantial reductions in recorded assaults on licensed premises (Warburton & Shepherd, 2004; 2006). Attempts have been made to characterise a specifically 'Australian approach' to alcohol policy, underpinned by principles including balance, partnerships, and a commitment to evidence-based policy (Lancaster & Ritter, 2014). Balancing the economic benefits of NTEs with the harm associated with them appears to be an approach favoured by the Queensland Government (Miller, Coomber, Ferris et al., 2019).

Other Interventions

Systematic reviews of specific non-policy interventions aiming to reduce ARAs and disorder in and around licensed premises have found there is little consistent evidence of any effective interventions to reduce NTE ARAs (Brennan et al., 2011; Jones et al., 2011; Liu et al., 2016). For example, a recent study into premises-level interventions to improve the drinking environment through provision of advice to licensees, reported an increase in police-recorded assaults (Moore, Alum, Heikkenen et al., 2017). Enhanced policing efforts, establishing CCTV systems, improving the social environment and built enviroment at both premise and precinct level have all been widely implemented. Different approaches to address the problem are explored below, beginning with reduction of alcohol availability.

Supply reduction

Reducing alcohol availability to reduce NTE assaults has been a frequently used approaches in Australia (Morgan & McAtamney, 2009). A recent Queensland study into reducing alcohol availability (Taylor, Coomber, Mayshak et al., 2019), found no change in violence levels. In contrast, a recent New Zealand study following national restrictions on late-night availability of alcohol found that weekend hospitalized assaults declined by 11%, and the equivalent of a 4.6% reduction in police recorded night-time assaults (Connor, Maclennan, Huckle et al., 2020). It is suggested that multi-component community action projects with bar-staff training have the best evidence of effectiveness (Jones et al., 2011; Trolldall, Brännström, Paschall et al., 2013). Server training, improved venue-level policies and stricter enforcement may be useful (Brennan et. al, 2011), although these are difficult to sustain without policy changes (Kypri, 2017).

Sharing of ARA injury-related data

One intervention type shown to consistently be effective is the gathering of data on ARA-related injuries within local EDs, combined with police data, and used to inform multi-component, multi-level projects, including targeted policing and enforcement operations (Benger & Carter, 2008; Boyle,

Snelling, White et al., 2012; Florence, Shepherd, Brennan et al., 2011; Quigg, Hughes and Bellis, 2011; Warburton & Shepherd, 2006). These studies are frequently excluded from systematic reviews and meta-analyses due to their single site, pre-post design. For example, in their systematic review of policing interventions to reduce ARA, Liu et al. (2016) mentioned only the Warburton and Shepherd study (2006), out of the five studies cited above. Brennan et al. (2011) mentioned neither of the studies available at the time (Benger & Carter, 2008; Warburton & Shepherd, 2006) in their systematic review, and Jones et al. (2011) cited only Warburton and Shepherd (2006). Phillpot et al. (2019) cited only Florence et al. (2011) in their summary review of the literature, although that focused on methodologies rather than intervention efficacy. Seven of the eight studies reviewed by Droste, Miller and Baker (2014) had been conducted in the United Kingdom. The sole non-United Kingdom study cited was a publication arising from the research in this thesis. A list of peer-reviewed publications arising out of this thesis is attached at Appendix 1. All studies that measured the effectiveness of this intervention reported substantial reductions of assaults post-intervention (Droste et al, 2014). Other descriptive studies examining the utility of this data sharing intervention suggest it is useful and call for further research into its utility (e.g. Bellis, Leckenby, Hughes et al., 2012; Moore, Brennan & Murphy, 2011). Studies also hint that the frequency of this data provision may be important. Although the study designs and outcome measures varied, monthly sharing of combined intelligence (e.g. Benger & Carter, 2008; Florence, Shepherd, Brennan et al., 2011; Quigg, Hughes & Bellis, 2011), was seemingly associated with a greater effect than sharing data relating to incidents that occurred many months earlier (e.g. Boyle, Snelling White et al., 2012). One early study (Warburton & Shepherd, 2004) discussed the timeline for data provision frequency and reduction in assault attendances once data sharing became routine and monthly (see Warburton & Shepherd, 2004, pages 474 & 476).

Interventions based on this data sharing intervention have included door staff training, contact with venue managers from the project team or visits from ED surgeons detailing the harm occurring on their premises (Warburton & Shepherd, 2006), increased CCTV focus, increased availability of late night transport or managing vehicle and pedestrian traffic and parking to convey patrons away from the site on closure (Warburton & Shepherd, 2006; Florence et al., 2011), enhanced covert and overt venue monitoring by regulatory authorities, (Warburton & Shepherd, 2006; Quigg et al., 2012), and referral of patients to alcohol treatment services, and public health interventions (Quigg et al., 2012). Studies measuring intervention effectiveness reported substantial reductions of assaults and ED attendances post-intervention (Droste et al., 2014). However, a significant reduction in ARAs on licensed premises, was reported to have been displaced from venues to the surrounding streets, reflecting the need for multi-level interventions both on premise and in the NTE (Warburton &

Shepherd, 2006). Combining anonymised, incident level data creates a clearer picture of the ARA problem, immediately suggesting co-ordinated prevention strategies (Benger & Carter, 2008).

Finally, effectiveness of this data sharing intervention increased with time as program partners became more familiar with the data available to them (Droste et al., 2014). As suggested by these studies, this intervention of gathering ED data on NTE ARA-related injuries and sharing with police and other intelligence sources has been found to be crucial to, and effective in, community action approaches.

Community Action

Community action, or community coalition, approaches are partnered, simultaneous multi-level, multi-stakeholder efforts, often informed by crime pattern and epidemiological data, usually led by a steering committee (Graham & Chandler-Coutts, 2000; Hauritz et al., 1998; Hoggard et al., 2015; Troldall et al., 2013). Along with reducing alcohol availability community action interventions has been the most frequently used approach to reduce NTE assaults in Australia (Morgan & McAtamney, 2009). Community coalition intervention projects often combine education of licensees, training of servers and other bar staff, police and regulatory enforcement to improve alcohol-serving practices and other premise-level interventions (Homel, Hauritz, Wortley et al., 1997; Warburton & Shepherd, 2006; Wiggers, Jauncey, Considine et al., 2004), and community-based participatory research to reduce ARAs in NTEs (Allamani, Casswell, Graham et al., 2000; Conway, Greenaway, Casswell et al., 2007; Haggård et al., 2015). This multi-level approach combines aspects of public health and criminology (Akers & Lanier, 2009; Brennan et al., 2011). A community action project had previously been successful in Cairns (Hauritz et al., 1998). This study was part of a series of community action interventions that aimed to reduce violence in licensed venues in a number of Queensland cities. The intervention was successful in the three regional cites in which it was implemented, and initially successful in the Gold Coast. No follow-up analysis was conducted in the regional centres, and a follow-up study on the Gold Coast found all gains had been lost because compliance with the voluntary code had ceased (Hauritz et al., 1998). This was due to a lack of enforcement of the code, and because licensees found it commercially unviable to adhere to aspects (Liu et al., 2016) such as liquor pricing, hours of operation and changes to the built environment when their competitors did not (Hauritz et al., 1998). The liquor accord in Cairns was established soon after the conclusion of the Hauritz et al. (1998) intervention study. In Australia, a modified community-action approach often occurs through the implementation of liquor accords.

Liquor Accords

Liquor Accords are voluntary, cooperative agreements between police, other regulatory authorities and licensees that aim to proactively improve public safety without relying on enforcement activities (Liu et al., 2016). Liquor accord interventions are generally a set of principles and a number of identified actions agreed by all stakeholders. These actions can include agreeing to levels of security surveillance, and use of two-way radios, sharing lists of banned patrons, utilising ID scanners at high-risk licensed venues, and agreed emphasis on contacting police as soon as problems are identified (Liu et al., 2016). Queensland police are formally involved in Liquor Accords across the state through a *Liquor Enforcement and Proactive Strategies* (LEAPS) division comprising officers in every police district and a state-wide coordinator. Queensland Police are formally involved in a liquor accord in the Cairns inner city (Clough, Hayes-Jonkers & Pointing, 2013).

Evaluations of liquor accord effectiveness in reducing assaults have found mixed results. An early evaluation of liquor accords (Lang & Rumbold, 1997) found that each of three accords achieved a reduction in ARAs. Only one liquor accord successfully sustained the reduction in assaults over time, with the other two accords ceasing to function effectively when external funding ended. Factors crucial in this failure were the cessation of centralised leadership, a reduction in consistent police enforcement, a termination of communication of relevant evidence and information to each of the stakeholders, and failure to instil the sense of ownership for the project among licensees that may have led to effective self-regulation (Lang & Rumbold, 1997). A New South Wales evaluation found the model reduced ARAs in four out of five sites, one site recorded no change, and increased assaults were recorded in three locations. No statistical analysis was performed (Liu et al., 2016). The Drink Safe precincts intervention in Queensland built on liquor accords, but relied more on enforcement rather than a voluntary code (Liu et al., 2016). The program is ongoing, and has incorporated more policy changes (see Taylor, Miller, Coomber, Mayshak et al., 2019), with mixed results regarding effectiveness. Studies suggest that interventions through accords shown to be effective are based on improved communication between stakeholders. They include strategies such as:

- safe late-night public transport initiatives (Miller, Sønderlund, Coomber et al., 2011),
- repeated operations involving higher police visibility, on the spot fines, and undercover policing operations (Miller, Sønderlund, Coomber et al., 2011),
- increased deployment of CCTV systems and implementing CCTV with real time communication (Miller, Sønderlund, Coomber et al., 2011).

As suggested above, improved communication and data sharing are central to any effectiveness. Data-led strategies and tactics are central to policing interventions (Wiggers, Jauncey, Consadine et

al., 2004; Liu et al, 2016; Morgan et al, 2018). The section below provides an overview of the policing approach to reduce ARAs in NTEs, beginning with an examination of *problem-oriented policing* (POP).

Policing Interventions in NTEs

A significant proportion of all recorded assaults in Australia occur in and around a small number of licensed premises within these NTEs (Doherty & Roche, 2003; Morgan et al., 2018); generally occurring near the end of the week, in the late night and early morning hours (Laing, Sendall & Barker, 2013; Miller et al., 2019) among young adult males and a high association overall between the time of assaults reported to police and the time of alcohol-related ED presentations (Descallar et al., 2012; Donnelly, 2018). Studies have repeatedly shown that only a small handful of venues in NTEs are responsible for the majority of ARAs in NTEs (Lui et al., 2016), and that the odds of major injury are two times higher in these hot-spots than in other locations (Dinh, Bein, Roncal et al., 2014). Hot-spots are geographically small places where high levels of crime occur (Eck & Weisburd, 1995). The predictability of this violence offers opportunities for preventative interventions which police have attempted through hot-spot policing, enforcement operations or proactive policing (Liu et al., 2016). In a systematic review and meta-analysis of the effectiveness of hot-spot policing (Braga, Papachristos, & Hureau, 2014), approaches were conceptualised as either problem-oriented policing, or traditional policing. Examples of traditional policing include focused enforcement on specific offences, and increased patrols (Braga et al., 2014; reflected in Liu et al., 2016). Based on deterrence, these have been less effective than the POP approach in reducing overall crime (Braga et al., 2014). POP involves ongoing in-depth study to clearly identify, define and diagnose the causes of the crime problem. Police attention is therefore focused on crime hot-spots, and favouring effective interventions (Eck & Weisburd, 1995; Braga, Papachristos, & Hureau, 2014). Studies have found the POP approach reduces levels of ARA compared with more reactive, defensive, and confrontational policing (Doherty & Roche, 2003; Maynard, 2012). Promising findings include a 15% reduction in reported alcohol-related offences in and around premises in New South Wales NTEs that received POP interventions (Wiggers et al., 2004) together with a reduction in non-domestic violence assault offences by up to nine offences per month (Miller, Tindall, Sønderlund et al., 2012), with perhaps 33 ARA incidents prevented per quarter (Kypri, Jones, McElduff et al., 2011).

The POP approach attempts to identify and address problem practices in licensed premises and locations early (Doherty & Roche, 2003). Proactive policing and operational enforcement have attempted to regulate the behaviours of venue operators, crowd controllers, private security staff, and bar staff, increased refusal to serve alcohol to obviously intoxicated patrons [known as *responsible service*], and regulate patron behaviour (Doherty & Roche, 2003; Graham, 2009). Proactive

enforcement strategies as part of collaborative, proactive policing strategies are potentially most effective if supported by Liquor Accords.

The *Queensland Police Service* (QPS) introduced a POP approach in 2001 (Atkinson, 2004). This enduring QPS model incorporates four stages; *Scanning, Analysis, Response,* and *Assessment* (SARA) to integrate crime prevention into routine police activities (Atkinson, 2004; Palk et al., 2007), including proactive policing of ARAs in NTEs. Following the implementation of the SARA model, assault offences declined year on year for three years (Mazerolle et al., 2007). The introduction of SARA led to improvements in alcohol-related data collection at a local level (Mazerolle et al., 2007; Chilvers & Weatherburn, 2004). Gathering and analysis of data to clarify crime prevention priorities assists in identifying and enlisting stakeholders, specifying outcome measures and intervention techniques and developing and refining evaluation strategies (Chainey & Chapman, 2013), although the information must be timely to be useful (Chainey & Chapman, 2013). As such, intelligence-led policing collects data prospectively, although these efforts have sometimes previously not been rigorous (Cherney & Sutton, 2007). Deterrence in crime hot-spots is commonly cited (Braga et al., 2014) through increased enforcement to improve alcohol-serving practices and other premise-level interventions (Homel et al., 1997; Warburton & Shepherd, 2006; Wiggers et al., 2004). Policing strategies and tactics to reduce ARAs in NTEs are most effective in circumstances where enforcement operations and routine policing are driven by data (Doherty & Roche, 2003; Florence et al., 2011). Strategies that harness the capacity of other stakeholders have also been shown to be more effective than police-only strategies (Cherney & Sutton, 2007). Unlike previous studies by Homel et al. (1997) and Doherty and Roche (2003), Fleming (2008) found that the way police approach NTE ARAs has shifted toward a greater emphasis on community collaboration, and the focus of enforcement efforts moving from patrons to licensed premises. Doherty and Roche (2003) suggested police collaborate with licensed venue operators, liquor authorities and local government to design and re-design licensed premises and NTE precincts to eliminate crowding, congestion and excessive noise within venues addressing aspects of all three issues of service, environment and enforcement (see also Graham & Homel, 2008).

Reducing alcohol availability

Interventions to reduce alcohol availability in NTEs and associated harms include lockouts, training of venue staff in responsible service of alcohol, and policy changes (Miller et al., 2019). In 2016 the Queensland Government enacted laws specifically designed to limit alcohol availability in NTEs. The *Tackling Alcohol-Fueled Violence Amendment Act* [2016] (QG, 2016), requires that Queensland venues call last drinks at 2am, with exemptions for *Safe Night Precincts* to be imposed from February 1, 2017. Venues in these designated Safe Night Precincts are required to stop serving alcohol at 3am (with a

1am lockout). An outcome evaluation of four Queensland precincts (Taylor, Miller et al., 2019) found that limiting alcohol availability had no significant effect on assaults. The four specified precincts were Cairns, Fortitude Valley in Brisbane (Queensland's capital), Surfers Paradise on the Gold Coast (a large coastal city conjoined with Brisbane, and an international and domestic tourist destination), and Townsville (the largest regional city in Queensland).

Lockout Strategies

Lockouts prevent patrons from entering or re-entering licensed premises after a specified time (Palk et al., 2007). The findings are mixed regarding long term significant reductions of NTE ARAs through lockouts (Kypri, McElduff & Miller, 2014; Miller et al., 2011). Palk et al. (2007) further examined the effect of an intervention which prevented patrons from entering or re-entering licensed premises in three Queensland NTEs (an intervention known as *lockouts*). Following the implementation of a Lockout strategy in the Queensland cities of the Gold Coast and Brisbane, recorded ARA offences reduced but not to a statistically significant level, although sex offences and street disturbances declined significantly (Palk et al., 2007). The Gold Coast experienced greater reductions in offences than in Brisbane. Respondents to the qualitative study partially attributed this to the community consultation processes prior to the introduction of the strategy in the different settings (Palk, Davey, Freeman, & Morgan, 2012).

Stakeholder views also differ regarding effectiveness and the implementation processes of the strategy (Miller, Palmer, McFarlane et al., 2014; Palk et al., 2012). Agencies or licensees involved in NTEs in New South Wales (NSW) and Victoria viewed lockouts negatively, with nearly two thirds believing them ineffective (Miller, Palmer, McFarlane et al., 2012). In Queensland, industry respondents were more positive, citing the benefits of improved patron safety to attract higher numbers of patrons; but overall licensees had mixed views (Palk et al., 2012). There were quantitative differences in the effectiveness of this strategy at the Queensland sites, with the Gold Coast showing greater reductions than Brisbane. Respondents partially attributed this to the community consultation processes prior to the introduction of the strategy in the different settings. The policing perspective was a key focus of this qualitative research, along with industry views and those of local government and liquor regulators (Miller, Palmer, McFarlane et al., 2014; Palk et al., 2012).

CCTV

It is estimated that two thirds of local councils in Australia have CCTV systems, with two thirds of all councils in Queensland reporting current operation of open-space CCTV (Hulme, Morgan & Brown, 2015). A significant proportion of these operate in NTEs, although only 8% of these systems are actively monitored 24 hours a day. Monitoring is suggested to be of most benefit when used to

support the rapid deployment of police or private security personnel; with this relying on an effective working relationship between camera operators and these agents (Hulme et al., 2015). CCTV is often introduced in conjunction with other measures, an approach found to have the largest crime prevention benefits (Hulme et al., 2015; Piza et al., 2019), and recommended in Australia (Clancy, 2009; Maynard, 2012). CCTV has been found to work best when there is a physical response on the ground: real-time communication from the camera operators can rapidly deploy police or private security officers to the site of an assault (Brown, 1995; Gill & Spriggs, 2005; Wells, Allard, & Wilson, 2006; Wilson & Sutton, 2003). For example, Sivarajasingam, Shepherd and Matthews (2003), and Piza, Caplan and Kennedy (2017), identified and illustrated intervention opportunities to interrupt street violence through early detection and disruption of activity and individual behaviours. Piza et al. (2017) identified reasons where operators did not alert police to the potential commission of a crime. In order of frequency reported these were:

1. known delays in dispatching officers to the scene as a result of dispatch queue times,
2. internal procedures regarding incident reporting, and
3. multiple concurrent, or immediately prior incidents distracting the operators from the precursors of those specific incidents.

Several studies have also demonstrated the ability of actively monitored CCTV systems in NTEs to capture assaults not recorded through other means (e.g. Brown, 1995; Gill & Hemming, 2006; Sivarajasingam et al., 2003; Warburton & Shepherd, 2006). Sharing this enhanced surveillance and detection intelligence with police tacticians and liquor enforcement officers has been shown to improve proactive policing and community action strategies (Gill & Spriggs, 2005; Gill, Spriggs, Allen, Hemming et al., 2005; Shepherd & Sivarajasingam, 2005; Wilson & Sutton, 2004; Wilson & Wells, 2007). According to Sivarajasingam et al. (2003) direct phone links and radio contact with police communications and dispatch rooms and the provision of a live video feed to police have shown some effectiveness in reducing ARA injuries. Regular placement of police officers in the monitoring room during peak activity periods enhance operations (Brown, 1995) for both parties due to improved communication and relationships (Hulme, Morgan & Brown, 2015).

Strategic deployment of resources to high ARA times and places, and real-time despatch of an on-the-ground response have, on the other hand, been associated both with reductions in these offences and the documenting of unchanged (Gerrell, 2016) or higher rates of assault and disorder offences (Brown, 1995; Piza et al., 2012). Importantly, there is evidence that hospital EDs experience decreased assault presentations when these support processes are in place, even though police recorded assaults rise (Sivarajasingam et al., 2003; Sivarajasingam & Shepherd, 2009). There is evidence that CCTV limits physical harm by restricting the duration of the assault incident, and thereby potentially curtailing the

number of blows, and subsequent injuries (Sivarajasingam, Shepherd & Matthews, 2003). The ability of CCTV surveillance camera operators to actively detect assault incidents is critical, and can be affected by the performance of camera operators who monitor the systems (Gill, Spriggs, Allen, Hemming et al., 2005; Norris & Wilson, 2005; Piza et al., 2019; Wilson & Wells, 2007). Technological factors such as camera placement and the field of view of the CCTV cameras also affect monitoring capacities (Blixt, 2003; Piza, Caplan, & Kennedy, 2014). Some evidence suggests that observers of CCTV footage can differentiate between behavioural sequences ending in violence and matched sequences which do not (Troscianko, Holmes, Stillman et al., 2004), and that NTE assaults (Barker, 2010) and other violence (Piza et al. 2017), are sequenced processes, offering the potential to refine research into this area (Piza et al., 2019).

1.4 Research questions

Six studies were used to answer two research questions to address the problem of ARAs in the Cairns NTE. The research was conducted in two phases.

Phase 1 addressed the question:

> *Is it feasible to collect, collate and share de-identified data on the number and circumstances of ARAs in the Cairns NTE in order to inform stakeholder interventions to reduce this type of violence?*

Phase 2 addressed the question:

> *How does an urban, open-space CCTV system with real-time communication links to agents on the ground act to address ARA in a NTE?*

Phase 1 took a community action approach. The design comprised three interconnected qualitative and quantitative studies to inform the development, implementation, and evaluation of interventions to reduce this type of violence. The objectives were:

1. to define the boundaries of the Cairns NTE and the context of ARAs within that boundary,
2. to design and pilot a multi-agency, quantitative data collection tool that would count the number of ARAs more accurately than current methods, and
3. develop a way to count these assaults in as close to real-time as possible, so that the results of this research could be translated for the stakeholder network mandated to implement interventions to reduce these assaults.

Study 1 sought to understand the ecology of the Cairns NTE. This study specifically sought to explore the feasibility of collecting and compiling accurate quantitative data on NTE ARA incidents in close to real-time from multiple stakeholders. Study 2 aimed to design and implement this monitoring tool. Study 3 reported these quantitative results. Inescapable problems of complexity arose during these studies.

The second phase of the research emerged to address the methodological and theoretical challenges of an empirical approach. It was decided to explore the utility of applying Realist Evaluation (Pawson & Tilley, 1997), to the problem of reducing ARAs in NTEs. Realist evaluation is a theory-driven approach for explaining and evaluating social programs (Pawson & Tilley, 1997). The methodology analyses chains of implicit assumptions to explicate the theory or theories underlying the interventions under study, and is now an established approach in the disciplines of public health and criminology (Coryn, Lindsay, Noakes et al., 2011; Shearn, Allmark, Piercy et al., 2017; Taylor, 2010). Realist Evaluation asserts that there is an objective social reality which can be observed and measured, but acknowledges that there are limitations to empirical measurement. The context–mechanism–outcome (CMO) configuration is the main unit of data analysis to observe patterns or regularities in how programs cause change (Pawson & Tilley, 1997). The approach is specifically designed to provide evidence for policy and practice in complex social interventions; it aims to make clear *what works for who and why* (Pawson & Tilley, 1997). There are numerous examples of this approach being useful to policy makers and practitioners across jurisdictions and disciplines (Sanderson, 2002; Taylor, 2005; Wilson & McCormack, 2006). The body of realist literature is growing, and guidelines on how to conduct a realist evaluation have been published (Pawson & Manzano-Santaella, 2012), as have reporting and quality standards for realist evaluation (Wong, Westhorp, Manzano-Santaella et al., 2016) and realist synthesis, a form of literature review (Wong, Westhorp, Pawson et al., 2013).

The studies in both phases of research in this thesis were conducted prior to the release of this guidance, and did not benefit from these standards. Realism is, however a general research strategy, not a strict technical procedure (Pawson & Manzano-Santaella, 2012). The studies in Phase 1 of this research were conducted from a purely empirical standpoint (see Chapter 4, pages 55-68, below). Phase 2 of the research (see Chapter 4, pages 69-71, below) comprised Study 6 and a case study analysis (Koenig, 2009) into CCTV utilising realist evaluation principles (Pawson & Manzano-Santaella, 2012). Importantly, realist evaluation can be applied retrospectively (Pawson & Tilley, 1997). One early finding of Study 1 was the important role the Cairns CCTV system plays in addressing night-time violence in the inner city. CCTV was chosen as the subject for the Realist Evaluation case study due to the wide use of CCTV in Australia and internationally (Hulme et al., 2015; Piza, Welsh, Farrington et al., 2019). Realist evaluation also has been implictly and explicitly used to evaluate the effectiveness

of CCTV systems (Brown, 1995; Gill & Spriggs, 2005; Piza, Caplan & Kennedy, 2014; Taylor 2010; Tilley, 1993). The approach is endorsed as an appropriate methodology by the *Australian Institute of Criminology* (Anderson & McAtamney, 2011), and a recent review emphasises the importance of undertanding contexts and mechanisms to achieve outcomes (Piza et al., 2019).

To answer the second research question, 'How does a constantly monitored, urban, open-space CCTV system with real-time communication links to police and private security reduce NTE ARAs?', three aspects of CCTV were examined:

- Study 4 assessed the operations of the Cairns CCTV system with good-practice recommendations found in the literature.
- Study 5 examined camera operator dispatch of agents on the ground to prevent and interrupt assault incidents.
- Study 6 examined the accuracy of data on assault incidents entered by camera operators, which may be important to inform community action interventions. Study 6 was designed according to Realist principles. It describes CMO configurations relevant to this domain of operations.

Empirical data from the first and second studies into the Cairns CCTV system (Studies 4 & 5) were re-examined, and a realist lens was retrospectively applied to the first iterations of outcomes found. The results of the Phase 1 studies were also reassessed through *Realist Evaluation* principles. While the Realist approach has been used to examine alcohol-related harms in Australia (Hunter, Maclean, Berends, 2012), no Realist Evaluation studies into ARAs in NTEs were found. Can applying Realist Evaluation help us to better understand ARAs in the NTE? If so, how? And who can use this understanding to reduce this violence and in what circumstances?

1.5 Structure of the thesis

The structure of this thesis is as follows:

- Chapter 1, a brief introduction: defined NTEs and ARAs and outlined the significance of the problem and described research approaches found to be effective for reducing the number of NTE ARAs and associated injuries.
- Chapter 2 summarises the theoretical foundations of previous research, including a brief examination of the interaction between alcohol and aggression, as well as approaches used to address the problem of NTE ARAs.

- Chapter 3 addresses the measurement of NTE ARAs: different methodological approaches, distinct data sources and what they reveal, and issues of reliability and validity. Chapter 3 also explores the application of Realist Evaluation in more detail.
- Chapter 4 details the methodology and methods used to address both research questions in this thesis through six studies.
- Chapter 5 reports the results of the qualitative research into ARAs in the Cairns NTE (Study 1).
- Chapter 6 reports the results of the design and implementation of the multi-agency, monitoring tool to more accurately count the number of these assaults (Study 2).
- Chapter 7 reports the quantitative results of the monitoring tool (Study 3).
- Chapter 8 describes the findings of the three original CCTV studies.
    i. The first of these is Study 4, a comparison of Cairns system operations with good-practice recommendations found in the literature of the Realist Evaluation.
    ii. Study 5 examines the ability of the Cairns CCTV system to identify and interrupt or prevent assaults incidents through deployment of agents on-the-ground. Both Studies 4 and 5 suggested context/mechanism/outcome configurations relating to these aspects of how CCTV may address NTE ARAs in Cairns.
    iii. Study 6 was the first study designed according to Realist principles, and examines the accuracy of incident data entered by camera operators.
- Chapter 9 refines the findings of Chapter 8 into a Realist Evaluation approach, before incorporating relevant aspects of the findings of Studies 1, 2 and 3 into this methodology.
- Chapter 10 concludes the thesis by outlining key contributions to knowledge and future research directions.

Chapter 2: Theorising violent crime in the NTE

Chapter 2 focuses on theories of ARAs in NTEs, the interplay between alcohol and violence, and approaches to this problem. Particularly attention is paid to deterrence within the community action approach, which is a commonly cited mechanism of CCTV (Piza, Welsh, Farrington et al., 2019) community and situational crime prevention. As noted in the introductory chapter, the current research began with an attempt to establish the feasibility of implementing a multi-agency monitoring tool to improve evaluation information to stakeholder networks mandated to intervene in Cairns to reduce NTE ARAs. Section 2.1 overviews systematic reviews examining various aspects of the problem. Section 2.2 explores the community action approach to understanding NTE ARAs, and the underpinning theories regarding these partnerships. This multi-level, multi-stakeholder approach has its own theory regarding management of this intervention and research methodology, combining aspects of public health and criminology. Section 2.3 examines the public health approach to NTE ARAs, particularly the application of epidemiological models. The public health approach has extensively applied alcohol availability theory to epidemiological examination of NTE ARAs. Section 2.4 explores a mechanism applicable to alcohol availability theory as it relates to assaults. Section 2.5 explores criminological theories relating to NTE ARAs. Section 2.5 scrutinises the theory of deterrence and CCTV, and Section 2.6 summarises the chapter.

2.1 Reviews of NTE ARA research

Reviews of the effectiveness of interventions to reduce NTE ARAs rarely consider theoretical underpinnings. Instead they generally focus on a range of outcomes related to ARAs. For example, Taylor, Miller, Coomber et al. (2018) found no pre-existing theoretical models that suggested how various alcohol restrictions might reduce alcohol-related harms in NTE environments. Alcohol availability theory had previously been used to explain the effect of community-wide restrictions (Chikritzhs, Gray, Lyons, & Saggers, 2007). Taylor, Miller, Coomber et al. (2018) attempted to refine how these restrictions may reduce assaults and related injury in NTEs. How alcohol availability theory may explain these assaults was not explored. Alcohol availability theory is examined below.

Systematic reviews (e.g. Brennan, Moore, Byrne et al., 2011) often focus on environmental risk factors contributing to disorder and severe intoxication in and around NTE licensed premises, and interventions to reduce these outcomes. There was no mention of theory relating to any of these domains in Brennan et al. (2011, see p.712). Jones, Hughes, Atkinson et al. (2011) focused on the effect a range of environmental and community action interventions on a number of particular NTE alcohol-related harm outcomes. Jones et al. (2011, pages 516-517) listed factors contributing to success in reducing NTE ARAs, particularly long-term sustainability, effective partnerships, and

ongoing evaluation in multi-component community action projects, but theories underlying these and other nominated success factors were not made explicit. In both reviews, interventions were categorised as either premise-level, enforcement, multi-component (or multi-level and community action), and liquor accords.

Stockings, Bartlem, Hall et al. (2018) focused on the effectiveness of whole-of-community interventions in reducing alcohol-related harms including assaults, in specific settings, including NTEs. Again, no underpinning theories were mentioned, although factors such as developing a culture of intersectoral collaboration were noted as contributors to higher intervention fidelity (Stockings, Bartlem, Hall et al., 2018). Stockings, Shakeshaft and Farrell (2018) focused on community-wide approaches to alcohol availability. Demand reduction, rather than reducing supply, has been the preferred approach (Stockings, Shakeshaft & Farrell, 2018). Lui, Ferris, Higginson et al. (2016) systematically reviewed Australian policing interventions to reduce ARAs: there was again a focus on outcomes and a list of intervention types, with the sole mention of theory noting only that theoretical complexities exist in this type of research.

With the exception of the Taylor et al. study (2019) noted above, all of these reviews included a focus on the methodological quality of included outcome evaluation studies. In contrast, Philpot, Leibst, Moller et al. (2019) specifically reviewed methodologies used to study NTE ARAs. Where the authors listed risk-factors linked with this type of violence, they also noted posited reasons as to why this violence occurred within a particular setting or context. Only Philpot et al. (2019) assessed methodological potential to establish causal claims. And it was the only review that aimed to assess the applicability of methodologies to measure outcomes relating to the motivations and meanings of violence, and interactional dynamics of NTE ARAs.

2.2 Community Action approach

The *Community Action* methodology is a multilevel, multicomponent program based on a systems approach, that generally includes a community coalition steering group (e.g. Haggård, Trolldal, Kvillemo et al., 2015). The approach has been one of the dominant paradigms of research addressing NTE ARAs (Miller, Sønderlund, Coomber et al., 2011), and has been favoured in Australia (Morgan & McAtamney, 2009). Terms such as c*ommunity coalition research, community-based participatory research, community-engaged research, community participation*, and *community engagement* have been used to refer this broad family of research and intervention practices into ARAs in NTEs (e.g. Haggård et al., 2015). A community action intervention project was previously conducted in Cairns (Hauritz, Homel, McIlwain et al., 1998).

Multicomponent community-action programs to address NTE ARAs (e.g. Haggård et al., 2015), are based on a system-wide approach (Stockings, Bartlem, Hall et al., 2018), with the over-arching theory suggesting prevention of assaults is most likely through combining increased understanding of the licensed environment, with associated evaluation and feedback to a steering group (e.g. Haggård et al., 2015; Hauritz et al., 1998). This group can then implement and monitor interventions. These interventions are examined in Sections 2.3 and 2.4 below, but broadly speaking the theories presume that the more parts of the system related to alcohol that are addressed, the more effective the program will be (Haggård et al., 2015). Local contextual knowledge in measuring and interpreting change (Graham & Homel, 2009; Haggård et al., 2015), and the importance of time and of place as defined in an ecological way (Doll, Saul & Elder, 2008), is crucial information (Newton, Hirschfield, Sharratt et al., 2010). This is rarely collated in a consistent format to reduce ARAs in NTEs (Newton et al., 2010). Attempts to overcome these gaps are the rationale for the extensive use of community coalition projects (Graham & Homel, 2008).

The community action literature has made an analytic distinction between the benefits of partnership governance and the outcomes of intervention projects (e.g. Haggård et al., 2015). Even community coalition projects that are extremely successful in terms of implementation and community awareness, are rarely able to demonstrate a clear impact on objective quantifiable indicators (Brennan et al., 2011). Recent studies aiming to understand the theoretical foundations of community action approaches to address ARAs are difficult to find. One study cited above (Stockings, Bartlem et al., 2018), addressed community engagement projects across harms and across settings. Giesbrecht, Bosma, Juras et al. (2014) focused on collaborative policy development and implementation at a local level to address alcohol-related harms, including violence. The authors drew attention to a number of projects (Wallin & Andréasson, 2009; Homel, Hauritz, Wortley et al., 1997; Treno, Gruenewald, Lee, et al., 2007; and Wiggers et al. 2004), suggesting that the findings of these studies remain relevant (Giesbrecht, Bosma, Juras et al., 2014).

One more recent multisite study identified factors that promote or hinder the implementation of a community action intervention to reduce ARAs (Haggard et al., 2015). This was conducted in parallel with an outcome evaluation study that found significant effect of the intervention on police-recorded ARAs linked to licensed premises (Trolldal, Brännström, Paschall et al., 2013). Haggard et al. (2015) noted there remains a lack of information addressing the implementation of this type of community action program, due to both the low number of studies examining the issue, and insufficient reporting of program implementation in those that do. Community action type projects still need a stronger emphasis on building local coalitions so that expertise and commitment can be sustained (Giesbrecht, Bosma, Juras et al., 2014). More detailed information on the process is required. Inadequate

resources to foster sustainability remains an issue; funding still typically lasts a few years, insufficient for meaningful evaluation, and local commitment and resources (Giesbrecht, Bosma, Juras et al., 2014; see also Haggård et al., 2015). Many studies demonstrate the intensity of the community action process, the need for long-term engagement necessitating continuing staffing by a skilled project coordinator and the requirement for a substantial amount of staff effort and expertise (Giesbrecht, Bosma, Juras et al., 2014). Few studies analyse what constitutes sufficient outreach and engagement (Giesbrecht, Bosma, Juras et al., 2014), even when working through existing coalitions rather than organizing new entities. Data on the specific local problems within each community is necessary to target strategies appropriately and effectively. That is, local research capacity and understanding of the local political landscape (Hauritz et al., 1998). Each of these factors affect implementation of community action projects (Giesbrecht, Bosma, Juras et al., 2014); knowing which bodies can impact efforts and where power lies are important (Giesbrecht, Bosma, Juras et al., 2014; Haggård et al., 2015). Despite the evidence base, local groups may not elect to implement appropriate options (Giesbrecht, Bosma, Juras et al., 2014), reflecting findings of earlier reviews (e.g. Holder & Moore, 2000; Graham & Chandler-Coutts, 2000). Local ecological context has also been identified as important, particularly in refining required outcomes of interventions to reduce NTE ARAs (Haggård et al., 2015), or other alcohol-related harms. The community action process often involves addressing complex, poorly defined problems rather than the pursuit and accumulation of incremental social-science knowledge (Graham & Chandler-Coutts, 2000). The process involves a notable lack of control over research objectives and critical project areas (Graham & Chandler-Coutts, 2000; Nation, Bess, Voight et al., 2011). Any existing community-based network contains pre-existing tensions and competing agendas between agencies and individuals (Graham & Homel, 2008). Importantly, community-based research often takes a very long time to implement, partially due to the "myth" of shared responsibility for outcomes (Emanuel & Fuchs, 2008; Fawcett, Schultz, Watson-Thompson et al., 2010).

Underpinnings of success have been identified by studies examining theories of effectiveness in partnered multi-level, multi-sectoral approaches in public health (Brunton, Thomas, O'Mara-Eves et al., 2017; Fawcett et al., 2010), violence prevention (Nation et al., 2011), and NTE ARAs (Holder & Moore, 2000). Clearly defining common goals, including quantifiable measurement of assault reduction, is important (Haggård et al., 2015). So too is task allocation, and not requiring any additional resources or any substantial efforts after its initial phase of implementation (Haggård et al., 2015). Understanding the motivations of different stakeholders, empowerment of stakeholders, and communicative competence (the process of engagement) were all identified as important (Giesbrecht, Bosma, Juras et al., 2014). This reflects earlier findings on community action projects to address

alcohol-related harms, including violence in the night-time economy (e.g. Holder & Moore, 2000; Graham & Chandler-Coutts, 2000). Communicative competence comprised adequate time for community members and other stakeholders to build relationships with one another for negotiation and collaborative working skills, and agreement on shared language, clearly defined target groups, objectives, interventions and programme components, and project design and administrative support elements (Brunton, Thomas, O'Mara-Eves et al., 2017).

Haggard et al. (2015) found that dissemination of the evidence base for what works preceding intervention implementation was also important. Linking the evidence base with local successes was an incentive to implement the intervention; this created a positive attitude toward any proposed intervention and its efficacy (if it is rigorously applied). Recent local negative events associated with ARAs in licensed premises were found to assist uptake of the intervention. Some informants perceived the top-down approach, i.e., recommendations from the capital and from governmental organisations, as a hindering contextual factor. A lack of resources and opportunities to specialise were described as hindering factors. On the other hand, more efficient communication channels and closer relations between staff were seen as promoting factors in the smaller municipalities.

Attending a steering group and performing structured supervision of partner stakeholders was reported as the most difficult aspect of this community action program, and others (Haggård et al., 2015). A reported negative side effect of the community action intervention design was that involvement in the programme for some stakeholders resulted in a feeling of two professional roles, one as an authority over staff and owners of licenced premises, and one as a partner with them. Components of the intervention had to be supported by frequent and structured supervision of partner stakeholders through the steering group, and, if necessary, sanctions for those not following the law (Haggård et al., 2015). Similarly to older studies cited above, effective implementation appears to be enabled by: an understanding of local needs; strong perception among stakeholders of the evidence base and advantages of the intervention; access to knowledge and information; ongoing evaluation and feedback; balance between potential costs and available resources; and clear goals and role definitions. The identification and recruitment of enthusiastic champions, confident in the program was stressed as important, partly due to their ability to influence others. The involvement of large and trendy licensed venues was also influential. Consistent, transparent regular information and feedback about the intervention affected uptake and sustainability through an enhanced sense of agency (Haggård et al., 2015).

The complexities of working within a community action approach to address NTE ARAs appear to have remained largely unchanged over time (Graham & Chandler-Coutts, 2000; Haggård et al., 2015; Holder

& Moore, 2000). Prevention efforts have similarly remained focused on a range of interventions. These include enhanced enforcement, enhanced polices and strategies governing the consumption of alcohol, improved training programs for staff to limit intoxication and violence de-escalation, regulatory change around both precincts and venues, physical and environmental improvements in venues (Giesbrecht, Bosma, Juras et al., 2014; Holder & Moore, 2000; Trolldall et al., 2013). Individual interventions, limiting alcohol availability (including venue density), demand or supply side interventions (Stockings, Shakeshaft & Farrell, 2018), increasing other regulatory restraints, rigorous enforcement of responsible service of alcohol, visible policing, more targeted intelligence-led policing, better management of venues and their built environment, and community wide education interventions, among other efforts, have been tried (Brennan et al., 2011; Graham & Homel, 2008; Jones et al., 2011). The focus on the ecological importance of time and of place of incidents, as well as the underpinning of alcohol availability theory lead logically to exploring the public health approach to NTE ARAs.

2.3 The *Public Health* approach

The public health approach tends to focus on a rigorous epidemiological evidence base; frequently experimental and empirical, rather than theoretical (Lee, 2017). The approach offers inter-disciplinary and multi-sectoral prevention interventions that co-ordinate policy change, economic analysis, health promotion at a population level, and inter-agency collaboration (Doll et al., 2008; World Health Assembly, 2014). Investigation and analysis of factors which make it more likely that incidents of interpersonal violence will occur or re-occur is emphasised (World Health Assembly, 2014).

Public health research often considers violence through an ecological lens comprising bio-psycho-social-environmental factors (Lee, 2015). Studies less often examine the offender's motivation as the most important cause of violent incidents (Lee, 2017), however a combination of characteristics of place and individuals is suggested as underlying the incidence of violence (World Health Assembly, 2014). Violence is often classified as intentional injury, and the incidents causing injury are not random, they are predictable and preventable (Heinze, Reischl, Bai et al., 2016; World Health Assembly, 2014). Injuries are characterized by spatial and temporal patterns, have seasonal variations within long-term trends, and can be analysed as having geographic and socio-economic distributions (Slutkin, 2012). Predictability arises to a greater or lesser extent through an ecological analysis of risk factors which are present at different levels; environmental, social, community, family and individual (Rutherford, 2008; Brennan et al., 2011; Heinze et al., 2016). Epidemiological methods have shown strong leverage in the prevention of injury incidents (Beaglehole & Bonita, 2009; Lee, 2017), even while some epidemiologists (e.g. Hernán, 2015) note that minimising the role of theory in study design

requires addressing narrower questions. This compartmentalisation may not be appropriate when addressing complex, multifactorial problems (Marshall & Galea, 2015). Disadvantages with empirically-based ecological models of violence prevention include limitations to the number of factors which can be incorporated, and particularly, that underlying dynamic processes playing out over time are very difficult to capture or represent (Allegrante, Marks & Hanson, 2006; Lee, 2017). A strength of the ecological framework of violence prevention is its focus on the development and refinement of systems to facilitate the ongoing and systematic collection, analysis, interpretation, and dissemination of information gleaned from health and other data (Mercy & O'Carroll, 1988; World Health Assembly, 2014). These inform the design, implementation, and evaluation of preventative interventions more comprehensively than other approaches. Defining the *risk group* at which interventions are to be targeted is important in this approach. This involves identifying individuals in places and times at greatest risk of assault injury, and any other environmental circumstances which are associated with an increased risk of violence (Lee, 2017).

A great deal of research effort has attempted to determine links between levels of intoxication upon presentation to hospital EDs (e.g. Cherpitel, Ye, Monteiro, 2019), and to differentiate accidental from intentional injuries (e.g. Cherpitel, Bond, Ye et al., 2003; Cherpitel, Ye, Bond et al., 2015). A significant dose-response relationship between blood alcohol level and ARA injury has been found (Young, Stockwell, Cherpitel et al., 2004; Quinn, Hides, Harding et al., 2017). For example, the odds of incurring a violent injury were significantly higher for patients with blood alcohol levels above 0.08g/100ml (e.g. Cherpitel, 2007; Quinn et al., 2017).

As noted above, one widely used manipulation of environmental aspects at a venue level to prevent assaults and disorder is limiting alcohol availability (e.g. Taylor, Miller, Coomber et al., 2019), consistent with alcohol availability theory (Chikritzhs, Gray, Lyons et al., 2007). Alcohol availability theory is based on the principle that increased availability will result in increased alcohol consumption, with a resultant increase in harms (see Section 2.4 below). Stockwell and Gruenewald (2004), suggested harm occurs through increased consumption affecting the routine drinking behaviours in which people engage. Routine activities are dependent on drinking environment and circumstances, for example drinking at home alone, or at nightclubs with groups of friends (Stockwell & Gruenewald, 2004, cited in Chikritzhs, Gray et al., 2007).

Alcohol availability has been postulated as a fundamental link between alcohol and violence in NTEs. The theory has been implicitly and explicitly folded into numerous theories and ecological models of high levels of violence in NTEs. For example, Gruenewald and Remer (2006) explored theoretical foundations to explain the relationship between outlets and violence. They suggested that licensed venues lack capable guardianship (Cohen & Felson, 1979) and provide high alcohol availability to at-

risk populations who interact while consuming an intoxicating and potentially disinhibiting substance. Concentrations of these venues focus and accelerate violent outcomes through spatial interaction effects that form assault hotspots. Similarly, Crime Potentials Theory asserts that violence rates are a function of population characteristics, place characteristics and their interactions across spatial areas (Gruenewald, Freisthler, Remer et al., 2006). Social disorganisation among NTE patrons increases the risk of this population (Gruenewald & Remer, 2006) due to normative constraints against violence being difficult to establish and maintain among socially disorganised populations (Gruenewald, Freisthler, Remer et al., 2006). Empirical results support these models (Gruenewald, Freisthler, Remer et al., 2006; Gruenewald and Remer, 2006).

Interventions to limit alcohol availability are often implemented through training of servers, and reduced venue hours (e.g. Taylor, Coomber, Mayshak et al., 2019). This is sometimes combined with audits of venue operations associated with violence, such as safety policies (e.g. Moore, Alam, Heikkinen et al., 2017), or enhancing venue characteristics to indicate a less permissive environment (see Hughes, Quigg, Eckley et al., 2011 for examples; and Hauritz, Homel, McIlwain et al., 1998 for an intervention study in Cairns), reducing crowding and loud music to reduce arousal and provocation.

Apart from limiting alcohol availability (e.g. Kypri, McElduff & Miller, 2014), other examples of manipulation of environmental aspects at a precinct level include:

a) improved transport links to remove intoxicated patrons and the design of public spaces (Townsley & Grimshaw, 2013). This is based on a combination of rational choice theory (Cornish and Clarke, 1986), routine activity theory (Cohen and Felson, 1979) and crime pattern theory (Brantingham and Brantingham, 1984) to ameliorate the immediate, proximate factors that allow offending (see p.28 below for elaboration on these theories).
b) Street-service pastoral care and safe spaces to reduce arousal and escape provocation (Quinn, Hides, Harding et al., 2017).
c) Breathalysing patrons. This intervention has had some success (Boyd, Farrimond & Ralph, 2018). The rationale aimed for cultural change (reducing social disorganisation), was linked in the study with alcohol availability theory (Boyd, Farrimond & Ralph, 2018), but appeared to be more a form of educational brief intervention to reduce the dose-response relationship between ARA and blood alcohol level (see also Section 2.4 below).

Brief Interventions aim to stimulate motivation to change drinking and associated behaviour, although they are more usually conducted in EDs (Neville, Goodall, Williams et al., 2014). These have been conducted at both a population level, for example *One Punch Can Kill* (see page 1, above). Brief Interventions often link drinking and the reason for the injury or other medical presentation so that

the person makes a choice to change their behaviour based on new information (Davey, Landy, Pecora et al., 2015; Neville, Goodall, Williams et al., 2014). Brief interventions often also try to utilise referral resources for ongoing individual support to sustain this choice-making (Cherpitel, Bernstein, Bernstein et al., 2009).

In summary the Public Health approach emphasises epidemiological and environmental approaches, and multi-level, place-based ecological research designs to evaluate ARA prevention interventions. Some approaches based on criminological theory share these foci.

2.4 Bio-psychological mechanism

It is well documented that alcohol consumption is associated with interpersonal aggression, with the acute, rather than chronic, effects of alcohol having the largest impact on aggressive behaviour, and aggression tending to increase in response to provocation (e.g. Giancola, 2004). Studies also suggest that alcohol most likely engenders aggression only for persons who are already predisposed to such behaviour. Three of the most well-accepted theories (Giancola, 2004) suggest that the pharmacological properties of alcohol either impair fear responses, disrupt higher order cognitive functions that are important in inhibiting impulsive behaviour, or that aggression is a result of increasing psychological and physiological arousal caused by alcohol. The cognitive abilities involved in each of these three broad models are components of a higher order cognitive construct involved in the self-regulation of goal-directed behaviour defined as executive functioning. Supported by neuroimaging data, it is suggested that executive functioning is best represented as a unified whole even though it is multifaceted in its respective functions. In an experiment testing willingness to administer an electric shock to a fictitious opponent, Giancola (2004) found that alcohol engenders aggression for men who have lower levels of executive functioning. This was not found for women; speculated reasons for this included societal constraints and expectations placed on women; a higher threshold for aggression in women; and that women may have developed other coping mechanisms more important than the role of executive functioning to deal with impulses to inflict physical harm on someone. The study also reinforced that the single construct of executive functioning best encapsulates the self-regulation of goal-directed behaviour, non-executive functions are best conceptualised by separating them into nonverbal and verbal clusters of behaviour (Giancola, 2004).

2.5 Criminological theories

Criminology essentially aims for the systematic study of the cause, nature, extent, and control of behaviour which contravenes the law (Lanier & Henry, 2008). The community safety and crime prevention approach shifted aspects of criminology from a post-incident, crime-control orientation

that focuses on victims and offenders, investigative policing and the criminal justice system to a viewpoint that aims to anticipate and prevent (Zedner, 2007).

Epidemiological methods have been implicitly used to build theory in many criminological approaches (Akers & Lanier, 2009), with a growing body of research suggesting the importance of place in understanding crime (Braga, Papachristos, & Hureau, 2014). For example, NTE hot-spots of alcohol-related violence have been shown to include nodes where patrons gather, and pedestrian pathways (Townsley & Grimshaw, 2013), particularly where pedestrians or waiting patrons with different social norms and cultures encounter each other. The incidence of assaults in identified hot-spots remains stable over time if underlying conditions do not change (Andersen, Curman & Linning, 2017).

Efforts have been made to combine alcohol availability theory with routine activities theory (Livingston, Chikritzhs, & Room, 2007). This suggests that a high density of premises located within staggering distance of each other draw higher numbers of people who may be involved in a potential assault incident, and that numerous mechanisms operate in these groups that are contingent on the setting and the type of outlet to cause the type of outcomes being examined (Livingston et al., 2007).

As outlined by Welsh and Farrington (2010), one of the first efforts to classify crime prevention programmes drew upon the public health epidemiological approach to injury prevention — primary, secondary and tertiary prevention interventions (as described by Brantingham & Faust, 1976). Primary prevention interventions are directed at modifications of criminogenic conditions in the immediate physical environment (see section 2.1 above, Public Health approaches), or social situations. Within the primary prevention model, general theories of crime which have been applied to ARA in NTEs include *Social Disorganisation Theory* (Shaw & McKay, 1931; Pridemore & Grubesic, 2012), *Social Control* and S*ocial Learning* theories. With the exception of *Social Disorganisation Theory* each of these general theories of crime places emphasis on the offender: the role of the offender's intentions in causing violence is central (Brantingham & Faust, 1976). Secondary prevention is directed at early intervention in the lives of individuals, or mediating the criminogenic circumstances at a group or cohort level. Tertiary prevention aims to reduce offences by preventing recidivism: offenders are removed via the criminal justice system (Brantingham & Faust, 1976).

Social Disorganisation Theory argues that social disorder results when formal and informal controls, like legislation, norms and shared values, are absent or in decline (Bursik, 1988; Pridemore & Grubesic, 2012). Some theorists argue *Social Disorganisation Theory* does not adequately consider variances across crime types and settings, and does not address the internal motivations of individual offenders,

but the association between densities of liquor outlets and the number of recorded assaults is significantly weaker in communities that are more socially organized (Pridemore & Grubesic, 2012).

Social Control or *Bonding Theory* is linked to *Social Disorganisation Theory*; it emphasises the importance of individual motivation through strong attachments to community values and norms in the maintenance of social order (Hirschi, 1998). There is limited empirical support for this theory (Ozbay & Azcan, 2006), and NTE patrons are not a homogenous community (AERF, 2011). *Low self-control theory* asserts lack of self-control is the essential element of criminality. This is partially supported by empirical studies (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000). Secondary prevention efforts in the case of NTE ARAs, have focused on the criminogenic circumstances of the patron cohort. The population characteristics were specifically related to the *Social Influence* and *Social Selection* theories (Treno, Gruenewald, Remer et al., 2008). Social Influence emphasizes the effects of concentrations of licensed venues, as well as patron behaviour at those venues, on the social norms that constrain or enable violence. Social Selection theory emphasizes the ways in which licensed venues are used by potentially violent drinkers. According to *Social Selection Theory* (Treno et al., 2008), the tendency for patrons to choose venues more suited to their tastes becomes self-reinforcing. For venues, attracting a specific type of patron is one of the operative mechanisms by which venues become violent places (Gruenewald, Freisthler, Remer et al., 2006). When venues attracting different patrons are proximate to each other, different values can contribute to clashes between patron groups (Grubesic & Pridemore, 2011; Lipton & Gruenewald, 2002).

To test the former, Treno et al. (2008) examined statistical relationships between social-psychological characteristics associated with violence and licensed venue density. They found that higher self-reported binge drinking relates directly to higher levels of self-reported hostility, and norms for alcohol-related aggression, irrespective of whether the drinking occurs at licensed venues, parties or friends' homes. Whether licensed venues and high density precincts increase levels of aggression, or whether they concentrate people with a propensity for violence and aggression into these environments is not known, but these processes may be mutually reinforcing (Treno et al., 2008).

Similarly, Grubesic and Pridemore (2010) placed an emphasis on the spatial relationships between violence, the locations of alcohol outlets, and the populations of probable offenders. The study examined situational factors in the precinct level as well as at the venue level. Different types of venues contribute different numbers and severity of assaults. Street intersections, public transportation nodes, and alcohol outlets provide high-risk hot-spots for violence. According to *Selective Disinhibition, Routine Activities*, and *Social Disorganization* theories, areas with high densities and close proximity of alcohol outlets provide a greater number of potentially deviant places (Grubesic

& Pridemore, 2010). Grubesic and Pridemore (2010) found that focused crime control efforts did not simply displace crime to other areas within a precinct although Warburton and Shepherd (2006), suggested that venue-level interventions did displace ARAs and disorder onto the surrounding streets. It appears that NTE precincts as a whole provide opportunities for deviance through some ecological interaction (Brennan et al., 2011; Jones et al., 2011).

As noted above, theories broadly classed as within the *Situational Crime Prevention* approach (Clarke, 1997) have played an important theoretical role in prevention interventions. Its theoretical relatives include *Routine Activities Theory* (Cohen & Felson, 1979; Felson, 2004; Graham, 2009), and the complementary approach of *Rational Choice Theory* (Cornish & Clarke, 1986). These place-based theories of crime suggest that crime is not a random event, and that violence emerges from a complex causal system (Welsh & Farrington, 2010). Research indicates that most alcohol-related violence is not planned but tends to erupt spontaneously and reflects situational and intoxication factors (Grubesic & Pridemore, 2010; Gruenewald, Freisthler, Remer et al., 2006; Liu et al., 2016). Warburton and Shepherd (2004; 2006), and Gruenewald et al. (2006) found that the impacts of venue densities on violence are context-specific. The authors noted that different types of patron groups use venues for different reasons. Gruenewald, Freisthler et al. (2006) also stated that violence rates are a function of place characteristics, population characteristics and their interactions within a defined space. *Crime Potentials Theory* asserts that certain environmental features or situations are more likely to be places where crime occurs (place potentials), and certain subpopulations are disposed to participate in criminal activity (population potentials) (Gruenewald, Freisthler, Remer et al., 2006). These place characteristics were proximity of venues with higher levels of alcohol availability, and signals of a permissive and dis-regulated environment (Graham, Osgood, Welles et al., 2006).

Offenders, like everyone else, have activities in which they routinely engage (Summers & Johnson, 2017). Routine Activity Theory (Cohen & Felson, 1979), conceptualises a crime as an event that occurs when an appropriate target, a motivated offender and an absence of capable guardianship intersect in space and time. Rational Choice Theory (Cornish & Clarke, 1986), considers crime as purposeful behaviour designed and directed to meet the needs of an offender. These needs may be material, or psychological (see pages 29 to 31 below). There is, however, limited qualitative and quantitative evidence regarding the effectiveness of interventions to prevent NTE ARAs based on Rational Choice Theory, possibly due to the effects of alcohol on rationality and executive functioning (Wallin & Andréasson, 2009; Warpenius & Holmila, 2008) (see page 25 above).

Crime Pattern Theory and the Geometry of Crime (Brantingham, Brantingham & Andresen, 2017), contend that each crime event does not occur randomly, either in time, nor space, nor society. For

example, bar fights occur more frequently on Friday and Saturday night, and each element in each crime has a historical trajectory when they intersect, shaped by history, environment, routine activities and motivation as the case may be (Brantingham et al., 2017, p.98). These theories consider crime to be either planned, or opportunistic: since criminals do not behave randomly, examining how people interact with urban spatial structures allows some predictability. For example *activity space* is defined as areas routinely used and already well known to an individual. When the activity space of a potential victim intersects with the *activity space* of a potential offender in the NTE and/or venues within it (Summers & Johnson, 2017), assaults may occur. Understanding the perceptions of stakeholders mandated to prevent or respond to ARAs within NTEs regarding why these assaults occur is important (Philpot et al., 2019). Numerous studies to understand patrons perspectives regarding the NTE as an activity space have also been conducted (Graham & Homel, 2009).

One study explored an offender's psychological needs regarding ARA in an Australian NTE as an activity space. Barker (2010) identified two groups of young people in this regard. The first, and by far larger group, desire to avoid violence and its negative consequences. The second group, however, value public ARA as a means to empower themselves. This group of young men initiate violence to improve their status and social capital. These groups used, and interacted in, the same space, and sometimes belonged to the same peer group. They drank at the same venues, waited at the same taxi ranks and passed each other on the street. The first group, however, listed social sanctions as an important reason not to be involved in violence. The second group, almost exclusively males, were found to be significantly involved in ARA because it empowered them and boosted their status. This group used violence to improve their social capital (Barker, 2010), reasoning that their physical strength and fighting prowess enhanced their standing with peers.

Barker (2010) further found that members of both groups identified four phases of ARA in NTEs comprising *victim selection*, *justification*, the *incident*, and the *aftermath*. For example, the victim selection stage could be anything from a young man bumping another young man and spilling his drink, to purposefully selecting someone with whom to have a fight who would present a physical challenge, but would be able to be beaten (Barker, 2010). The justification phase was often termed the *interview*, or *baiting*; for example, "What are you looking at?" Following the assault incident itself, the participants would disperse, sometimes encountering legal or medical consequences.

A range of other psychological constructs have been linked with a propensity for violence including psycho-biological and temperamental vulnerabilities, disturbed internal processes (King, 2012), cognition, parenting styles, socio-demographics, and individual level factors including personality traits, educational attainment and social capital (Giancola, 2004; Thornberry, Freeman-Gallant,

Lizotte et al., 2003,. Fifty-two psychological theories were synthesised into a framework of alcohol-related aggression (Graham, Wells & West, 1997), broadly characterised as:

1. a psychopharmacological relationship, in which alcohol alters behaviour,
2. the drinking setting,
3. alcohol use as an excuse for aberrant behaviour, disinhibition and violence,
4. the expectations of the drinker and interactions with other people, and
5. unknown factors that result in both drinking and violent behaviour, including personality variables, such as impulsivity and high risk taking.

Meta-analyses and systematic reviews of links between alcohol and human aggression suggest that alcohol causes aggression, if not violence (Bushman, 1997). Intoxication is only one of several factors contributing to NTE ARAs however: other factors include environmental conditions and their interaction with patron characteristics, regulatory and enforcement activity, staff behaviour and behavioural norms.

2.6 Deterrence and CCTV

The use of closed circuit television (CCTV) by local authorities to monitor open space in NTEs has become widespread, including in Australia (Hulme et al., 2015; Wilson, 2005). CCTV is often classified as a situational crime prevention strategy that increases deterrence through formal surveillance of an identified, targeted area (e.g. Piza, Welsh, Farrington & Thomas, 2019). Deterrence is the triggering of a perceptual change that alters an offender's choice structuring properties (Ratcliffe, 2006) as per the rational choice perspective. As noted above, situational crime prevention focuses on preventing crime through modifying the physical environment in a way that both reduces opportunities for offending and increases the level of perceived risk offenders (Piza et al., 2019). Deterrence is also one of the main mechanisms identified through which hot-spot policing is thought to generate reductions in crime, although police-led efforts to change underlying conditions has greater efficacy in reducing the volume of crime in these geographical micro-areas (Braga Papachristos & Hureau, 2014).

An examination of two recent reviews (Alexandrie, 2017; Piza et al., 2019) introduce this chapter section. The theory of deterrence, with specific focus on CCTV, is then examined before an analysis of other ways in which CCTV has been identified to reduce crime. Piza et al. (2019) updated Welsh and Farrington's systematic reviews and meta-analyses (2002; 2009), using the same methodology, and adding more studies: from 22 in the original systematic review (Welsh & Farrington, 2002), to 44 (Welsh & Farrington, 2009), to 80 (Piza et al., 2019). It is thus unsurprising they drew the same conclusions, although additional moderator variables were incorporated to help explain how CCTV

may work to reduce crime. The study found that actively monitored systems implemented in conjunction with other interventions had the most success in reducing crime, particularly in car parks although there is mounting evidence of its efficacy in residential areas. The authors reported the continued need for CCTV to be narrowly targeted on vehicle crimes and property crime (Piza et al., 2019, p.135). Similarly to the reviews into NTE ARAs listed in section 2.1 of this chapter, a major focus was on methodologic rigour, as measured against quasi-experimental standards (see Chapter 3, pages 41-43, for further discussion). Alexandrie's narrative review (2017) also focused on this type of methodological rigour, and examined seven studies that used randomised and natural experiments. The study found that video surveillance can reduce crime, particularly property crime, in several settings.

Both reviews accepted that deterrence, through an increase in the perceived certainty of punishment, is the main mechanism through which CCTV reduces crime (see also Piza, Caplan & Kennedy, 2015; Piza, Caplan, Kennedy et al., 2015). Both reviews also noted that active monitoring also allows police to be deployed to intervene in offences as they occur (or shortly afterward), leading to increased apprehension and subsequent prosecution, with related deterrent effects (Alexandrie, 2017; Piza et al., 2019). This ability of police to be directed by CCTV to intervene had been previously reported in terms of limiting the duration of assault incidents, with a reduction in injuries recorded by Emergency Departments (Sivarajasingam, Shepherd & Matthews, 2003). Some human factors relating to active deployment are examined below.

The salience of camera presence in the attribution of an offender to their arrest or apprehension was recognised early (Tilley, 1993), and the theoretical basis for deterrence has been increasingly refined. CCTV activity can increase the certainty of punishment of an offender on a case-by-case basis, particularly when combined with proactive police patrols directed by camera operators (Piza, Caplan, & Kennedy, 2012; Piza, Caplan, Kennedy et al., 2015). Studies repeatedly emphasise this integration of proactive policing and CCTV functions (e.g. Piza et al., 2012; Piza et al., 2015); with offenders who attribute their apprehension and subsequent punishment to CCTV are more likely to be deterred. In two studies (Priks 2014; 2015), deterrence was examined from a behavioural economics viewpoint. Although neither the terms rational choice, nor routine activity were used, Priks (2015) divided crimes into 'planned crimes', and 'assaults and drug-related incidents'.

He did so through a standard economics model where, "*criminals receive utility from committing a crime and disutility from getting caught… This implies that some types of crimes should be more sensitive to camera surveillance than others*" (2015, p.289). Assaults were considered *heat of the moment* crimes, and people involved in drug-related incidents were presumed (without any evidence),

to be under the influence of one drug or another. Priks also constructed an equation which a rational, motivated offender must solve to decide if committing a crime is worth the risk (Priks, 2014, p.1175). The empirical results showed that planned crimes around subway stations were reduced by a significant level, and that this was due to deterrence, while the assaults and drug-related incidents were not reduced (Priks, 2014). It also appeared that rationally motivated, routine activity driven crimes were displaced to nearby locations with no cameras. These findings may possibly be due to reduced executive functioning or other forms of impaired cognitive processing (see Section 2.4 above). Studies of CCTV in prison have found that planned assaults were reduced, while unplanned assaults were not (Allard, Wortley & Stewart, 2008).

Studies into the effect of CCTV installation and police action across multiple sites using police and emergency department data found conflicting results (Sivarajasingam & Shepherd, 1999; Sivarajasingam et al., 2003). The authors concluded that CCTV does not deter NTE ARAs, nor prevent them through other mechanisms (Sivarajasingam et al., 2003, p.315; 2006), because these assaults occur due to the involvement of alcohol, and the impulsive nature of the violence. They suggested that the effect of CCTV deployment of police limited the duration of the assaults, reducing injury consequences of each incident. Vigilance of camera operators and police responsiveness were identified as important factors.

Actively-monitored CCTV and deployment.

Benefits of the logistical role of CCTV in policing, and how police can leverage these is an area of increasing research, although the research continues to focus on outcomes (e.g. Piza, Caplan & Kennedy, 2017), rather than theory. Studies have focused on procedural aspects of CCTV systems including control room design and communication between camera operators and police (Gill & Spriggs, 2005), operational performance of camera operators (see Piza et al., 2019), and the field of view shed by individual cameras (Piza, Caplan & Kennedy, 2014). Overall, these procedural aspects, including the actions of camera operators seem to have an impact on the efficacy of CCTV as a crime reduction intervention (Brown, 1995; Piza et al., 2019). The operational performance of camera operators appears to be vital to early identification of incidents, which in turn may expedite early intervention and interruption of individual crimes (Piza, Caplan & Kennedy, 2017), including NTE ARAs (Sivarajasingam et al., 2003, although see commentary on Gerrell, 2016, p.135, below).

Literature from the predictive risk discipline (Cromwell, 1999) suggests that the production of assault victims occurs through chains of events: precursors lead up to an incident, the violent incident itself occurs, and events subsequent to the incident happen. If observed on CCTV, these may be intervention opportunities through the detection of incidents of concern in real time, may be able to

deploy police officers to the scene to limit the duration of an incident and its injury consequences (Sivarajasingam et al., 2003), or possibly before a situation escalates into violence (Piza, Caplan & Kennedy, 2017). Australian ethnographic research has found that violence in NTEs is a staged, sequenced process (Barker, 2010). Evidence suggests that observers of CCTV footage can differentiate between behavioural sequences ending in assault and matched sequences which do not (Troscianko et al., 2004; Piza, Caplan & Kennedy, 2017). Camera operator attention and commitment to tasks (Alexandrie, 2017; Keval & Sasse 2008; Donald, 2019), cognitive capacity (Donald, 2019), and operational practices in camera rooms (Brown, 1995; Wilson & Wells, 2006; Piza et al., 2019) have been identified as critical for promptly detecting antisocial behaviour and violence.

Other suggested mechanisms

Other suggested mechanisms (Welsh & Farrington, 2009; Tilley, 2001) through which CCTV may prevent crime include enhanced awareness of crime potentialities within a space by users of that space (individual target hardening), increased natural surveillance, and improved apprehension of offenders leading to tertiary prevention (e.g. Brown, 1995; Mazerolle, Hurley & Chamlin, 2002; Piza et al., 2019; Welsh & Farrington, 2009). Studies have shown the value of CCTV to assist police after the commission of crimes, immediately afterward by improving the response of personnel to emergencies (Ratcliffe, 2006), providing visual evidence for use in criminal investigations and securing early guilty pleas from offenders (Ashby, 2017).

2.6 Conclusion

This chapter examined some of the main approaches and theories relating to NTE ARAs from a number of disciplines, and contained some discussion regarding crime prevention/control techniques. As noted in Chapter 1, testing the feasibility of implementing a co-ordinated data sharing tool to inform interventions, with no a priori theory surrounding this type of ARA, was the starting point of this research program. Phase 2 of the research, the realist inquiry using CCTV, was guided toward appropriate theory by the data. The thesis did however need an initial rough, guiding theory (Pawson & Manzano-Santaella, 2012). Hence the above exploration of approaches. The next chapter looks at what has been shown to work in reducing NTE ARAs.

Chapter 3: Measuring NTE ARAs

3.1 Introduction

Chapter 1 identified the problem to be addressed in this thesis, began to define the research to be conducted and explored what has been shown to work to reduce ARAs in NTEs. Chapter 2 explored the theoretical underpinnings of previous research into NTE ARAs. The application of theory appears to quite often be missing in approaches to studying this problem, and in explicating the design of studies. Chapter 3 addresses difficulties in measurement of NTE ARAs and other methodological issues found in the review of literature. Approaches to studying the problem that were described in previous chapters suggest that quasi-experimental designs are often preferred, and that empirical data based on this approach has provided conflicting results.

Accurately recording the number of NTE ARAs make evaluating the effectiveness of interventions (Newton & Hirschfield, 2009), and estimation of trends (Nepal, Kypri, Attia, et al., 2019) problematic. Reliable data is crucial for prevention (Bellis et al., 2012; Liu et al., 2016), and it is well documented no single agency sees every ARA (Morgan et al., 2018). Data currently available to accurately measure alcohol-related crime has a number of strengths and limitations (Morgan, Lyneham, Davy et al., 2018). For example, a significant proportion of NTE ARAs is not reported to police (Braga, Papachristos, & Hureau, 2014; Morgan et al., 2018; Newton & Hirschfield, 2009; Warburton & Shepherd, 2006). A considerable proportion of this violence also does not result in presentations to health services, or is not recorded as such (Bellis, et al., 2011; Descallar, Muscatello, Weatherburn, et al., 2012). Not all assaults on premises are reported by licensed venues (Agnew-Pauley, 2014), and police data suggests a high proportion of ARAs occur in a small number of venues (Martin, Freeman & Davey, 2012). While police and health statistics have been the major sources of information about this type of violence (Connor, Maclennan, Huckle, et al., 2020; Droste, Miller & Baker, 2014; Morgan et al., 2018), the increasing use of actively monitored CCTV in NTEs has added an additional set of data points (Brown, 1995; Sivarajasingam, Shepherd & Matthews, 2003; Hulme et al., 2015). Routine data collection systems within these services reflect the mandate of each agency (Descallar et al., 2012; Miller et al., 2019). Each contains sources of measurement error and has various other complexities (Doll, Saul & Elder, 2008).

Accurate measures of prevalence, as well as the spatial and temporal dynamics of injuries and criminal offences arising from NTE ARAs are therefore difficult. Even the mapping of ARA patterns in an NTE may not be sufficient for designing rigorous research (Philpot et al., 2019). The complex interactions involving individuals, the local community and the physical environment require multiple outcomes to be used when evaluating interventions in the NTE (Brennan et. al, 2011; Jones et al., 2011; Philpot

et al., 2019). The reported effectiveness of interventions also differs depending on the outcome being examined (Graham, 2011). Section 3.2 explores sources of data found in the literature, describing what they have been shown to reveal, and what they do not. For the purposes of this thesis, these sources are police, hospital emergency departments (EDs), closed circuit television systems (CCTV) and licensed venues. Each of these are explored in turn in Section 3.2. Section 3.3 then addresses wider issues of study design, including outcome measures and measurement methods, and the application of theoretical bases. The section explores a critique of the quasi-experimental evaluation design (Graham, 2011) before introducing Realist Evaluation (Pawson & Tilley, 1997) and Realist Review (Wong, Greenhalgh, Westhorp, et al., 2013). The section uses examples of these approaches to explore how realism may possibly enhance our understanding of what works for whom and why in NTE ARAs. Section 3.4 summarises the chapter.

3.2 Data sources; what they tell us and what they do not.

The four most widely used categories of data sources used to examine NTE ARAs are official records, observation, experiments and self-reports (Philpot et al., 2019). The focus in this section is on official records. The ability of these records to map incidents across time and space is highest out of the four methods listed above (Philpot et al., 2019). The experimental and self-report methodologies were examined for this thesis but did not relate to either research question. Patron observation was also examined and found to be impractical, although recent recommendations for the use of video footage are suggested to overcome some limitations of this method (Philpot, et al., 2019). For the purposes of this thesis, offical records are defined as the data provided by police (e.g. Donnelly, Menéndez, & Mahoney, 2014), hospital emergency departments (EDs) (e.g. Droste, Miller & Baker, 2014), CCTV (e.g. Piza et al., 2019; Sivarajasingam et al., 2003), and licensed venues (Morgan et al., 2018). Each of these are addressed in turn below.

3.2.1 Police

Police have a primary, legislated responsibility for enforcing laws related to licensed premises and are often the first responders to assaults on the street of a NTE (Doherty & Roche, 2003). The *Queensland Police Records and Information Management Exchange* database (QPRIME) captures crime at an incident and person level (Morgan et al., 2018). QPRIME reports also require comment on the presence and impact of alcohol on assault incidents, whether the incident occurred within or in the vicinity of a licensed venue, demographic factors, and where possible the place of last drinking (Palk et al. 2007a). Police also require evidentiary standards which will facilitate investigation and withstand scrutiny in a court of law, including precise information on incident location and time (Doherty & Roche, 2003). As a result, incidents which may in other circumstances be recorded as assaults are

sometimes recorded as *public disorder* or similar lower-level offences due to a lack of evidence (Braga et al., 2014; Truman, Langton, & Planty, 2013). Conversely, the only indicator as to the severity of an assault available from police data is often the level of offence under which the incident is prosecuted (e.g. Nepal, Kypri, Attia, Chikritzhs et al., 2019).

Police data indicate that only a small handful of venues are responsible for this disproportionately high rate of alcohol-related violence (Martin et al., 2012), suggesting that the predictability of violence offers opportunities for preventative interventions (Liu et al., 2016). Geospatial mapping technique is increasingly used to analyse patterns of these ARAs (Grubesic & Pridemore, 2010; Lipton & Gruenewald, 2002; Stevenson, Lind, & Weatherburn, 1999). The development of computer crime-mapping and geo-referencing has dramatically improved analysis in terms of both time and space, and led to an increasing reliance on this form of crime control by police (Chainey & Chapman, 2013; Mazerolle et al., 2007). Nevertheless, these techniques still often rely on assaults being reported by those involved, or those witnessing them. The reporting rates of NTE ARAs is a problem for the reliability and validity of assaults as a data source. Where assaults are reported, police information systems in all Australian jurisdictions capture data on whether the offender is affected by alcohol at the time of offending, but this relies on the assessment of the individual police officers who attend the incident (Morgan, Lyneham, Davy et al., 2018). Every officer on the ground needs to understand the definition of ARA relevant to their jurisdiction. The consistent application of this definition and process for recording and counting requires extensive training, and it may be that police only record alcohol involvement in severe assaults (Morgan, Lyneham, Davy et al., 2018). Skill levels of individual officers, and their attitudes to collecting intelligence about ARAs, have been found to impact on collecting and recording such data (Doherty & Roche, 2003; Morgan et al., 2018), and have been identified as possible barriers to effective data collection (Wiggers et al., 2004; Morgan et al., 2018).

Further, only approximately 30% of all ARAs, including domestic and family violence incidents, are reported to police in Australia (Bryant & Williams, 2000; Morgan et al, 2018). One study suggested that between 80-85% of assaults in and around licensed premises in NSW are not reported (Doherty & Roche, 2003; cited in Morgan et al, 2018). More recent victim surveys suggest that slightly more than half of all Australians over 15 who experience a non-sexual physical assault report it to police, although a further number of approximately ten percent appear to have it reported on their behalf (ABS, 2015; 2020). The reporting rate is similar across genders. The decision by individuals whether or not to report crimes, including assault, to the police is affected by interrelated complex factors (Bryant & Williams, 2000; Carcach, 1997; Avdija & Giever, 2011). These include the age of the victim and the type of crime experienced (Tanton & Jones, 2003), attitudes toward the police and experience of previous interactions with police (Avdija & Giever, 2011), socio-economic status and experience of

prior victimisation (Avdija & Giever, 2012). Finally, increased police activity or an operational focus on specific offences has been shown to improve detection and recording of offences (Braga et al., 2014), including ARAs and disorder in NTEs (Mazerolle, Rombouts, & McBroom, 2007). These operations are sometimes associated with a reduction in assault-related injury presentations to the local ED, and sometimes not (Bleetman, Perry, Crawford, & Swan, 1997; Putnam, Rockett, & Campbell, 1993; both cited in Graham, 2011; see also section 3.3.3 below).

3.2.2 Emergency Departments

A significant proportion of presentations to EDs in Australia are the result of ARAs in NTEs (Chikritzhs, Jonas, Heale, et al., 2000; Dinh, Bein, Roncal, et al., 2014; Miller, Sønderlund, et al., 2012). Most victims of ARAs presenting to EDs are young males with minor injuries as a result of assaults (Dinh, Bein, Roncal, et al., 2014). These presentations are concentrated in the weekend peak periods, late at night or early in the morning. Recorded severity of injury is positively correlated to licensed premise hot-spots in NTEs, with the odds of major trauma two times higher than at other locations (Dinh, Bein, Roncal, et al., 2014).

Injury data measured through presentations to EDs have also been shown to provide a measure of serious violence that is independent of police measures (Descallar et al., 2012; Howe & Crilly, 2002a; Shepherd, 2001b; Young et al., 2004). Research (Gray, Barton, Davies et al., 2017; Quigg et al., 2012) has found that EDs detect more violence than police data. Quigg et al. (2012) reported that 25% of ED presentations for assault were unrecorded by police. This supports previous findings that almost two-thirds of assaults are recorded exclusively by EDs (Droste, Miller et al. 2014). At the time of the research reported in this thesis, Queensland Health database systems recording ED presentations did not identify ARAs in a systematic way (Barker, Swaminathan, Aaora, & Scott, 2011). This appears to still be the case, with a recent study relying on overnight hospital admission data (Miller, Ferris, Coomber et al., 2017). Data previously collected by the *Queensland Injury Surveillance Unit* suggested that between 40% and 58% of alcohol-related injury presentations to a sample of Queensland EDs are the result of violence (Laing et al., 2013). This did not include Cairns Hospital. The only relevant epidemiological paper found on injury presentations to the Cairns ED (Smith, O'Hagan, & Gole, 2006), reported that assault was a common cause of eye injury presentations, with alcohol use documented in approximately 76% of cases.

The priority in EDs has been the treatment of injuries sustained in assaults, rather than the collection of data useful to interventions (Graham & Homel, 2008). Data sets collected within the ED reflect this priority, rarely systematically collecting information on the location of the injury event (Langley, Gulliver, Cryer et al., 2013), with studies collecting precursor details of the injury event difficult to find

(Kypri, 2015). As noted in chapter 1, a number of studies have integrated specifically designed research items into computerised triage tools to augment standard ED data collection in order to help identify ARAs. Data on injury presentations to EDs to examine ARAs have been greatly enhanced through the uptake and use of data collected through electronic tools (Muscatello, Churches, Kaldor et al., 2005; Indig et al., 2010), which allows routine collection of prospective data (for example, Shepherd, 2003; Shepherd & Bisson, 2004; Howe & Crilly, 2002b). Prospective injury surveillance research designs aim to identify and measure exposure factors before the outcome occurs (Broderick, Ranney, Vaca, et al., 2009), while retrospective studies look backward in time in an attempt to identify the cause of the event. Both designs provide data valuable for preventative interventions (Broderick et al., 2009).

Droste et al. (2014) found that data-sharing protocols and partnerships could be easily implemented into modern ED triage systems, with minimal impost to staff workload and finances, or impact on patient treatment. Nevertheless, for many reasons data collected in EDs may fall short of providing a comprehensive and systematic assessment of the number of violent incidents occurring in NTEs, and the context in which they occur. Attempts to analyse and interpret clinical documentation have found this is rarely useful for understanding context regarding the assault (Barker et al., 2011; Goodwin & Shepherd, 2000). Information about the circumstances of intentional injury is key to prevention (Shepherd, 2001b; Young et al., 2004). Conversely, the clinical details of a patient's injuries which are typically obtained in the ED are seldom of immediate importance in reducing violence in the community. Most studies attempting to link ED and police assault statistics use de-identified or anonymised information (Droste et al., 2014), however a recent study used patient name, age and incident or presentation time (Gray, Barton, Davies et al., 2017). Results regarding prevalence of assaults unreported to police supported previous research.

Two major limitations of ED data to inform interventions to reduce NTE ARAs are locational, and under-detection of ARA-related injury. The research difficulties in ED staff obtaining locational data for ARA injury presentations which are precise enough for reliable monitoring have been well documented (Havard, Shakeshaft, & Sanson-Fisher, 2008; Poynton, Donnelly, Weatherburn et al., 2005; Shepherd et al., 2000). Regarding under-detection, not all assaulted individuals present for it, even when requiring treatment (Droste et al., 2014). Some studies also show that approximately 5% of injury presentations to emergency departments by people over 18 years old are identified as alcohol-related (Indig, Copeland, Conigrave, et al., 2008; indig et al 2010). It is suggested this is because this type of presentation places a high demand on ED staff during peak times (Indig et al., 2008). Patient intake and admission procedures also affect the rate of identification of alcohol-related

injuries (Indig, Copeland & Conigrave, 2009; Warburton & Shepherd, 2002). Nevertheless the low rate has been found in numerous studies across health jurisdictions (Indig, Copeland & Conigrave, 2009).

Apart from process complexities, another obstacle is precisely defining what alcohol-related data and injury data is to be collected within the emergency department to inform a community wide intervention (Warburton & Shepherd, 2002). While there is potential to gather relevant qualitative data, the information describing particular incidents leading up to any patient's injury is not usually clinically relevant, so ED staff may see no reason to collect it (Shepherd, 2001; Nordqvist, Johansson, Lindqvist et al., 2005; Cryer, 2005). However professional assessments at the time of triage or treatment is crucial to collecting this data. Detecting ARAs in the ED, and collecting quality data is dependent on the motivation and competence of staff, which can vary between staff members (Boyle et al., 2013; Benger & Carter, 2008; Muscatello, Churches, Kaldor, et al., 2005; Muscatello, Thackway, Bellshaw, et al., 2009). These factors can be improved when staff receive relevant feedback on their data collection (Benger & Carter, 2008). Boyle et al. (2013) found that feedback on the impact of a community action project improved data collection by ED staff on relevant presentations from one fifth to nearly three quarters. Quigg et al. (2012) and Boyle et al. (2013) suggested that the quality of data collection depends on the strength of relevant data-sharing partnerships, with more effectiveness reported when there was police involvement. As noted in Chapter 1, this information is useful to stakeholders for evaluation purposes. This intervention had not occurred in Queensland.

Observational studies in the ED regarding ARA in the NTE are limited, with most research that does not involve staff utilising surveys or interview techniques. There is substantial evidence that the likelihood of incurring a violent injury increases as blood alcohol level increases (Poynton et al., 2005).

The effectiveness of surveillance systems of attendance at an ED for minor injuries is also known to depend on the proximity of the incident to a hospital (Shepherd, Sivarajasingam & Rivara, 2000; Muscatello, Churches, Kaldor et al., 2005). The time of presentation at an ED has been found to be a valid proxy for the time of occurrence of the incident (Young & Douglass, 2003).

3.2.3 CCTV

A systematic review and meta-analysis of forty years of research into the effects of CCTV on crime (Piza, Farrington, Welsh & Thomas, 2019), found that CCTV is not associated with a significant reduction in violent crime. Although violent crime has been the most commonly reported outcome studied, no significant effects have been found; similarly no significant effects were found for disorder offences (Piza, Welsh, Farrington & Thomas, 2019). Actively-monitored CCTV has been associated with significant reductions in property crime statistics within a monitored area (Piza, Welsh, Farrington & Thomas, 2019; Welsh, Farrington, 2009). However, a growing number of studies have suggested

that including aggregate level information gleaned from CCTV in data sharing arrangements impacts on the number of ARAs reported. Where actively monitored CCTV has been used to measure NTE ARAs on the streets (Brown, 1995; Sivarajasingam et al., 2003; Wilson & Wells, 2007), studies have also demonstrated its capability to capture assaults not recorded through other means (e.g. Brown, 1995; Sivarajasingam et al., 2003).

CCTV information shared with police for intelligence purposes has been shown to improve the proactive deployment of resources to address specific offending times and places (Brown, 1995; Piza et al, 2019; Sivarjasingam, et al., 2003). Sharing this enhanced surveillance and detection intelligence with police tacticians and liquor enforcement officers has been shown to improve proactive policing with a resultant effect on recorded crime (Gill & Spriggs, 2005; Gill, Spriggs, Allen, Hemming, et al., 2005; Wilson & Sutton, 2004; Wilson & Wells, 2007). Strategic deployment of resources to high ARA times and places, and real-time despatch of an on-the-ground response have been associated both with reductions in these offences and the documenting of higher rates of assault and disorder offences (Brown, 1995; Piza, Caplan, Kennedy et al., 2015; Wilson & Sutton, 2003; Wilson & Wells, 2007). Importantly, studies have found that hospital EDs experience decreased assault presentations when these processes are in place (Sivarajasingam, Shepherd, Matthews, & Jones, 2002).

The ability of camera operators to actively detect offences is critical (Piza et al., 2019). This detection is affected by the performance of camera operators who monitor the systems (Donald, 2019; Keval & Sasse, 2008; Norris & Wilson, 2005), and by technological factors such as camera placement and the field of view of the CCTV cameras (Blixt, 2003; Piza, Caplan, & Kennedy, 2014). Factors which influence the performance of camera operators in capturing quantitative and qualitative information include activity levels (Piza et al., 2019), and cognitive and attentional requirements (Donald, 2019). Regular placement of police officers in the monitoring room during peak activity periods enhance operations for both parties (Brown, 1995) due to improved relationships and real-time communication (Hulme, et al., 2015). The provision of a live video feed to police has been suggested to provide enhanced knowledge of incidents for police entering the scene.

Repeated systematic reviews and meta-analyses found the effects of CCTV on crime in city and town centres were small and non-significant, although some types of offences were reduced (Welsh and Farrington, 2002; 2009; Piza et al, 2019). Welsh and Farrington (2002; 2009) provided little analysis of the types of offence, apart from a mention that the major crime types reported were *violence* and *vehicle crimes*, and a finding that CCTV had no overall effect on reducing violence. In sites where CCTV was associated with a reduction in violence, how and why were not examined in any further detail (Welsh and Farrington, 2009). Welsh and Farrington (2009) acknowledge the importance of examining the

crime reduction outcomes, the contexts in which those outcomes were found, and the mechanisms which brought about a reduction in crime. While using the same systematic review and meta-analysis design, and finding the same overall results, Piza et al. (2019) expanded slightly, though implictly, on how evaluation designs using more clearly defined contexts, mechanisms and outcomes may advance what CCTV information can reveal. Overall, the literature reflects a growing realisation about the complexities within CCTV systems and the impacts these have on both data quality and achieving the system's stated aims (Donald, 2019; Gill & Spriggs, 2005; Norris, McCahill, & Wood, 2004; Piza, Caplan, Kennedy, & Gilchrist, 2014; Wells, Allard, & Wilson, 2006).

3.3.4 Venues

Collecting ARA information from licensed venues has been shown to be a sensitive issue. In Queensland, ARAs reported as occurring on or near licensed premises are used by police and liquor regulators to inform risk assessments of venues and may lead to case-management of venues by regulatory authorities, although this data is also provided to licensees so they can implement interventions (Nepal, Kypri, Attia, Evans, et al., 2019; Morgan et al., 2018). The power to case manage a venue, or to suspend or cancel liquor licences may create a strong incentive for staff or management not to report assaults on their premises (Agnew-Pauley, 2014). The majority of both ARA offenders and victims in licensed venues are patrons. Similarly, the majority of offences are reported by patrons (43%), although staff or management report nearly one third of these assaults (Agnew-Pauley, 2014). There has been no apparent change in this trend over a number of years. Following these incidents approximately 60 percent of offenders were ejected from the premises, with victims also being ejected approximately 17 percent of the time. Approximately nine percent of the time, the offender could not be identified by the victim. Delays in reporting until injuries had worsened, or recall affected by intoxication were the reasons for this inability to identify the offender (Agnew-Pauley, 2014). Phase 1 of this thesis used an ecological, community action approach, rather than fine grained examination of any specific data source, while Phase 2 focused on CCTV. As such premise-level data is not examined in further detail.

3.3 Different approaches: quasi-experimental vs realist

Graham (2011) noted a number of requirements to improve evaluation design regarding NTE ARA studies. These comprised:

a) better defining outcomes to be measured,
b) improved logic models linking interventions to these outcomes (the role of theory),
c) avoiding confoundment of outcome measures and intervention implementation, and
d) longer study duration.

Two studies from the 1990s that implemented enhanced policing as an intervention illustrated the last point (Bleetman, Perry, Crawford et al., 1997; Putnam, Rockett, & Campbell, 1993). Both studies recorded an increase in police-recorded ARAs. However, the results of one study relied solely on police recorded assaults, with the other reporting on assault-related presentations to an ED, which decreased significantly (Graham, 2011). The final suggestion made to improve evaluations into the effectiveness of interventions to reduce NTE ARAs was controlling threats to internal and external validity in order to measure what the intervention is meant to measure, or specificity (Graham, 2011).

Brennan et al.'s (2011) systematic review highlighted the need for more appropriate, multi-faceted outcomes measures, and comprehensive intervention models. The literature reviewed in Chapters 1 and 2 suggested that the positivist paradigm had guided the methodology of most research into this problem. Positivism asserts there is a real world which we can understand only directly through observation. In its most extreme form Positivism asserts that causality cannot be observed and that the best we can do is to demonstrate regularity between a particular intervention and a particular outcome (Marchal, Westhorp, Wong et al., 2013). In the physical sciences this has led to the development of the scientific method and the reliance on controlled experiments – studies in which an independent variable is deliberately introduced or manipulated to observe its effects (Watson, 2000). Graham (2007) noted that aggregate-level studies within the positivist paradigm demonstrated that factors such as drinking context and outlet density are associated with changes in the rate of violence independent of changes in the rate of overall alcohol consumption. The impact of any increase in drinking levels on violence may depend on whether the increase in drinking occurs in bars, pubs or clubs, as opposed to an increase in wine drinking at home by pensioners. Substantial evidence exists regarding the higher risk of violence in the former setting (Graham, 2011). Graham (2011) stated that understanding context may be key in identifying possible mechanisms in the relationship between alcohol and violence. She went on to briefly explore the routine activities of young men, sketching out the link between aggregate-level, gender-specific, heavy episodic drinking and aggregate-level outcomes of violence (Graham, 2011), although there was no attempt to delineate or incorporate contexts or mechanisms into these outcomes.

Realist evaluation vs quasi-experimental approaches

As demonstrated in Chapter 1 (e.g. Brennan et al., 2011; Jones, et al., 2011; Miller et al, 2019), quasi-experimental studies and reviews often find that the evidence of programme effectiveness is mixed or conflicting. Such studies provide few insights as to why the intervention worked or did not work (Pawson & Tilley, 1997). For empiricists, when outcome regularities that arise from interventions are identified, they are analysed through either deductive or inductive reasoning to identify probable causal relationships, mainly by falsifying or supporting hypotheses about the intervention (Shadish,

Cook & Campbell, 2002). This is done through a *Pattern Model of Explanation*, where explanation of outcomes is achieved by establishing uniformities or constant conjunctions (Caldwell, 1994). In contrast, Realist Evaluation (Pawson & Tilley, 1997) asserts that causality is generative (Harre, 1970) and that these causal drivers often exist at a different, unseen level of reality to the empirical outcomes they generate (Bhaskar, 1975).

Realist research seeks to explain casual processes: experimental designs are insufficient to understand why particular programs work or do not (Pawson & Tilley, 1997; Shearn, Allmark, Piercy et al., 2017). Realist inquiry presumes specific *outcomes* in complex social interventions are caused by relevant *mechanisms* being triggered in defined *contexts*. This is often expressed as O = M + C (outcomes equals mechanisms plus context). Realist mechanisms are often described as resources and reasoning, mediated by context (Dalkin, Greenhalgh, Jones et al., 2015; Pawson & Tilley, 1997).

These mechanisms are often unseen. For example, human reasoning cannot be directly observed (Shearn et al., 2017), so uncovering these mechanisms is driven by theories about them. Realist evaluation (Pawson & Tilley, 1997) is based on the following principles (as summarised by Greenhalgh, Wong, Jagosh et al., 2015):

- complex social interventions aim to address an existing problem through theory-based programs;
- these programs have an effect by providing resources that enable participants to make different choices, which requires a change in their reasoning;
- this choice-making is always limited by things such as their beliefs and attitudes, previous experiences, and opportunities;
- these resources include skills, information, support and material;
- this combination of reasoning and resources, known as mechanisms, enable the program to be effective;
- the contexts in which the programs are delivered can light the fuse on different mechanisms for different participants;
- contexts include things like geography, social structures and networks, local and personal history, and economics;
- these contextual factors may either enable or prevent the mechanisms' work; and,
- there is always an interaction between context and mechanism, and that interaction generates program outcomes.

Realism analyses chains of implicit assumptions to explicate the theory or theories underlying the interventions under study in order to describe context-mechanism-outcome configurations (CMOs).

However, realism also acknowledges generative mechanisms can be progressive, where Outcome 1 leads to Context 2 and so on.

The use of realist evaluation and realist synthesis in social and health sciences continues to increase (Marchal, van Belle, van Olmen, et al., 2012; Shearn, Allmark, Piercy et al., 2017), as do publications to support this line of research. Standards for conducting realist evaluations and realist reviews (a form of literature review and synthesis) have been developed by the *Realist and Meta-narrative Evidence Syntheses: Evolving Standards* (RAMESES). RAMESES I, (Wong, Greenhalgh, Westhorp, et al., 2013), provides guidance for realist reviews. RAMESES II (Wong, Westhorp, Manzano, et al., 2016) provides guidance for realist evaluation. This guidance became available after Phase 1 of the research in this thesis was conducted. While studies described as realist evaluations of CCTV have been conducted (e.g. Gill & Turbin, 1999; Taylor, 2010; Tilley, 1993), realist syntheses of CCTV were not found. Similarly, searches of peer-reviewed and grey literature did not locate realist evaluations or realist syntheses into ARAs. Examples realist research relevant to the topic of this thesis are however given below. These are:

1. a realist review into community-based alcohol harm-reduction projects (Hunter, Berends & MacLean, 2012),
2. a realist evaluation into victim reporting of offences (Solymosi, Cella, & Newton, 2018), and
3. a realist review of brief interventions in an ED to reduce alcohol-related harms (Davey, Landy, Pecora et al., 2015).

Neither Hunter, Berends & MacLean (2012), nor Solymosi, Cella and Newton (2018) fully meet the RAMESES standards (Wong, Greenhalgh, Westhorp, et al., 2013; Wong, Westhorp, Manzano, et al., 2016). The studies do however illuminate relevant aspects of data sources and research approaches described above. Police data in large part rely on victims reporting crimes (Section 3.3.1 of this chapter). Effective implementation of community-action, or community action approaches has also been examined in previous chapters (Section 3 of Chapter 1 and Section 2 of Chapter 2). Davey, Landy, Pecora et al. (2015) appears to be a successful application of the realist approach to guide further, more refined research.

A realist synthesis of more than one hundred Australian projects to reduce alcohol and drug harm explored successful implementation of diverse programs across social and structural contexts (Hunter, Berends & MacLean, 2012; Maclean, Berends, Hunter et al., 2012). The adapted realist synthesis methodology enabled identification of commonalities and differences in implementation success across a large number of complex social interventions involving multiple components and actors across multiple sites (Hunter, Berends & MacLean, 2012). Identified contexts in which the

interventions were implemented included project target group, geographic project location and socio-economic disadvantage. The study generated what were described as high level theories (Hunter, Berends & MacLean, 2012). Each project was identified as belonging to one of four categories of intervention:

1. community education and prevention,
2. engagement and treatment services,
3. organisational enhancement, or
4. sector training.

Outcomes were defined as successful implementation of all project funding requirements. Contexts were not explored in detail and configurations were not described. Studies examined for the review did not share an underlying theory or mechanism. Mechanisms for successful implementation that operated across a number of programs were retrospectively identified, with each encompassing a combination of enabling or barrier factors (Hunter, Berends & MacLean, 2012). Table 1, amended from Hunter et al.'s table (2012, p.62), summarises these below. Eight case studies were then analysed to further explore the way facilitating or barrier mechanisms operated regarding project implementation (Hunter, Berends & MacLean, 2012). The use of case studies in realism has been suggested to identify, explore or refine theory or test hypotheses (Koenig, 2009). For this use case studies were not selected to be representative, but rather to provide insight into theory (Hunter, Berends & MacLean, 2012; Koenig, 2009). While the results were not reported as CMO configurations, the study reported refinement of high-level theoretical domains regarding successful implementation of community-based programs to reduce harms related to alcohol and other drugs. These domains support previous research (see Chapter 2, Section 2 above), and begin an iterative process to frame refinement of theory through a realist lens.

Table 1.

Identified domains of enabler and barrier categories.

a.	**External engagement, communication and relationships**
Enablers (communication and relationships) *Support from partner agencies or from participating communities, used existing networks*	**Barriers (engaging communities & partner agencies)** *Lack of partner agency or community interest in or commitment to project, partner agency withdrawal*
b.	**Team Staffing**
b1. Enablers (communication and relationships) *Staff engaged and enthusiastic about project, staff consultation mechanisms*	**Barriers (Clarity of staffing roles)** *Staff roles unclear, staff conflict, staff did not prioritise project involvement, placed additional stress on staff*
b2. Enablers (leadership)	**Barriers (Identifying & retaining staff)**

Employed suitable staff or contractors, staff or management provided leadership, staff training activities undertaken	*Delay in staff recruitment, staff or management turnover, staff lacked required skills*
c.	**Project planning and design**
Enablers *Evidence-based model, good fit to needs, flexible design, appropriate scoping, holistic approach*	**Barriers** *Poor fit, inadequate scoping, poor timing*
d.	**Governance**
Enablers (organisational governance & capacity) *Organisation already experienced in project work, good policies & procedures, effective internal reference group*	**Barriers** *Lack of management involvement, reference group unrepresentative or ineffectual*
e.	**Sensitivity to settings & needs of service users**
Enablers (Sensitivity to service users and settings) *Model culturally appropriate, employed culturally/gender appropriate staff*	**Barriers (Meeting cultural needs of specific demographic groups)** *Resources or approach not culturally appropriate, failed to engage specific demographic groups*
f.	**Service users & service delivery**
Enablers (Participatory approach to service delivery) *Target group involved in development, used role models or peer approaches, activity based approaches*	**Barriers (Complexities of service users)** *Participation poor, challenging behaviours*
g.	**Funding and resourcing**
Enablers *Well-funded, used existing resources, gained additional funding, partner agency contributed resources*	**Barriers** *Submissions for ongoing funding unsuccessful, other funding problems*
h.	**Research, evaluation and data collection**
Enablers *Well documented, effective data collection, ongoing research*	**Barriers** *Poor data collection systems, poor response to evaluation, datasets missing*
i.	**Local service system**
Enablers *Not identified as an enabler by projects in the study sample*	**Barriers** *Lack of other services, inter-professional problems, philosophical differences in addressing AOD*

One realist evaluation examined a public relations campaign to increase reporting of offences, unwanted sexual behaviour on public transport in London, the United Kingdom (Solymosi, Cella, & Newton, 2018). While it is recognised that underlying pathology in sexual offending is different to non-sexual assault (Jespersen, et al., 2009), this study may illuminate the strengths of the realist approach. The study was also an example of how data that was not collected for the purpose of the evaluation was used to guide description of CMO configurations. For the original intervention, three mechanisms were identified through focus groups. These were that the message should:

1. reach the intended target audience,
2. be aimed to address barriers to reporting the offence, and

3. not increase fear of crime.

Four observed barriers to reporting to reporting these offences were:

1. normalisation of the behaviour (the incident was framed as antisocial but not a crime),
2. internalising the situation, (women chose to escape and forget, often as a result of thinking that they were in any way at fault for the incident),
3. lack of clarity and awareness around reporting (what behaviour was an offence and who to report to), and
4. credibility (a lack of belief that reporting the offence would result in any form of justice).

Recognition of the message increased with the first three waves of the campaign, before plateauing with the fourth and last wave. Attitudes of those surveyed within the target group did not change, but statistical analysis showed an increase in the number of reported offences with each wave. Three different surveys found no change in self-reported experience of the offence. Solymosi et al. (2018) attributed the findings to increased reporting, rather than increased prevalence of offences. They further identified contextual differences through which aspects of the campaign worked, and which did not, beginning to describe the configuration of features needed for an effective program (Solymosi, Cella, & Newton, 2018).

Another study further suggested the potential for realist research in an area related to NTE ARAs. A realist review of brief interventions in EDs for alcohol misuse examined the mixed results in their effectiveness (Davey, Landy, Pecora et al., 2015). Candidate theories for effectiveness of the intervention were described, with no evidence found to support two of these, suggesting these may be ruled out if this finding is supported through further research. Four mechanisms and four mediating contexts were identified. A range of CMOs were generated, although testable hypotheses were not clearly described in the study.

Realist evaluation into CCTV

Realist evaluation has been identified as a useful and appropriate methodology in open-space CCTV research (Anderson & McAtamney, 2011; Brown, 1995; Gill & Spriggs, 2005; Gill & Turbin, 1999; Pawson & Tilley, 1997). In fact CCTV research was seminal in the development of Realist Evaluation (Pawson & Tilley, 1997; Tilley, 1993). It was cited as a guiding approach in an extensive national evaluation of CCTV in the United Kingdom (Gill & Spriggs, 2005), although apart from one mention in the introduction of the final report, the methodology was not referred to again. Realist evaluation has been suggested as an appropriate evaluation framework for local government operated CCTV systems in Australia and elsewhere (Anderson & McAtamney, 2011). Indeed, one of the seminal

studies which led to the development of Realist Evaluation was a study of CCTV in car parks in the United Kingdom (Pawson & Tilley, 1997; Tilley, 1993).

3.5 Summary

The number of assaults, where and when they happen and other circumstantial characteristics are of central interest when designing or evaluating approaches to reduce the number and severity of violent incidents. The types of quantitative data each agency collected were examined, and strengths and gaps identified as well as reasons for these. Under-detection of NTE ARAs is a problem across all official data sources. The reasons for this vary across sources, but are often linked to data capture processes, decisions taken by individuals reporting assaults or capturing data, or operational processes. Useful contextual information regarding ARA incidents is difficult to capture using methods other than intensive qualitative research (Dinh et al., 2014), although the use of video footage has been recently recommended (Philpot et al., 2019).

To properly evaluate the effectiveness of comprehensive intervention models to reduce NTE ARAs there is a need for multi-faceted outcomes measures, and more appropriate study designs. Realist evaluation and realist review may provide this. Realism seeks to identify how an intervention affects an outcome, rather than simply measuring whether it works or not. The approach defines the context in which an intervention is expected to have an impact, the mechanisms through which the intervention achieves its impact, and the outcome of introducing the intervention. Realism has been applied to studying a number of social problems related to accurate measurement of assaults and alcohol-related harms, including the effectiveness of community-based interventions. Case studies are a valid approach to identifying and refining theory through realist inquiry. As outlined in Chapter 1, this thesis undertook research in two phases: positivist and realist. Six studies were conducted across these phases. Chapter 4 describes the methods used for these studies.

Chapter 4. Methods

4.1 Introduction

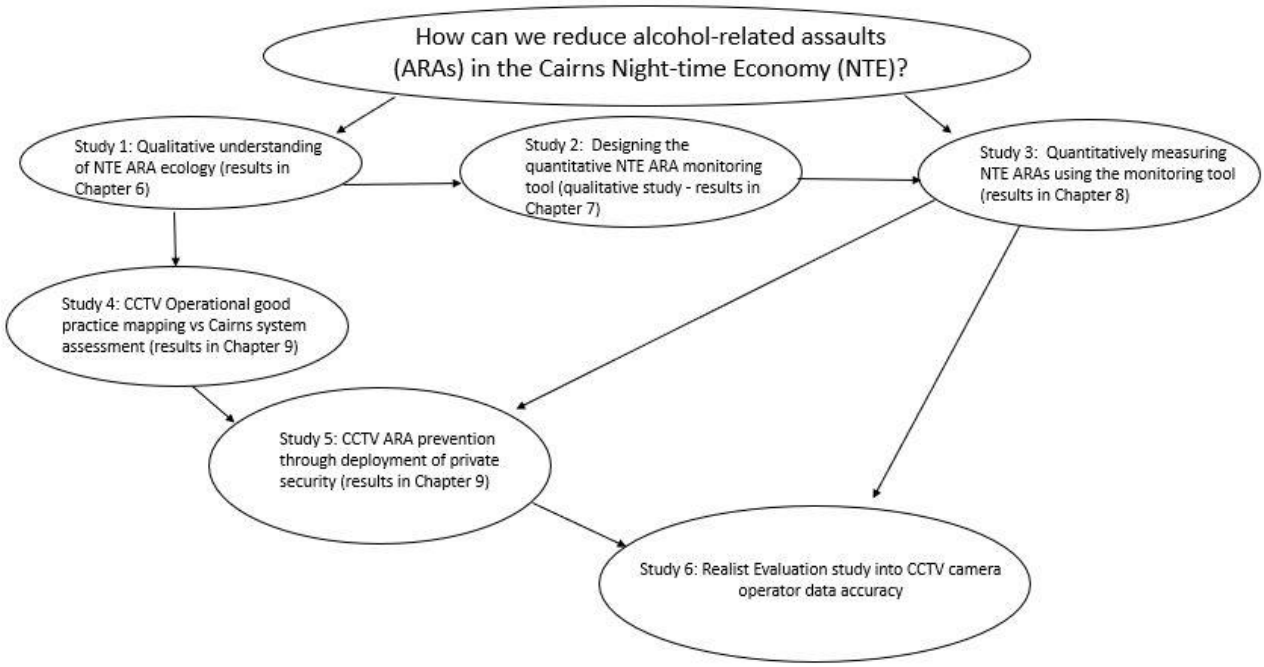
This chapter describes the setting in which the research for this thesis took place, before documenting the methods used in each of the six studies. Section 4.2 describes the setting, including a summary description of the CCTV system. Section 4.3 details the qualitative methods used in Study 1. This study aimed to better understand stakeholder perceptions regarding the Cairns NTE boundary, the context and causes of ARAs, as well as interventions to reduce violence, and to explore agencies' ability to share relevant data. The study specifically explored the feasibility of implementing a multi-stakeholder data collection tool. Section 4.4 describes the qualitative methods used in Study 2: the design and establishment of the multi-agency ARA monitoring tool. Section 4.5 details the quantitative methods used in Study 3, which aimed to more accurately count the number of ARAs in the Cairns NTE. The probabilistic linkage method is introduced.

Sections 4.6 and 4.7 detail the methods used to examine aspects of the CCTV system that may have been identified in Study 1 as important in controlling ARAs in Cairns NTE. Section 4.6 describes Study 4, an assessment of operational practices of the Cairns system compared with good practice as identified through an examination of the literature. This section also describes how the Realist Evaluation approach began to be investigated. Section 4.7 describes the methods used in Study 5, which explored identification of assault incidents and the dispatch of physical, on-the-ground response by operators. Section 4.8 describes the methods used in Study 6 which explored performance regarding the accuracy of data entered by operators into the incident recording database. Study 6 was designed according to Realist Evaluation principles. Studies 1, 4 and 5 identified and refined domains relating to camera operator performance. Study 6 aimed to identify some initial CMO configurations regarding camera operator performance. The order and arrangement of these studies is depicted in Figure 2 on the next page.

Ethical approvals for the studies were provided by the *Queensland Health Cairns and Hinterland Hospital and Health Service District* and the *James Cook University Human Research Ethics Committee*. The *Queensland Police Service Research Committee* provided approval.

Figure 2.

Research Plan Overview



4.2 Setting

Cairns is a tropical regional city adjacent to the Great Barrier Reef in far north Queensland, Australia. The estimated residential population for Cairns at the time of the study was 162,730 (ABS, 2011). Cairns is an international and domestic tourist destination, hosting over 550,000 visitor nights in 2010. Tourist numbers include a significant 'backpacker' component (TTNQ, 2010). Backpackers are defined as young (up to 29 years old), low-cost tourists seeking adventure, with Cairns specifically marketing the NTE experience to this cohort (Botterill et al., 2013; Botterill et al., 2014). After domestic tourists, the United Kingdom is the single largest market for Cairns tourism; 27% of all United Kingdom visitors to Australia visit Cairns. As a popular destination for domestic and overseas travellers, the inner-city of Cairns has a vigorous night-time entertainment precinct. An aerial photograph of the central business district (CBD) is shown on page 52 in Figure 3. The precinct comprises an area of approximately 0.6km^2. According to the Office of Liquor and Gaming, at the time of the study, 26 venues within the boundaries of Figure 3 were licensed to sell liquor after midnight. Eight of these venues were licensed to trade beyond a lockout time at 3am, closing at 5am. The total permitted capacity of the licensed premises in the Cairns NTE was in excess of 18,000 persons (Pointing, Hayes-Jonkers & Clough, 2011).

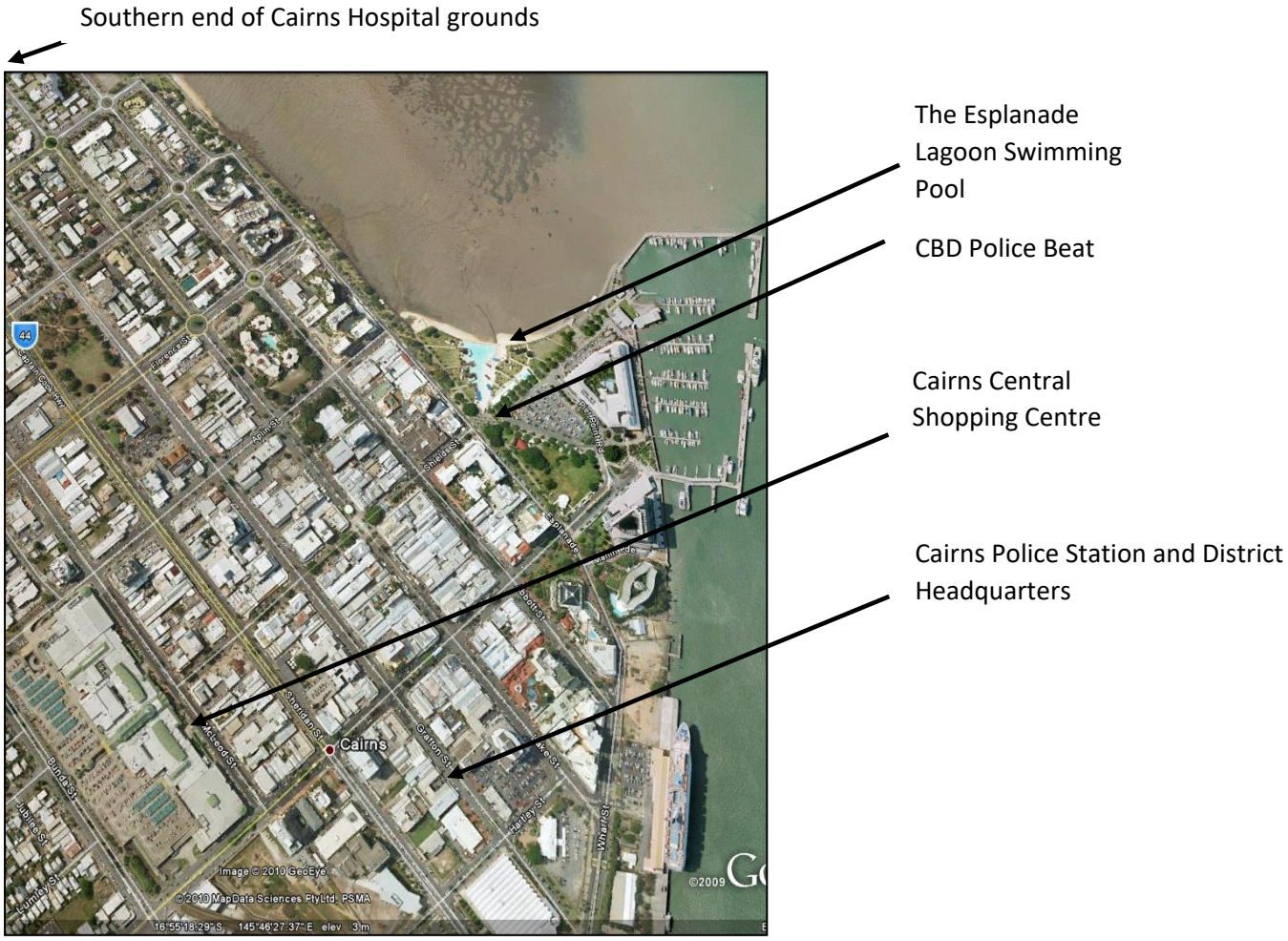
The Cairns Hospital is located approximately 1.5 kilometres to the north of the CBD (just outside the top left corner of Figure 3 below). The hospital is managed by the Queensland Health Department and contains the sole ED servicing Cairns city (Smith et al., 2006). In the first full year of the study there were approximately 45,000 attendances to the Cairns ED (Queensland Health, 2010). A private 24-hour medical centre also operates on the border of the CBD boundary. Cairns Police Station and a "Police Beat" mini-station are also indicated in Figure 3. The top right and right hand side of the photo show the Coral Sea. Jutting into the water is a tourist shopping precinct (The Pier), and the marina. The light blue sliver to the immediate left of the Pier is the Esplanade Lagoon swimming pool. Cairns Central Shopping Centre is in the lower left corner of the picture. The Esplanade and Cairns Central form natural boundaries in this urban setting. At the commencement of the study the area depicted in the photo contained a suburban bus terminus, and an unofficial taxi rank and CCTV cameras. A few months into the study an additional "official" taxi rank was established. This was constantly monitored by a fixed CCTV camera, and overseen by an employed security marshal (Hayes-Jonkers et al., 2012).

With tourism a major economic contributor to the city, there were well established and enduring inter-sectoral forums addressing community safety issues. The *Cairns City Licensees Safety Association* (CCLSA) comprised venue owners and representatives, as well as private security firm representatives. A second network comprising agency managers and CCLSA representatives had a focus on inner city safety projects, the *CBD Safety Summit*. The CCLSA, the Queensland Police Service, and the Cairns Regional Council established a formal CBD 'liquor accord', based on two *Memoranda of Understanding* (MOUs) between the parties. The MOUs consolidated safety networks and protocols with an aim to improve patron safety and decrease liquor-related public disorder around licensed premises in the urban precinct (Hayes-Jonkers et al., 2012). Through these forums, a number of communication and operational procedures were established at the time of the study. These included real-time communication between the CCTV camera operators, police and private security. The CBD Safety Summit was responsible for the establishment of the additional "official" taxi rank mentioned on the above page.

The CCTV system is owned and managed by Cairns Regional Council, and staffed by a private security contractor. This is consistent with the most common Australian management model where NTEs are actively monitored through CCTV (Wilson & Sutton, 2003; Hulme et al., 2015b), although only 8% of Australian systems include this type of intensive operation within the scope of their CCTV functions

Figure 3:

Google Earth image of the Cairns CBD



(Hulme et al., 2015b). At the initiation of the study, the CCTV technology in the CBD comprised 81 late-generation pan-tilt-zoom digital cameras linked to information and communications technology infrastructure in a monitoring room. Footage from the CCTV cameras was viewed on six large television screens in the monitoring room. One of these screens split the feed into twelve smaller images. The screens showed simultaneous footage from 17 sites in all. The monitoring room was continuously staffed by at least one operator. A second operator was rostered on during three peak eight-hour shifts on weekends and public holiday evenings. Real time camera monitoring was virtually continuous. Operators had constant radio contact with street and venue security (during the hours when venues operated). Operators also had telephone contact with police and provided continuous live footage from any given selected camera directly to the police communications room. Active CCTV monitoring of an incident could be initiated by the camera operators, by requests from police or street or by venue security via phone or radio contact. At the time of the study, the private contractor tasked

with operating the CCTV monitoring also provided physical street security during peak periods in the precinct (evenings from Thursday to Sunday). Up to eight street security officers patrolled the CBD on weekend nights. Systematic searching of available databases found no published evidence that could be used to compare with the Cairns model. The Council website (CRC, 2009) defined the objectives of the Cairns CCTV system to include identification and prevention of crime and inappropriate behaviour in the Cairns CBD, and to enhance perceptions of safety. The purpose of the system was defined separately and included assisting identification and co-ordination of response to incidents that negatively impact upon the public safety of the community and visitors to Cairns. The Council explicitly acknowledged that personal protection had priority over property protection (CRC, 2009).

Cairns is also the service hub for a number of remote Aboriginal and Torres Strait Islander communities in far north Queensland, and for the Torres Strait communities bordering with Papua New Guinea. At 9%, the proportion of Indigenous residents in Cairns was nearly three times the Australian average (ABS, 2011). Overall, the Cairns region is rated as socio-economically disadvantaged when compared with the rest of regional Queensland, all of Queensland, and with Australia nationally. In 2011, unemployment in Cairns (6.6%) was higher than the average for regional Queensland (6.2%), Queensland (6.1%), and Australia (5.6%), with the rate remaining relatively stable over the previous five years (ABS, 2011). Cairns is also a location which contains a very high proportion of chronic offenders, defined as individuals who repeatedly offend in the same location with an escalating offence trajectory (Allard, Chrzanowski, & Stewart, 2012). The city has been identified as a community which generates chronic offenders and bears the second highest economic burden of offending by chronic offenders in Queensland (Allard et al., 2012). At the time of the study, publicly available police statistics did not break down the number of offences to a level sufficiently narrow to estimate the number of assaults in Cairns city. The publicly available statistics did show that the Cairns District of the Queensland Police Service (QPS) Far Northern Region had assaults 1.95 times higher than the Queensland average (QPS, 2010). From the statistics it was impossible to discern whether these assaults were linked to alcohol. Presentation statistics from the 24-hour private medical centre were unavailable for this study.

4.3 Study 1: Defining the NTE precinct, ARAs within it and the feasibility of sharing data.

This section details the qualitative methods used to ascertain the ecology in which NTE ARAs took place, stakeholder knowledge of interventions, and stakeholder ideas around prevention improvements. A critical issue for the study was to understand whether a multi-agency tool could be implemented to more accurately count the number of these assaults and feed this information back to stakeholder networks mandated to reduce NTE ARAs in Cairns.

Participants

Categories of potential participating organisations, and roles within them, were identified through the literature review (see Chapter 2, pages 17-19 and Chapter 3, pages 34-35). These organisations were regulatory and enforcement agencies, primary health services and ambulance, local government, and licensed venues and security staff. Community registers were searched to identify organisations with key organisational responsibilities to prevent or respond to NTE ARAs. To achieve saturation, during interviews each participant was asked to identify any additional stakeholder organisations and specific positions within those organisations that should be interviewed as part of the project.

Interviews

The interviews were semi-structured, designed to allow examination of any points that arose with further relevant questioning (Gibbs, 2008). The candidate conducted all the interviews between 20 November 2009 and 4 February 2010. A copy of the list of questions, the project information sheet and the consent form are attached at *Appendix 2*. The contents of the project information sheet were explained to interviewees who were provided with a copy of the information sheet before providing a participation agreement form to sign if they were willing to participate. Interviewees were then asked to consider "person-to-person physical contact with violence," linked to licensed premises, specifically excluding sexual assault (see Appendix 2). Interviewees were then asked to comment on the provided definition of ARA, and to describe why this violence happens in Cairns. Participants were provided with a base map of the urban areas of Cairns city, and asked to draw the boundaries of the area they believed to be of greatest concern with respect to ARAs, to mark particular localities of concern within these boundaries, and to explain their reasons for these choices. This cognitive mapping method (Basta, Richmond & Wiebe, 2010), modified for the purposes of this study, has previously been used to assess health risks linked to alcohol outlets in urban environments (Flowerdew, Manlery & Sabel, 2008). Participants were then asked:

- to comment on the main ARA issues in the area they defined,
- how these issues had an impact on the business of their agency,
- about their knowledge of existing interventions to address the violence,
- about the participation level in formal and informal collaboration around the issue for their agency, and for all agencies as a whole,
- about the outcomes of these collaborations,
- about opportunities and barriers to developing and implementing further targeted collaborative interventions to reduce ARAs in the Cairns NTE,

- a number of questions focusing on the routine data collection procedures within their agency regarding the issue of ARAs in NTEs, and the potential for sharing this data. They were asked to identify any specific barriers to the sharing of this data,
- about their awareness of any economic analyses of ARAs in NTEs, and
- to refer other key people who they believed had similar roles, who were similarly knowledgeable and experienced, and could validly comment on the issues.

Using a standard qualitative data analysis approach (Gibbs, 2008), the interview data were transcribed and analysed by extracting key themes. Thematic analysis is an inductive design where the researcher identifies and explores themes which arise during analysis of the data in order to draw tentative conclusions (Gibbs, 2008; Stenius, Mäkelä, K., Miovsky et al., 2008). Initial analysis of the participant responses was based primarily on the questionnaire structure (similarly to Stenius et al., 2008). Following the initial analysis, certain themes emerged, and all notes were re-analysed for appearances of that theme. Categorisation was not exclusive.

Stakeholder Feedback Groups

Following principles of community-based, participatory research into this problem (e.g. Graham & Chandler-Coutts, 2000; Hanson, Hanson, Vardon et al., 2005; Holmila, Holder, Andréasson et al., 2008) repeated engagement over an eighteen month period with community stakeholder groups tasked with preventing or responding to NTE ARAs were also planned. These groups were identified through community registers and using a 'snowball' to identify relevant stakeholder agencies. Attendance at stakeholder routine meetings was scheduled. Due to the centrality of the ED to the design, as identified through the literature (e.g. Warburton and Shepherd, 2004), specific workshops with nursing and medical staff were planned.

Observational Sessions

An observational session to examine routine service activities in the Cairns ED was conducted in conjunction with other two researchers between 8pm on Friday, 12 February and ending at 4am, Saturday 13 February 2010. Observational sessions with one of the above other researchers were also conducted at the Cairns Regional Council CCTV monitoring room from 10pm on Saturday 21 February, until 4am on Sunday 14 February 2010. This was followed by intensive observation sessions in the CCTV monitoring room (see Sections 4.6 & 4.7 below for details).

4.4 Study 2: Designing and establishing the ARA monitoring Tool.

Study 1 sought to discover what data could be shared, to identify potential barriers and facilitators within each organisation to such sharing, and to confirm data-provision roles within stakeholder organisations. Study 2 was a qualitative and quantitative study aiming to design the responsive multi-agency monitoring tool. Studies (Benger & Carter, 2008; Warburton and Shepherd, 2004) suggested the best way to approach the quantitative collection was to focus on ARA *incidents*. To more accurately count the total number of unique NTE ARAs in Cairns it was essential that the data be at an aggregate level for the entire NTE precinct as defined through Study 1. Six stakeholders were identified as potentially being important to the provision of this data: the police, the ED, the twenty-four hour medical centre close to the CBD, the Queensland Ambulance Service (QAS), the CCTV system, and security on licensed venues. Within each agency four categories of information were identified:

1. Confirming the incident was an assault,
2. The assault occurred in the NTE,
3. Demographic information relating to persons involved in the incident (sex and age of people), and
4. The involvement of alcohol.

The literature (Benger & Carter, 2008; Roche, Watt, McClure et al., 2001; Warburton & Shepherd, 2004) suggested that the main obstacles to the collection and provision of data within each agency would be potential interruption of stakeholders' core business, the types of data collected by different agencies and commercial enterprises, internal policies governing the release of information, and staff commitment to the project. The interview process aimed to uncover the specific complexities relating to these issues for each agency, and was the first stage of Study 2. Revisiting potential data providers after the initial interviews, individually and in the feedback groups, was planned to clarify and resolve emerging questions and concerns about data sharing. The second stage was the conceptual design of the linked monitoring tool across provided stakeholder data. A retrospective linkage exercise tested the concept and the utility of data provided, focusing on testing the method, rather than analysis of temporal or spatial patterns of recorded assaults.

A probabilistic cross-matching methodology (Jaro, 1989; Méray, Reitsma, Ravelli et al., 2007) using precise location, time and date of the incident formed the basis of incident identification and analysis. Probabilistic linkage techniques produce a high-quality linked database from crude data by combining information from several partially identifying fields (Méray et al., 2007). The process for probabilistic linkage (Jaro, 1995; Wang & Ling, 2012), involves comparing separate sets of records pertaining to a

given set or population. Each database consists of a number of records (observations), and a number of fields relating to those records (component variables). Typically, each *observation* corresponds to a member of the set, in this case a unique ARA incident. Each *field* is an attribute identifying the individual observation, such as time, address, age, or sex. The fields in common between the databases are the fields used for matching. This approach has been recognised as a potentially valuable methodology to address alcohol-related harms through a place-based design (Stevenson & McClure, 2005). The methodology has been described and validated in a number of studies, including assaults attended by ambulance, and assault presentations to EDs (Dean, Vernon, Cook et al., 2001; Downing et al., 2005; Tromp, Ravelli, Bonsel et al., 2011; Wang & Ling, 2012). A presentation to the ED within 20 minutes of the incident time recorded by other agencies was accepted as sufficiently close in range to link the variable of *incident time* across databases for this pilot study.

Based on findings from Study 1, the required data elements for individual participating stakeholders was identified. A data-capture table specifying the sharable, ARA-relevant information captured by each agency was compiled. This table was expanded to include the reasons each agency collected the data, noting complexities identified for each recording agency. Interviewees were revisited to verify the accuracy of the information captured, and to confirm the agency was still prepared to share the data with the research group. Retrospective data was analysed using Venn Diagrams, enabling meaningful organisation of quantitative data collected by multiple agencies for single incidents (i.e. police, ED, CCTV). Some incidents may potentially be seen by all agencies: different agencies collect quantitative data about ARAs based on the way they encounter these ARAs and record them. To organise this data in a meaningful way, Venn Diagrams were used to enumerate the occurrences and to depict ARAs found in more than one data source. This facilitated data sharing with stakeholder agencies.

An all-of-agency workshop held with decision-makers in the identified data-provision stakeholders completed the final stage of Study 2. Endorsement from each stakeholder to collect and share data was gained through this workshop, the goal of which was to overcome final logistical issues; enable negotiation of inter-agency complexities; reach agreement on what aspects of data were to be collected; and establish the project duration and timelines for implementation.

4.5 Study 3: Measuring NTE ARAs using the multi-agency monitoring tool.

This section describes the specific parameters for data capture and provision by agencies contributing to the monitoring tool. The literature suggested that each agency was strong in only some areas of data, for example police had strong locational data as well as whether participants were affected by

alcohol. CCTV had strong location and time data, but no way to accurately measure whether participants in the assault incident were affected by alcohol. Once the data sharing protocols and parameters were agreed, spreadsheets on incidents could be emailed fortnightly, collated and the incidents linked. Selected linking variables were: *whether the incident was recorded as an assault, date of incident, time of incident, incident location, age and gender of the presenting patient or offender, and alcohol involvement.*

4.5.1 Measuring ARA presentations to the ED

Studies showed that collection of ARA data from the ED would be the most complicated and complex of all data provision agencies. For example, information about patient presentations to the ED as a result of an ARA is contained within information linked to the presenting patient's medical record. Extensive consultation with ED staff was required to de-identify this data and generate accurate aggregate level data. The *Emergency Department Information System* (EDIS) was the database on which clinical details of all presentations were routinely recorded in the Cairns ED. Upon patient presentation to the ED, triage nurses entered details into the *Presenting Problems* screen of the EDIS. Following treatment, a patient could not be discharged from the Cairns ED without information being entered by the attending clinician into a compulsory *Diagnosis* screen of the EDIS. This Diagnosis screen contained a number of mandatory fields.

The EDIS used the Australian modification of the tenth version of the *International Statistical Classification of Diseases and Related Health Problems* (ICD), (ACCD, 2015). The ICD uses a tabular list of alphanumeric codes for injuries, diseases and other health problems. The coding scheme is structured according to body system and aetiology of the injury or disease (ACCD, 2015). For example, the '*F*' codes within the ICD categorise mental health diagnoses, with the code F10.0 denoting a diagnosis of *Alcohol Intoxication*. The ICD has been used extensively in injury prevention research to determine injury or disease patterns, to identify cases for research, including data linkage across systems (Muscatello et al., 2005; WHO, 2009). The pattern of injuries arising from assaults has been described in the literature (e.g. Brink, Vesterby & Jensen, 1998; Lee, Olsen, Sun et al., 2017). The most common sites of assault injuries are the head, neck or face, with approximately three quarters of assault victims presenting with head, neck or facial injuries (Brink et al., 1998; Lee et al., 2017). After the head and face, the upper limbs, particularly the hands, are the region injured most often, with 14% of injuries occurring in this area (Brink et al., 1998). The 'S', range of ICD codes describe most injury diagnoses. The primary ICD Code cluster *S.00 – S.09* denotes injuries to the face and head, the primary ICD Code cluster for injuries to the wrists and hands is *S60 – S69*. Additionally, there are a range of miscellaneous codes in the 'X' and 'Y' cluster range. For example, codes *X85 – Y09* denote

various forms of physical and sexual assault (ACCD, 2015). A number of ICD codes were chosen to identify assault presentations to the Cairns ED. *Appendix 3: Selected ICD codes* details these. Following extensive consultation and negotiations through Study 2 above, a software programme was designed by the EDIS data manager to de-identify potential ARA presentations to the Cairns ED. This was inserted into the EDIS. It is described below.

For the identified ICD codes, if presenting patients were aged 16 and over, triage nurses were asked to type 'CBD' in the Presenting Problems EDIS screen where it was believed the incident occurred in the CBD. For patients aged 16 years or over who presented for the identified ICD codes, the following question was attached to the Diagnosis Screen as an automatic, compulsory pop-up screen which the attending physician was required to answer: "*In your opinion is this presentation the result of an alcohol-related assault in the Cairns CBD?"* The possible answers were: '*yes/no/unsure'*, and required one mouse click for completion.

Following this single mouse click, the physician was returned to the Diagnosis Screen and routine data entry for patient discharge was resumed. This meant that a patient diagnosed with the identified ICD codes, who was aged 16 or over, could not be discharged from the ED without the treating physician answering whether or not they believed the presentation was linked to an ARA within the defined inner-city area. For each presentation where the attending physician answered *yes* or *unsure*, a range of variables relating to the presentation were captured and compiled into a separate report. These variables were:

- the age and gender of the patient,
- the date and time of the presentation,
- mode of arrival,
- triage category,
- provisional primary and secondary diagnoses, and
- the free text recorded by triage nurses when the patient presented, including the Presenting Problem and Nursing Assessment screens.

The *incident location,* and *alcohol involvement,* would be the weakest linking variables in the ED data because these variables lack strong relevance for treating clinicians (Warburton & Shepherd, 2008). The literature (e.g. Roche et al, 2001; Barker, Swaminathan, Aaora et al., 2011) reported that the involvement of alcohol in presentations was inconsistently recorded in Queensland EDs and capturing whether the assault occurred in the NTE is highly problematic as the location is not clinically important (see Chapter 3).

4.5.2 Police

The QPS uses the *Queensland Police Records and Information Management Exchange* database (QPRIME) to record details of persons and incidents. Following written approval from the Assistant Commissioner, the QPS Intelligence Officer wrote a software piece on QPRIME. The police recorded all charges per ARA incident within the NTE boundary in the spreadsheet sent to us. The literature suggested that police capture precise temporal, demographic and locational data on assaults automatically to meet prosecution requirements (Palk et al., 2012; Morgan et al, 2018). Police therefore had the strongest documentation for each of the selected linkage variables, including involvement of alcohol in the incident. However, just a fraction of all assaults occurring are recorded by Police, and recording the involvement of alcohol was an individual judgement of each officer.

4.5.3 CCTV

The CCTV *Security Incident Management System* (SIMS) captured data entered by camera operators, and the recorded camera footage relating to incidents of concern. This footage was stored digitally for 28 days. Camera operators manually categorised and logged incidents of concern in the SIMS database. Each SIMS incident report contained the relevant segment of camera footage and the linked SIMS record in which the rostered camera operator completes six information fields including a free-text field. The system offered operators 42 *Incident Types*, under which they could categorise an observed incident, including the category of *Alcohol-related assault*. The SIMS allowed generation of summary reports by incident types. The SIMS incident reports, but not the footage, for every incident categorised by camera operators as an ARA was emailed in a spreadsheet containing all six information fields. Each incident report was examined by two researchers. If the incident type was checked as an ARA, the free text field was examined to compare the description of the incident against the categorisation. Accuracy of data and proportion of ARAs first seen by operators was examined. Demographics of assault participants, and the involvement of alcohol were unable to be established..

4.5.4 Venue Security

Licensed venues are required under the *Liquor Act* (Queensland Government, 1992) to keep incident logs relating to each security shift for seven years after completion of that shift. Studies suggested that collecting information from licensed venues proved to be a sensitive issue (see Chapter 3), with assaults on licensed premises recorded by the Office of Liquor and Gaming Regulation, the statutory enforcement agency. These records could potentially be used to lodge grievances against the venue. Venue security on all licensed premises which cooperated with the study collated reports on ARA incidents from each incident register. Copies of these summary reports were provided. The date and

time of the incident, as well as the participants' demographics, address of the premises and involvement of alcohol were documented in every record provided.

4.5.5 Ambulance

Similarly to the ED, data is collected by the ambulance because of a clinical rationale. The involvement of alcohol is often known but not recorded. The location is precise because it is the place where patients are picked up or treated (Downing, Wilson & Cooke, 2005).

4.6 Study 4: CCTV operational good practice mapping versus Cairns NTE system assessment

Study 4 examined evaluations of open-space, urban, CCTV systems, and compared these against an assessment of the Cairns NTE CCTV system[1]. Criminological and public health databases were searched for publications examining open-space, urban CCTV systems. Recommended management and operational practices were extracted from peer-reviewed public health and criminological literature in the SCOPUS and PUBMED databases, as well as from government reports. The search terms used were: 'closed circuit television', 'CCTV', 'open-space CCTV', 'open-space closed circuit television' and 'monitoring rooms'. The search terms used to review literature were framed around the CRC's request to audit operational practices, so "CCTV evaluation" was not included as a specific search term. Reference lists of all included publications were searched for studies meeting the criteria. Reports, papers and conference presentations meeting the search criteria were examined for inclusion. The websites of police and departments of Justice and Attorneys General for each Australian jurisdiction were also searched using the terms listed above. Additionally, the United Kingdom Home Office website was searched. These practices were grouped and tabulated by key thematic topics, and elements of good practice under each topic were identified. The management and operational practices of the Cairns NTE CCTV system were then identified by:

a) examination of the Cairns Regional Council CCTV operational manuals,
b) observational sessions within the camera room,
c) open-ended discussions and focus groups with camera operators, and Council CCTV system management,
d) the free text notes for all CCTV SIMS records provided during Study 3 were examined for any evidence they contained about communication techniques and activities.

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[1] This study took place prior to the release of the RAMESES publication standards for Realist Synthesis (Wong et al., 2013)

The Cairns practices were then compared against the recommended practices identified in the literature search. These practices and recommendations from the literature were then re-examined as regards the findings of systematic reviews published subsequently (Alexandrie, 2017; Piza et al., 2019).

Observation sessions in the CCTV camera room

Following the initial observation session described on page 55 in Section 4.3 above, three further observation sessions totalling 28 hours were conducted by two researchers in the camera room to observe the actions of camera operators. The sessions were conducted during the peak periods of Friday and Saturday nights and one Tuesday during business hours. The operational practices used by camera operators, including those used to categorise incidents and describe them in the free text *Notes* field, were observed during these sessions. Emphasis was also placed on their communication techniques, as well as their use of the available communications and computer hardware.

Focus group discussions with CCTV operators and managers.

Five focus groups over 18 months were conducted by two researchers to discuss operations and performance and to provide study feedback as the research was being conducted. Notes were collated of discussions conducted at these focus groups. The CRC *Operations and Procedures Manual* for the Cairns open-space CCTV system was used to identify the initial content of these focus group discussions.

4.7 Study 5: CCTV operator dispatch to limit ARAs.

Studies have examined operational practices within CCTV camera rooms, including cognitive processes such as attention and search processes, and task analysis, which aims to isolate and analyse the camera operator activities (e.g. Gill, Spriggs, Allen et al., 2005; Keval & Sasse, 2008; Wilson & Wells, 2007; Piza et al., 2019). Study 5 was a descriptive study that examined the dispatch by camera operators of *on-the-ground* physical presence to prevent or limit assault incidents. For nine days in late-August and thirteen days over Christmas/New Year, the footage and associated SIMS reports of all incidents logged by camera operators were examined. Observations of each incident were recorded. Each incident of assault was subsequently categorised as:

A. an assault which happened too quickly for the camera operators to direct street security to intervene,
B. an assault where camera operators directed street security to intervene while the assault was occurring,

C. an assault incident where the sequence of events allowed time for the camera operators to direct street security to intervene before violence occurred.

Three case studies which best illustrated these incidents were described. Footage was viewed by two researchers during a total of eighteen hours in the camera room during mid-week business hours, with camera operators retrieving the footage and SIMS reports for viewing while fulfilling their observational and other duties. During this time camera operators' actions were also observed and recorded, and open-ended discussions were held with them.

4.8 Study 6: Realist Evaluation study into CCTV camera operator data accuracy

Study 6 built on camera operator activities identified through Studies 1 to 5, with a particular focus on the accuracy of data entered into the SIMS by the Cairns CCTV operators. Camera operator performance, particularly attention and task motivation, is an increasing area of research (see Chapters 2 and 3). Realist Evaluation has previously been applied to CCTV evaluation in an attempt to more accurately assess CCTV's effectiveness (see Chapter 3). However, realist evaluation appears not to have been applied to issues regarding human performance within CCTV control rooms. Realist evaluation (Pawson & Tilley, 1997) has been found to provide useful guidance to the process of hypothesis making through focusing attention on the importance of Outcomes, Mechanisms, the salient aspects of the Context in which each occur, and the inter-relationship between these three components (Pawson & Tilley, 2004; Dalkin, Greenhalgh, Jones et al., 2015). An important task of the realistic evaluator is to generate potential CMO configurations, and to postulate scientific hypotheses, progressively refining the understanding of CMO patterns, including the concept of progressive generative mechanism, where Outcome 1 leads to context 2 and so on (Pawson & Manzano-Santaella, 2012; Marchal et al, 2013).

Discovering evidence that a relevant mechanism within a CMO configuration exists was the goal of this study. The first CMO iteration postulated that camera operator performance would be influenced by knowledge of an impending audit of data accuracy. The CMO configuration was postulated as follows:

> The Outcome was the accuracy of information contained within incident reports in the SIMS. The Context was *Camera room staff and operations*. The intervention which varied the Mechanism was the *communication* to camera operators that the accuracy of data that each individual operator entered into SIMS incident reports was to be audited.

The pre-intervention Outcome data comprised 69 SIMS incident reports and associated footage randomly selected from reports completed over ten days, between Friday, 20 August, and Monday 30

August 2010. Reports for this day were unavailable for evaluation, no explanation was provided (see Chapter 8, p.139). The post-intervention Outcome data comprised the footage and SIMS reports for 100 incidents randomly selected from those recorded over 12 days in the Christmas/New Year period 2010-2011.

At the CCTV line manager's request, the rostered camera operator retrieved the reports from the system. Each SIMS record was printed and read in the monitoring room, then the associated footage was viewed by two researchers. This footage was retrieved by the camera operator and viewed on a desk-top monitor in the CCTV monitoring room. The accuracy of each SIMS record was assessed qualitatively on three dimensions by the researchers. The three dimensions were:

1. whether the categorisation of the incident accurately reflected the footage of the incident,
2. the accuracy of descriptive information contained within the free-text *Notes* field compared to the footage, and
3. the internal consistency between each of the six fields contained in the SIMS record.

Accuracy of Incident Categorisation

A total of 42 *Incident Types* could be applied to each SIMS record.

a. Accurate: all correct fields ticked; no incorrect field ticked,
b. Approximate: 80% correct fields ticked,
c. Inaccurate: Incorrect field ticked, or a relevant field not ticked.

Accuracy of descriptive information

A six-point Likert scale was used to rate the accuracy of information entered into the *free-text* Notes field in each SIMS record, when compared to the footage:

1. No footage of the logged incident;
2. Inaccurate or meaningless;
3. Notes do not provide relevant detail;
4. Satisfactory: provide relevant detail;
5. Concise and accurate: includes notes on initiating request;
6. High quality: includes notes on initiating request and action taken by responding agency.

Internal Consistency

The internal consistency compared the information contained in the free-text *Notes* field and the other five main information fields in each SIMS record. These fields comprised *Incident type,*

Respondents attending the incident, Map reference, Last drink venue, Incident duration, and *Camera added*. This analysis would provide crude quantitatively measurable outcomes.

Compilation of CCTV studies into a Realist Evaluation case study

Study 6 was designed according to Realist Evaluation principles. Feedback from a reviewer of the published article arising from Study 4 suggested applying the Realist Evaluation approach may have led to an improvement in the study quality. Studies 4 and 5 were re-examined and an attempt made to begin retrospectively applying Realist Evaluation principles to the empirical studies of the CCTV involvement in the prevention of, and response to, NTE ARAs in Cairns. This led to an initial attempt to explore and identify CMO configurations relating to operational performance of the Cairns NTE CCTV system. Study 6 aimed to refine CMO configurations relating to camera operator performance. In realist evaluation, changes in observed outcomes are considered to be the result of mechanisms in an intervention program operating within the context in which the intervention takes place.

The data sourced through the original studies 1-6 (chapters 5-8 below) was then used to inform a multi-faceted case study of how realist evaluation of CCTV may enhance research approaches to address the problem of NTE ARAs. A realist case study (Koenig, 2009), and guidelines on the conduct of a realist evaluation (Pawson & Manzano-Santaella, 2012) were used to conduct the case study.

Pawson and Tilley (1998) stress that realist evaluation is a theory of research approach and study design. Campbell (1975) and Koenig (2009) confirm the selection and use of case study analysis to test and build theory, in this case the applicability of realist evaluation to study NTE ARAs. The case study approach using CCTV was selected to test the applicability of realist evaluation to study the social problem of NTE ARAs given that realist evaluation has been used to study CCTV (e.g. Pawson & Tilley, 1997). A CMO configuration framed around deterrence of NTE ARAs through CCTV was used to examine the utility of deterrence theory to ARA in the NTE. Initial descriptions of other CMO configurations/rough theories based around identified operational contexts of CCTV to reduce NTE ARAs were then attempted. The aim was to demonstrate through the case study whether the realist approach would help in advancing thinking about NTE ARAs, and whether the findings of Studies 1 to 6 could frame initial, coarse CMO configurations. Chapter 9 describes the results.

4.9 Summary

This chapter described the study settings and qualitative methods for understanding and preventing ARAs in Cairns NTE. The chapter also detailed the step-by-step process as to how the multi-agency NTE ARA monitoring tool was to be designed and established in Cairns. The tool aimed to compile a more accurate count of the numbers of ARAs in the Cairns NTE, and gather contextual details on each

assault. The chapter also described the methods used to more closely examine the role of the CCTV system in controlling ARAs in the Cairns NTE. These studies culminated in an investigation designed according to realist principles. Chapters 5 to 9 describe the results of these studies.

Chapter 5. Study 1: Qualitative Results on ARAs in the Cairns NTE

5.1 Introduction

This chapter details the results for stakeholder perceptions regarding ARAs in the Cairns NTE, and the initial exploration of agencies' ability to share relevant data. The findings of Study 1 relate to specific stakeholder perceptions regarding the NTE boundary, the causes of violence and interventions to reduce it. The results of Study 2, designing and establishing the multi-agency ARA monitoring tool, are described in Chapter 7. Studies 1 and 2 aimed to explore the perceptions of stakeholders to better understand the prevalence of assaults and the reasons for assaults, and explore the contribution this engagement process could make to sustainable interventions to reduce them.

*Section 5.*2 describes the results of the participant engagement process in Study 1. *Section 5.3* then illustrates the spatial and situational information gained through the hand drawn mapping exercise, followed by a description of the themes identified through the interviews (*Section 5.4*). These themes combined narratives reflecting the semi-structured nature of the interview, and *narratives* which emerged as the participant spoke. Themes include perceptions of the rate and severity of violence in the Cairns NTE, causes of incidents and hotspots, interventions (current and proposed), and available information about the issue and the importance of co-ordination to prevention efforts. *Section 5.5* then summarises and concludes the chapter.

5.2 Participant Engagement

The methods to engage participants were documented on pages 54-55 in Chapter 4. Community registers suggested that 12 stakeholder organisations had key organisational responsibilities in preventing or responding to Cairns NTE ARAs. These organisations were regulatory and enforcement agencies, primary health services, local government, and licensed venues and security staff. Two safety networks were also identified, the CCLSA, and the *CBD Safety Summit*. Table 2 below details the stakeholder agencies and businesses, and individual roles within those organisations that were interviewed for the project. These interviewees represented agencies with key responsibility for preventing and/or responding to ARAs in the Cairns NTE. Representatives of the 24-hour medical centre declined to be involved in the study. Twenty-nine semi-structured interviews were conducted in 2009-10. Seven respondents were drawn from the Cairns Hospital Emergency Department (ED), six respondents from the Queensland Police Service (QPS), three from Cairns Regional Council, and two from the Queensland Government liquor regulatory office. Interviews were also conducted with one manager from a private security firm which provided security officers to venues within the CBD, and with the respondent nominated by the licensed venue industry association, the *Cairns City*

Table 2.

List of interviewees for Study 1

Agencies identified as having responsibility for preventing or responding to ARAs in the Cairns NTE	**Positions interviewed within each agency**
Regulatory and Enforcement Agencies	
Queensland Police Service	District Inspector. Officer in Charge of the *City Beat* police station. Two officers from the *Liquor Enforcement and Proactive Surveillance* unit (LEAPS). These officers were tasked with liaising with the industry through the Liquor Accord and partnered enforcement operations, including in the loosely defined NTE. Intelligence officer. Tactical officer (in charge of first response and operations).
Queensland Office of Liquor and Gaming Regulation (responsible for licensing and monitoring of venues)	District Manager. Field Officer.
Licensed Venues	
Owners, management and security providers.	One venue owner (who was the President of Cairns City Licensees Safety Association). Operations Manager of security providers to the majority of venues.
Health	
Queensland Ambulance Service	District Operations Manager of the Queensland Ambulance Service.
Cairns Base Hospital Emergency Department	Four nurses, including the ED Nurse Unit Manager. Two registrar doctors. The ED data manager.
Drug and Alcohol Brief Intervention Team	Two nurses and one psychologist from the *Drug and Alcohol Brief Intervention Team* (DABIT). The DABIT project was a pilot project that applied brief interventions to patients admitted to the Cairns ED who potentially had alcohol-related presentations.
Service Delivery Organizations (non-government)	
Victims of Crime Support Service	Manager.
Youth Substance Misuse Service	Manager.

Transport Businesses	
Public transport bus service	Manager.
Taxi Company	Operations Manager of the sole taxi company in Cairns.
Cairns Regional Council	
	Two community safety positions. Inner-city facilities manager (responsible for maintenance of the precinct, Council facilities and operational oversight of the CCTV system).
CBD Safety Summit Chair	
	One solicitor who was the Chair of the network.
Print Media	
	The Crime Reporter and Chief of Staff from the local newspaper (Cairns has a free suburban newspaper as well as the Cairns Post, which must be purchased. The journalists report for both papers).

Licensees Safety Association (CCLSA). One solicitor, who chaired the CBD Inner-city Safety Summit, a senior manager from the Queensland Ambulance Service, and two media reporters were also interviewed. The length of time each participant had been in Cairns varied between six months and 17 years. The local 24-hour medical clinic, and other security providers to licensed venues were approached, but declined to be involved in the study.

The CBD Inner-Safety Summit comprised the *Liquor Enforcement and Proactive Policing Service* (LEAPS) police officers, the *Cairns City Licensees Safety Association* (CCLSA) representative and the venue security manager who participated in the interviews, as well as Council officers and the Summit Chair. A further 18 venue owners and managers regularly attended the CCLSA, and were provided with the opportunity to comment or provide feedback on methodology and results, either in that forum or in private interviews (see Table 3 below).

The QPS had a specific unit dedicated to addressing alcohol-related offence prevention, the Liquor Enforcement and Proactive Strategies unit. In Cairns LEAPS comprised two officers for whom approximately 80% of their work focused on the Cairns CBD, with some services provided by themselves (and one additional LEAPS officer) to suburban pubs and hotels across the Cairns Regional Council area. The LEAPS officers were managed by a QPS' Cairns District Inspector. In addition to University ethics approvals, all police officers required an agreement with the QPS *Ethical Standards*

Command, as well as written approval from the local Assistant Commissioner before they would provide information.

Table 3.

Stakeholder Feedback Group Sessions

CBD Safety Summit*		
	25 November 2009	Project Awareness Raising and Progress Report (soon after initiation)
	24 February 2010	Project Progress Report. All interviews had been concluded, update on results of observational sessions in ED and CCTV monitoring room, and progress on quantitative data collection methodology.
	26 May 2010	Monitoring quantitative data for April 2010 presented and discussed. Retrospective data for November 2009 were presented and discussed. Comparisons between the results were discussed.
	22 September 2010	The normal agenda was suspended to focus on the results of the research project. Detailed feedback by all members of the research team on qualitative and quantitative results, including identified additional interventions.
Cairns City Licensees Safety Association (Liquor Accord)		
	13 July 2010	Feedback by candidate on qualitative and indicative quantitative results, including identified additional interventions.
	25 August 2010	Feedback of refined quantitative results
Cairns Regional Council		
	10 December 2009	Project Awareness Raising and Progress Report (soon after initiation)
	18 February 2010	Project Progress Report
	18 June 2010	Project Progress Report
	19 August 2010	Detailed feedback by all members of the research team on qualitative and quantitative results, including identified additional interventions.
	21 October 2010	Feedback of refined quantitative and qualitative results and identified additional interventions
Emergency Department		
	8 January 2010	Project Awareness Raising and formal focus group
	21 May 2010	In-service Education Session
	21 March 2011	Feedback of refined quantitative and qualitative results

*No meeting of the CBD Safety Summit was held in December 2010 or January and July 2011. Another member of the research team attended the March and August 2011 meetings and the candidate sent a written update to the June 2011 meeting.

Once these approvals were gained, engagement with local officers quickly followed. Two of the police officers were specifically tasked to liquor-related duties in the NTE, with the other four in management roles relating to the Cairns NTE. The two CBD LEAPS officers and the officers from the Queensland Government's Liquor Licensing authority were members of the CCLSA, as were the venue owners and the security management.

A *Memorandum of Understanding* (MOU) was requested by the CCLSA around the provision and use of confidential information. This was drafted, submitted, and approved by the CCLSA and the University legal officer within the James Cook University (JCU) Research Office. Respondents from both licensed venues and the police stated these agreements significantly contributed to perceptions regarding the independence of the research. The realist implications of this are elaborated in Chapter 9.

Following provision of this MOU, representatives from six licensed venues agreed in-principle to provide data from their venue incident registers through their security providers. The security provider for all six of these venues was a single company. Licensed venue incident registers are required by law to be held by each premise licensed to serve alcohol in Queensland (Queensland Government, 1992). Assaults are required by law to be recorded in these registers, and the registers are cross-checked by police and liquor regulatory officers.

Stakeholder Feedback Groups

Twelve stakeholder project feedback sessions were conducted. Table 3 (p. 70, above) lists the dates and topics of discussion in the stakeholder network meetings. Project progress was fed-back to stakeholders during regular scheduled network meetings of the CCLSA and the *CBD Safety Summit*, and at seminars at the ED (classed by hospital management as part of the regular in-service training sessions). The CCLSA included a higher proportion of venue owners and managers, and venue security as well as police from the liquor-specific unit in Cairns and a Council community safety officer. The *CBD Safety Summit* included fewer venue owners, more council officers, a representative of a law firm in the CBD, and police; usually the same officers (Hayes-Jonkers et al., 2012). Three training and information sessions were held with ED staff, The ED sessions captured the staff rostered onto the shift at the time of the sessions. Additional maps of the defined area were provided and placed in high visibility staff areas of the ED. One formal focus group to design the multi-agency quantitative data collection tool was also held (see Chapter 6, pages 102-104).

The group meetings detailed in Table 3 above provided regular and frequent two-way communication with interview participants and other community members. The feedback sessions were used to test the veracity of the methods and progressively feedback indicative and refined results in an effort to facilitate ownership of the project among the stakeholders. They were also used to test the methods and indicative results with participants, and to gain insights by frontline service providers which may have been prompted by the results.

5.3 The Boundaries of the Cairns NTE and Locations of Violence

The hand-drawn maps from each interviewee in Table 2 (pages 68-69) above were scanned to image files and initial comparisons made by overlaying the image boundaries around each participant's defined area of concern. Key themes linked to locations identified in the mapping were assessed as they emerged from an analysis of the interview transcripts. Assault hotspots identified by interviewees were identified by tallying the frequency with which they were nominated, with a higher frequency suggestive of a hotspot. None of the interviewees had ever been previously asked to draw a map, or draw on a map, of the Cairns NTE.

Figures 4-6 (pages 73 to 75 below), display three maps with the NTE boundary and violence hotspots as defined by interviewees. Figure 4 is the combined border of the NTE as defined by interviewees. Figure 5 (p.74), illustrates routes of significant assault activity for people walking home from the NTE, as identified by participants. Figure 6 (p.75), is a synthesis of the boundary, the pedestrian egress routes from the NTE and the identified hotspots. For comparison, examples of hand drawn maps as completed by participants are included in Appendix 4.

None of the stakeholders interviewed thought in terms of a defined "real" boundary to the NTE. Ten respondents (35%) identified hotspots, but no NTE boundary. Of those who did not draw a boundary, two participants identified specific violence hotspots on the map (see p.74, below). Most participants (n=18, 62%) identified assault incidents which occurred outside of the NTE precinct as an NTE ARA because of antecedent events which had occurred in the NTE. Some interviewees explicitly presumed that those involved in these assaults had become intoxicated within the NTE environment. Eight respondents (28%) noted that events outside the NTE have an impact on the number of assaults within it. Two interviewees spontaneously identified suburban venues a number of kilometres outside of the NTE as ARA hotspots. While they drew on the map six interviewees (21%) spoke about specific incidents they had recently heard about or were experienced by someone they knew, supporting findings that salience of assaults influences recall (Roberts, Mulvey, Horney, et al., 2005).

Figure 4:

Boundary of the Cairns NTE Precinct

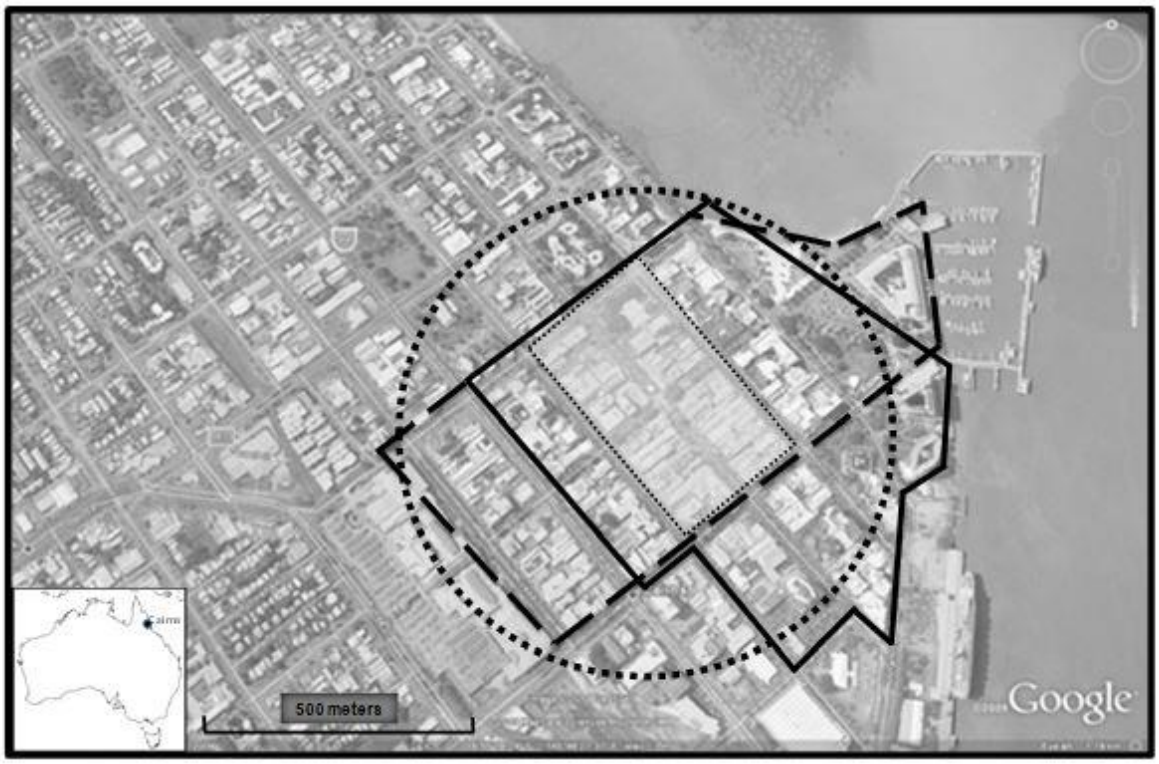


Figure 4 above shows the borders of the NTE as defined by participants. The unbroken line was identified as the NTE boundary by the representatives of the venue owners and security, and the LEAPS police officers (see Table 2, pp. 68-69), all members of the Cairns Inner-City Liquor Accord. The boundaries depicted through the circle and the dashed line in Figure 4 did not adhere as starkly to group or agency membership: those boundaries were drawn by representatives from a mix of all interviewees. The central area of *Figure 4: Boundary of the Cairns NTE precinct*, which is shaded grey, was identified as one single violence hotspot by 10 of the 29 respondents (35%), including taxi management, and 5 of the 7 ED medical staff.

Figure 5 (p. 74, below) illustrates pedestrian egress routes, nominated as places of significant assault activity. These were initially identified by two interviewees, and later confirmed in the stakeholder feedback groups (see Table 3, p.70 above). The reasons given for high ARA numbers along these routes was the high volume of foot traffic due to the preponderance of budget, high density accommodation to the north-west of the NTE, including "backpacker" accommodation.

Figure 5.

Pedestrian egress routes

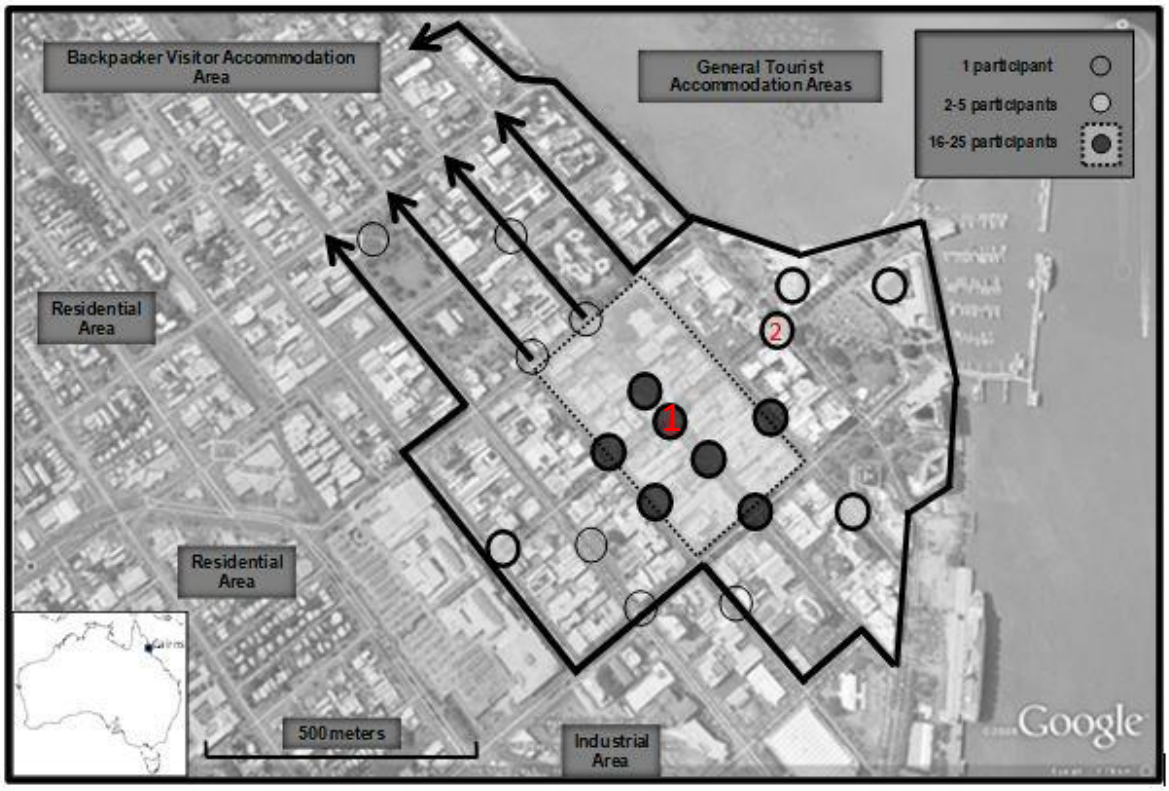
Figure 6 (p. 75, below) is a synthesis of the boundary, the pedestrian egress routes from the NTE and the identified hotspots. Twenty-one participants (72%) identified the central zone of the NTE as the main area of concern. This is shaded grey in Figure 6. This zone included two large venues, the taxi rank and late-night food establishments. Apart from these locations, most identified hotspots are at intersections. When talking about these violence hotspots, seven participants (24%) nominated specific locations as places where clientele from different styles of venues mixed while they were walking on the street.

Those individuals whose agencies were intimately involved in daily operations within the Cairns NTE were more specific in their placement of assault hotspots. All police and liquor licensing officers interviewed, as well as the local government officers and the venue and private security representatives interviewed, nominated at least two hotspots each. Two emergency department nurses also nominated hotspots. Apart from these nurses, all seven of the other hospital-based health staff, drew a block boundary on the map corresponding with the grey shaded area in Figure 4. They nominated no hotspots. The ED data manager was not considered 'health staff'. The grey shaded

block boundary was also drawn by the managers of the taxi company and the bus service, and the Chair of the CBD Safety Summit indicating they considered the entire area to be a violence hotspot.

Figure 6:

Combined cognitive maps and hotspots



In Figure 6, the darker shaded circles were identified by between 12 and 16 interviewees, with different people varying in their identification of hot-spots, plus eight who considered the entire grey shaded area as a single ARA hotspot. All of these identified places in Figure 6 are on intersections, with the exception of the circle closest to the centre of the block-shaded rectangle (marked in red as '1'), which signifies the sole taxi rank in the Cairns NTE at the time. The lighter shaded circles in Figure 6 (identified by between two and five interview participants), correspond with certain venues with larger patron capacity, or in one case, a 24-hour McDonalds restaurant (marked in red as '2').

Participants generally agreed on a defined precinct boundary but highlighted some unexpected violence hotspots. The boundary of the Cairns NTE and the refined areas of concern describe eight ARA foci; the pedestrian egress routes, seven hotspots of violence centred around the two largest licensed premises and the sole taxi rank. The density and proximity of licensed venues within the defined precinct is high (26 licensed venues within 0.6km^2). The areas most often identified as

violence hotspots were on intersections, at the sole taxi rank, or at certain venues with larger patron capacity and a 24-hour food outlet. Identified violence hotspots were nominated as places where patrons from venues catering to different clientele mixed, either at congregation points around food, transport hubs or pedestrian cross-flows.

A number of interview participants stated that different types of patron groups use venues for different reasons and that assaults are a result of the interactions of these different patron groups when they mingle at food outlets or the taxi rank. The emphasis on pedestrian egress pathways from the NTE (Figure 5) arose when two interviewees drew these spontaneously when asked to define the boundary of the NTE. Another participant drew pedestrian pathways between venues, the taxi rank and late night food outlets. Six other interviewees discussed how pedestrians moved about during the night while their pen hovered over the map, or during the answers to the interview questions. Of those participants who did not draw an NTE boundary (see p.72, above), one identified a violence hotspot in the southern area of the Esplanade foreshore, and a second identified an area half-way up the Esplanade; both areas are situated on the margins of the central area of concern.

All nine interview participants who were members of the CBD City Safety Summit (out of 29 interviewees; 31.0%), mentioned efforts to make the NTE precinct safer through situational improvements, particularly through the establishment of a formal taxi rank, and the addition of a taxi rank supervisor who ushered people into taxis as well as the stationing of security at the taxi rank. This was an initiative the group had implemented. The two print media reporters also mentioned this, as did other interviewees. More than half non-ED participants (12 out of 21; 57.1%), noted venues had implemented a number of management improvements to reduce violence.

5.4 Key themes from interview data

Using a standard qualitative data analysis approach (Gibbs, 2008), the interview data were transcribed and analysed by extracting key themes (see Chapter 4, Section 3, pages 54 to 55). A number of narratives appeared in many themes. Rather than reducing the data to a small number of numerical codes, additional categories were added, based on the number of times these themes were nominated by interviewees, and theories identified in the literature, to capture as many nuances as possible in the data. Themes that summarised opposing viewpoints were presented. All key themes were grouped for feedback to stakeholders in the feedback groups (Table 3 above, p.70). Issues raised by members of the feedback groups were then compared with existing key themes within the thematic analysis and incorporated, or an additional stream added. The key themes identified by

participants are summarised in Table 4 (p.77 below). Following Table 4, the key themes are expanded. Table 5, on pages 79 to 81 lists participants' nominated intervention strategies.

Table 4.

Key themes from interview data

Information about the Issue
Recognition that licensees have worked to enhance patron safety.
No one agency sees all the assaults – incomplete picture.
Friday and Saturday nights (rolling over into early morning) are main source of incidents.
Mixed awareness of partnered projects to address issue.
Mixed level of internal initiatives to address issue.
Low marketing of internal projects to potential partners (with exceptions)
High level of willingness to collaborate around both co-ordinated interventions and data sharing.
Regulatory and Police visibility important, but not the only thing.
Rate and Level of Violence
Rate and level of crime dropping from 10 years ago.
Cairns CBD relatively safe (depending on where the participant had worked).
Partnered enforcement operations involving police, Liquor Licensing and other agencies have made a positive impact.
The real time communication between CCTV monitoring staff and on-site security guards through the establishment of a radio network has made a positive impact.
The research project is valuable "honest information broker" role.
Causes of Incidents
Alcohol availability – shortening trading hours is required.
Poly-drug use an increasing problem.
People 'liquoring up' before coming into town.
Quick exit from CBD important.
Enforcement of responsible service of alcohol.
Responsible drinking.
Attitudinal – less respect for others and for authority than in the past.
People drink to get drunk – Australian culture.
Underage drinking an increasing issue.
"Tide is turning" in regulation and government.
Education at a young age is a key ('Thinking Drinking' initiative valued).
More violence occurs between women now than in the past.

Information about NTE ARAs

All participants outside of the ED reported that the members of existing networks had their own agendas, and that these interfered with collaborative action, but there was acceptance that

negotiation between these agendas was part of the collaborative process. There was goodwill to other members of these networks reported by all interviewees (excluding ED staff, who reported no relevant external networks). Many non-ED staff reported that information feedback through existing formal networks such as the Liquor Accord and CBD Safety Summit allowed decision makers in stakeholder agencies to "jump on and jump off" when they identified issues relevant to their agency. Decision makers could add items to the agendas of these networks as issues emerged and continued to pursue these issues until a satisfactory resolution to those decision-makers was reached. Once these issues were resolved, other emergent issues relating to their roles required re-prioritising their time commitments.

All participants stated they understood that the rate of violence was incomplete because no single agency sees all assaults. Specifically, there was recognition among all interviewees that police statistics did not accurately reflect the number of assaults within the NTE. Almost all participants recognised that police statistics were inaccurate compared to the actual number of assaults in the precinct. There was a high level of willingness to collaborate around data sharing. All respondents outside of the ED reported engagement with at least one intervention to reduce ARAs in the Cairns NTE. Apart from the media representatives, the ED staff was the only group who was not engaged in some form of network aiming to address the problem of this type of assault. Reasons listed for this centred around role requirements, with time commitments also mentioned. Participants also reported a mixed level of awareness regarding existing interventions (both internal and external to their own agency). There is a lack of knowledge among ED staff about interventions to reduce ARAs in the Cairns NTE despite these assaults being identified within the ED as a significant driver of workload on Friday and Saturday nights. Only one interviewee, a police officer, was aware of any economic analysis of the costs of alcohol-related harm, and benefits of the alcohol-related entertainment industry. No respondents were aware of any research assessing the cost effectiveness of multi-agency community-level crime prevention partnerships in Queensland.

Level of Violence

Across all participants, most assaults were perceived as occurring Friday and Saturday nights: this was attributed to the higher numbers of patrons in the NTE at these times. Some participants commented that public holiday long weekends saw a spike in ARAs. The link between public holiday long weekends and a spike in ARAs supports previous research (Bellis et al., 2012; Lloyd, Matthews, Livingston, et al., 2013; Miller, Droste, Baker, et al., 2015).

Perceptions regarding personal safety in the NTE varied depending on where the participant worked. With the exception of ED staff, the precinct is viewed as a safe place by the majority of respondents. All participants from the ED felt the entire NTE to be an unsafe place.

Stakeholder perceptions are that the rate and severity of violence in the Cairns NTE has fallen over time, with 21 out of 29 participants (72%) reporting the NTE is safer at the time of the study than 10 years previously. This was attributed to the safety networks that had been established to address the issue; the example of the secure taxi rank was highlighted. Many interviewees stated that licensees had worked to make their venues safer. No ED staff member stated this. All stakeholder groups, except ED staff and victim support workers, shared the perception that reducing alcohol availability would reduce the number of assaults but would have negative impacts on the Cairns economy. The level of NTE ARAs was acceptable to most stakeholders (excluding ED staff), due to the perceived economic benefits patrons bring to Cairns. Health staff and victim support workers who suggested limiting alcohol availability did not mention any economic impacts.

Most interview respondents (n=18, 62%) also perceived a generational culture of 'drinking to get drunk'. Charismatic young men with small groups of followers were identified by venue owners and security officers as initiators of violence. These young men were labelled R*oosters*, by licensees and security, and either instigated violence themselves or facilitated it within their immediate social network. Barker (2010) suggests that among a certain group of young men, violence builds or maintains social capital.

Table 5 below explores stakeholder perceptions of prevention efforts in further detail. The table lists the intervention strategies that were nominated by interviewees to reduce alcohol-related violence in the Cairns NTE.

Table 5.

Existing and suggested NTE ARA intervention strategies in Cairns

Strategy Type	**Number of participants aware of this type of current strategy (out of 29 participants)**	**Strategy Type**	**Number of participants recommending implementing this type of strategy or enhancing existing strategy**
Enforcement		**Enforcement**	
Responsible Service of Alcohol regulations	13 (45%)	Restrict availability and enforce Responsible Service of Alcohol	17 (58%)

Liquor Enforcement and Proactive Policing officers	10 (35%)	Combined operations e.g. 'Amazon'	10 (35%)
Joint Operations and targeted Police rostering	10 (35%)	Expand use of ID Scanners in clubs	9 (31%)
Council street-based security guards	4 (14%)	Target repeat offenders and ban from premises	7 (24%)
Last drinks venue recorded in assaults reported to Police	3 (10%)	Higher police visibility	7 (24%)
Police evaluation of patterns and locations of incidents	2 (7%)	Joint training Initiatives (venue and street-based security, Police)	5 (17%)
Police Infringement Notice system available	1 (3%)	More severe sentences for offenders	2 (7%)
Education and community awareness-raising programmes		**Education and awareness-raising**	
Responsible drinking generally encouraged	10 (35%)	Change attitudes to responsible drinking at population level	20 (69%)
'Think the Drink' programme	7 (24%)	Enhance youth-focused interventions, e.g. 'Think the Drink' programme	12 (41%)
Drug and Alcohol Brief Intervention Team (DABIT)	7 (24%)	Enhance brief interventions, e.g. role of DABIT	6 (21%)
'One Punch Can Kill' programme - Queensland Police	3 (10%)	More community education on role and scope of CCTV	5 (17%)
Local newspaper	2 (7%)	"Naming and shaming" people presenting at Emergency Department	2 (7%)
'Don't Turn a Night Out into a Nightmare' national programme	1 (3%)	Victim / offender narratives in the media	1 (3%)
'Leggy not Legless' national programme	1 (3%)	Local newspaper initiated campaign	1 (3%)
Inter-agency communication processes in place		**Communication and information sharing**	
Between individual agencies	12 (41%)	Refine liquor accord to enforce more closely	15 (52%)
Cairns 'CBD Safety Summit' forum	11 (38%)	Enhance inter-agency co-ordination, communication, sharing information	10 (35%)
'Liquor Accord' and 'Cairns City Licensee Safety Association'	10 (35%)	Continue JCU Research Project	5 (17%)
Cairns Regional Council 'Community Safety Committee'	5 (17%)		
Environment/situational		**Environment/situational**	
Cairns Regional Council Closed Circuit TV surveillance	9 (31%)	Reduce venue density	7 (24%)

3 a.m. 'lockout' for premises trading until 5 a.m.	6 (21%)	Education and/or visible enforcement at late-night food vendors	5 (17%)
ID scanners for entry to licensed venues	5 (17%)	'Breathalysers' for self-testing - condition of entry to venues at 3am	4 (14%)
Additional lighting (& other CPTED principles)	1 (3%)	Enhanced use of CCTV	3 (10%)
		Crime prevention through environmental design to remove hotspots	3 (10%)
		In-venue educational resources	2 (7%)
		Provide snacks in venues	2 (7%)
Transport initiatives		**Transport**	
Secure taxi rank during peak times (one security guard and a Marshall)	6 (21%)	Getting people out of town quickly and safely: pedestrians, taxis, buses	11 (38%)
Late-night bus (project since discontinued).	2 (7%)		

Current Interventions to address NTE ARAs.

Interview participants' understandings of intervention strategies are listed above in *Table 5*. Analysis identified 'Collaboration and informed co-operation' as the most important intervention theme to understanding and addressing ARAs in the NTE (Table 5, above). Inter-agency communication forums were identified as important by a majority of participants. All existing inter-agency forums were focused on the Cairns CBD with each serving a different stakeholder mix. There were significant overlaps in the membership and objectives of these stakeholder networks (elaborated in Hayes-Jonkers et al., 2011). All interview participants noted that preventing or responding to the issue of ARAs was not their core business, but that they were involved in efforts to reduce this type of violence because collaborative processes grew out of their core business. Police and venue security acknowledged they were the ones with the strongest mandate to prevent assaults, but reported they are busy responding to these assaults as they happen. The police reported that investigation and prosecution was their core business. Security industry representatives reported that providing a paid service was their core business.

As demonstrated in Table 5, liquor enforcement operations are prominent in participants' minds. Additionally, situational/environmental interventions comprise 13 of the 24 existing interventions (54%) mentioned by respondents. Transport initiatives to quickly remove patrons from the NTE when

they wished to depart were also identified as important. Of other existing interventions identified, six of seven regulatory and enforcement interventions are specifically situational and the seventh, 'evaluation of location and patterns of violence', requires precise offence location data. Most identified interventions were small scale (e.g. moving the tables inside a venue toward the end of a night). The exception was the co-ordinated effort to introduce a secure taxi rank, which was nominated by all interviewees with direct involvement (n=15, 100%), plus the two media representatives. Apart from reducing alcohol availability, ongoing communication, improved data collection and sharing, and community level education programmes, the majority of interventions identified by stakeholders were situational/environmental interventions. During the interviews, most participants linked these interventions to specific hotspots.

The broader social marketing and education programmes were mentioned by comparatively few participants. Five of the seven educational interventions identified were broad population-level strategies in Cairns. The other two entailed broad cultural level shifts across Australia. A locally developed educational project targeting senior school students, *Think The Drink*, was identified as important by non-ED staff. Apart from the *Drug and Alcohol Brief Intervention Team* (DABIT) initiative, which was recognised as an important intervention by those aware of it (ED staff and one police officer), no respondent identified individually focused psychological or counselling interventions. The individual level brief intervention work of the DABIT, focused on referral to agencies providing personal safety strategies or other counselling to prevent repeat victimisation.

CCTV as an intervention

None of the ED staff, media, victim or substance abuse support representatives mentioned the CCTV system. Police mentioned the cameras and operators in terms of footage assisting in prosecution. Council officers, venue owners and private security all mentioned them in terms of the real-time communication radio system, and the disruption of assault incidents due to quickly getting a person to the site of a disturbance. Prior to this research there had been no external evaluation of the effectiveness or operations of the CRC CCTV system in its fourteen years of operation. While the CCTV system is described in detail in Chapter 8, an early finding was the considerable capacity for the Cairns CCTV and street security function to detect and document incidents of person-to-person violence that could augment information from the ED and police. The CRC *Inner City Facilities Manager* stated that the CCTV data had not been previously accessed prior to the current study. The CCTV camera room operations and street-based security worked around the clock. Further, direct observation in the CCTV camera room found that security often either quelled the violence or intervened to limit the potential harms from violence. This process sometimes seemed to prevent incidents from becoming violent in

the first place. This routine intervention was achieved through a radio communication network to deploy security officers to the site of disturbances observed by camera operators. Police officers spoke about the cameras in terms of provision of footage to assist in investigations and prosecution, and the value of the live video feed of situations to the police communications room to provide on-site, real-time intelligence regarding incidents.

Suggested Interventions

Interview participants were also asked to identify new interventions they thought should be implemented. Interventions suggested during the interviews were tested within the stakeholder feedback sessions. A high willingness to continue to collaborate on interventions was identified. Again, regulatory and enforcement interventions are prominent. Five of the seven are venue and precinct environment specific. The venue security provider recommended joint training initiatives focused on operational processes within the precinct. Police called for more severe sentences for offenders.

During the interviews, all stakeholders other than liquor industry representatives (n=27, 93.1%), stated that reducing alcohol availability would further reduce violence. Reducing venue density was mentioned by seven of 29 interviewees (24.1%). Most interviewees (n=19, 65.5%), also stated this would have negative economic consequences for the city. Many stakeholders believed that community level education programmes addressing the perceived generational culture of 'drinking to get drunk', would be an important intervention. Two new educational/awareness themed interventions were suggested: community education on the role and scope of CCTV; and naming and shaming of people presenting to the ED for specific alcohol-related problems (e.g. over consumption, alcohol and "stupidity related injuries"). Both of these have clear locational implications limited to the NTE precinct. The enhancement of five existing programs and two media strategies were also suggested. Seven additional specific environmental/situational interventions were suggested, as well as a recommendation to remove patrons quickly from the NTE at the end of their night. During the interviews there were no concrete suggestions on how to do this. Improved lighting of the pedestrian egress routes to the north of the NTE outside of the NTE boundaries was suggested by local government representatives. Seven interview participants (24%) suggested an intervention centring on identifying repeat offenders and banning them from entering the precinct itself or from entering any NTE venues. Both the licensee representative and the venue security representative branded these repeat offenders as "roosters", and four interviewees stated that these repeat offenders were often charismatic and had small bands of "followers". These *followers* would also sometimes initiate violence, mainly to impress the *roosters*. This speaks to Barker's (2010) findings regarding social capital.

Co-ordinated Data Collection and Partnered Intervention approaches

This was the intervention theme identified as most important to understanding and addressing NTE ARA (52% of participants). Stakeholders expect to continue working together to reduce violence. Co-ordination and communication between relevant stakeholders were reported by all stakeholder agencies to be essential to successful interventions. Improved data collection was mentioned by most participants (n=22, 75.8%), as potentially contributing to improved co-ordination. All interviewees agreed that co-ordinated data collection was desirable, provided that identified agency-specific confidentiality requirements could be negotiated. The MOU that was developed and signed between the University and the CCLSA around the provision and use of confidential information was viewed as more important than the University ethics approval. Feedback group respondents also stated that the project methodology of providing continuous feedback of indicative results was useful. All interviewees reported co-ordinated intervention approaches are feasible and desirable.

There was general consensus supporting enhanced collaboration around data collection and sharing. The caveat was that no additional stress be placed on current resources. The possibility of using any quantitative results gained through the co-ordinated data collection tool to inform the tasking of operational resources was viewed as an important step toward sustainability of interventions. The respondents in the stakeholder feedback groups stated that the independence of the research was an important factor in engagement with the project.

Stakeholders reported that the research process used to define and test the NTE boundary enhanced their understanding of the context in which ARAs and related injuries occur in the Cairns precinct. The analysis of the location of assault incidents was reported by all participants as potentially contributing to embedding sustainable interventions. All interviewees saw implications for the focusing of situational crime reduction and harm-minimisation interventions. Stakeholder feedback groups reported that the project provided the network with new information and knowledge, and in turn enhanced communication processes.

Most participants (n=19, 65.5%) reported that the research project was a vehicle for enhanced communication, and that due to the MOU between JCU and the CCLSA and ethics approvals, the researchers were seen as 'honest brokers' of information. The majority of participants engaged in the stakeholder networks also reported that having a co-ordinated vehicle whose job it was to observe, monitor, record and feedback these intersections kept the safety issues on the agenda and kept the safety focus within the NTE as a co-ordinated and collaborative process. No interviewees spontaneously reported on the detailed roles of other network members, nor on the communication processes involved in the collaborative and co-ordinated process. When prompted, members of the

stakeholder groups nominated the process and governance of meetings and nominated a small number of projects as evidence of collaboration.

5.5 Summary

Reducing ARAs in the Cairns NTE is everyone's business but no one's core business. A general theme that emerged in the analysis included that no agency sees all the assaults. Stakeholders have an incomplete picture as to the nature of the problem, and that there was a high level of willingness to collaborate around both co-ordinated interventions and data sharing. In response to the specific questions, all interview respondents agreed that co-ordinated data collection and collective intervention approaches arising from it were feasible and desirable, provided no additional stress was placed on current resources. The development of a stakeholder generated map and the results regarding violence hotspots provided new local knowledge; contributing to a sense of shared responsibility for outcomes. The cognitive mapping results highlighted unexpected findings related to the location of incidents, specifically the pedestrian egress routes to the north of the NTE.

As noted in Table 5 on pages 79 to 81 above, the intervention theme identified as most important to understanding and addressing NTE ARAs was more informed co-operation to refine operations of the *Liquor Accord.* All respondents agreed that co-ordinated data collection and resultant co-ordinated intervention approaches were feasible and desirable, provided no additional stress was placed on current resources. As a foundation for interventions, five of the 29 participants (17%), reported the need for improved data collection to measure the number of assaults more accurately. Of existing interventions, 41% (n=12) of interviewees mentioned one-on-one interagency communication, with information sharing between the police and the liquor licensing unit the most often mentioned of these processes. Police or Liquor Licensing officers speaking to the licensees was the second most frequently mentioned communication. Identifying the boundaries of the NTE and hotspots within it, and testing these with stakeholders, was an important step in gaining agreement for co-ordinated data collection.

Stakeholders expected to continue working together to reduce violence. The importance of a 'safe' brand for tourism in the city and the Cairns economy may be key drivers to willingness to collaborate among the stakeholder network (see also Botterill et al., 2012). With the exception of ED Staff, stakeholders strongly emphasised communication. Health staff were not engaged with any stakeholder groups focusing on safety. Other interviewees repeatedly emphasised partnerships: formal collaboration with other agencies (including MOUs) allowed the implementation of real-time communication with other venues and CCTV operators through radios. Issues raised such as poly-drug

use, patrons pre-loading with alcohol and the importance of quick exits from the precinct echo previous research (Miller, Tindall, et al., 2012).

With the exception of community-wide awareness raising and education campaigns, the majority of interventions identified or suggested through interviews were situational or environmental, particularly transport out of the NTE. With the exception of one individual-level intervention, one population-level educational campaign, and enhancements of inter-agency links, all existing and suggested interventions were focused on the defined NTE. Importantly, however, almost every person interviewed highlighted generational and attitudinal issues as a necessary point of intervention.

Participants in this study reported new connections, or strengthened existing connections, between multiple sectors as a result of the project. The facilitation of collaboration and co-operation, and provision of information to stakeholders were identified as essential. The study also found that independent community action research facilitates information transfer between network sectors and in implementation and monitoring of co-ordinated interventions. The independent role of researchers, signified by ethics approval and separate written agreements, was reported by respondents as important in establishing trust: good relationships were built on transparent information sharing.

This qualitative research process established that it was feasible to design and implement the multi-agency ARA monitoring tool that would collect quantitative data in close to real-time. Chapter 6 reports on the process used to design and implement the monitoring tool, and Chapter 7 reports on the quantitative results of that tool.

Chapter 6. Study 2: Results specific to the ARA monitoring tool.

6.1 Introduction

This chapter reports the findings of Study 2, the design and implementation of the multi-stakeholder ARA monitoring tool. Study 1 found that 52% of participants identified more informed co-operation to refine interventions through the *Liquor Accord* as very important for addressing NTE ARAs in Cairns. As noted on page 77 (Table 4) above, all those interviewed stated that there was incomplete understanding of the level of violence because no single agency sees all assaults; police statistics did not accurately reflect the number of assaults within the NTE. Study 1 also revealed that although there was a high level of willingness to collaborate around data sharing, several major challenges had to be overcome before achieving valid, useful, and timely quantitative data collection, and its translation and sharing with intervention stakeholders. Two factors were identified as essential regarding continued support for community action projects to reduce NTE ARAs. Firstly, the data must be at an aggregate level for the entire NTE in order to inform evaluation. Secondly, the research must not involve potential interruption of agencies' core business.

The interviews in Study 1, followed by the participatory feedback groups with stakeholders, had begun to identify the data parameters required from each participating stakeholder. Building on this, Study 2 comprised a five stage process:

1. interviewees were revisited to verify the proposed information to be captured, work through the identified barriers, and to confirm the agency was still prepared to share the data with the research group,
2. the conceptual basis for the design of a data-capture table to specify the ARA-relevant information captured by each stakeholder, that was feasible to share. This data-capture table would test the concept and the utility of data provided across stakeholders, and include the reasons each agency collected the data,
3. a further round of consultations and negotiations with identified stakeholders to test the design of the data-capture table and to resolve complexities identified for each recording agency,
4. a retrospective incident linking exercise to test the data-capture, and
5. an all-of-agency workshop held with data-provision decision-makers to gain endorsement from each stakeholder to collect and share data. This required confirming what aspects of their data could be collected, to negotiate any final inter-agency complexities, overcome final logistical issues, and establish start date and project duration.

This chapter describes the results of this process. Section 6.2 summarises the aggregate findings regarding all potential data providers — in order to design the monitoring tool — and describes the initial data-capture table. Section 6.3 specifies the results regarding data collection in the ED. Sections 6.4 and 6.5 respectively describe the findings regarding the police and CCTV data. Figures and commentary in these sections explain the provided police and CCTV data sets. Section 6.6 shows the results of the linkage of retrospective data provided by the different agencies. Section 6.7 details the results of the inter-stakeholder data collection workshop to design the monitoring tool.

6.2 Qualitative results specific to the multi-stakeholder ARA monitoring tool

Applying the findings of Study 1 and the methods of Study 2 overlapped in practice. Using the evidence-base to show how the project could lessen their workload and resource commitments was crucial. Working appropriately with busy staff in front-line agencies and businesses was extremely time intensive. Observation sessions in the ED and CCTV camera room allowed a better understanding of the difficulties faced in their operations by each agency and built rapport. As noted on page 82 in chapter 6 above, a number of respondents identified that agency-specific confidentiality requirements had to be negotiated. Once these approvals were gained, interviewees stated these agreements significantly contributed to perceptions regarding the independence of the research. Such agreements and how they are negotiated in close consultation with local stakeholders are rarely reported.

As noted in Chapter 1 (pages 5 to 6), and Chapter 2 (pages 18 to 19), and confirmed through Study 1, six stakeholders were identified as potentially important providers of data: the Police, the ED, the twenty-four hour medical centre close to the NTE, the Queensland Ambulance Service (QAS), the CCTV system, and security on licensed venues. The twenty-four-hour medical centre was approached but refused to be part of the study. Table 6 on page 89 below specifies the information relevant to an assault incident that interviewees reported that their agency collected, and which could potentially be shared for the research. Following the interviews, identified decision makers representing each stakeholder were revisited to verify the accuracy of the information contained in Table 6. Table 7 on page 89-90 was compiled following this round of visits, and elaborates on Table 6 to include the reasons each agency collects the data. Below Table 7, footnotes provide further clarification on complexities identified for each data recording agency. As can be seen in Tables 6 and 7, the master schedule originally included information collected by the *Queensland Ambulance Service* (QAS).

Table 6.

The First Iteration of the Multi-agency Data Compilation

AIM: TO GET THE SUM TOTAL OF UNIQUE INCIDENTS						
Ability to Provide Data						
Agency	***Date***	***Time***	***Location***	***Alcohol Involvement***	***Assault***	***Demographics***
Police	✔	✔	✔	✔	✔	✔
ED[1]	✔	✔	(✔)	(✔)	(✔)	✔
Ambulance[1]	✔	✔	✔	X	(X)	✔
CCTV	✔	✔	✔	X	✔	Male/Female only
Licensees' Security	✔	✔	✔	✔	✔	✔

1. Circles around items in the table denote concerns about the accuracy of this data point.

After the initial interviews, the QAS did not continue their involvement in the project due to ethics approval timeframes within their agency. Their information fields were removed from the tool.

Table 7.

Master Schedule of Cairns NTE ARA Data Collected

	Council CCTV	**Emergency Department**	**QPS**	**Security Officers**
Focus of the data recorded	Incident focus	Have a Person/ presentation focus, not an incident focus	Incident focus & person focus (offender/victim)	Incident focus
Incident				
Field identifying incident as an assault	Yes	No as routine. Yes through chart analysis project[1]	Yes	Yes
Incident identifier number	Yes (SIMS* incident number)	No	Yes (QPRIME# number)	No
Involvement of alcohol	No as routine. Presumed yes in the NTE	No as routine. Yes through ETOH breath/blood indicators	Yes[2]	Yes[2]
Location	Yes[3]	No as routine. Yes through chart analysis project	Yes	Yes

Date	Yes	No as routine. Yes through chart analysis project	Yes	Yes
Time of day	No	No as routine. Yes through chart analysis project	Yes	Yes[4]
Indicator of level of violence	Yes (SIMS contains *minor incident* field)	Yes through triage assignment	Yes (level of charge)	No
Weapon used	No as routine. Can be done through notes field	No as routine. Yes through chart analysis project	Yes	No as routine. Can be done through rich notes.
Duration of incident	Yes	No	Not routine	No
Contextual details captured	Yes	Yes, as part of diagnosis process[5]	Yes	Yes
Place of last drinks	No as routine. Yes through video review[6]	No as routine. Yes through chart analysis project.	Yes	No
Place of most drinks	No	No	No	No
People involved				
Gender	Yes	Yes	Yes	Yes
Age	No	Yes	Yes	Yes
Victim/Offender	No	Yes	Yes	No
Number of people involved	No as routine. Can be done[7]	No as routine. Yes through chart analysis project.	Yes	No
Relationship of people involved	No	No as routine. Yes through chart analysis project	Yes	No
Repeat presentation	No	No[8]	No[8]	No[8]
Outcome				
Reported to who?	Yes[9]	No	Yes	Yes
Charges laid	No	No. Recorded outcomes in ED are Admitted to hospital, Treated & discharged, Did not wait	Yes	No

Notes:

1. * SIMS refers to the CCTV *Security Incident Management System* database (see Chapter 9 for details).
   # QPRIME is the Queensland Police Service database that captures and records details of crimes and individuals.
2. Police and venue security had three choices when completing their respective records: Yes/No/Unknown. Police record these details on QPRIME, premise security record these details in the hand-written *incident register* mandated by law to be kept on licensed premises.
3. There was no specific field in the database. Broad locational details were captured by the CCTV system operators and recorded on the SIMS database, mainly through camera location plus incident location in notes, although the notes field was found to be variable in accuracy and quality of field completion. Some notes contained nothing, some contained street details, and others stated that the incident occurred *outside X venue*.
4. Details regarding the time of the assault as recorded on the licensed premise incident register were often vague, as the register was sometimes completed at the end of the responsible person's shift.
5. The level of contextual details recorded in the ED varied extensively depending on the workload of the ED, the importance the doctor placed on capturing these details, and the forthrightness of the patient.
6. Video review refers to camera operators tracking back the movements of an identified individual to piece together a timeline. It was relatively rare that video review was used; it happened only when police request that it be

performed for investigation and prosecution reasons, generally only for major incidents. CCTV operations are explored more in Chapter 9 below.

7. At the time of the project the number of participants involved in an assault incident was not routinely counted by the CCTV system operators and recorded on the SIMS database. There was no specific field in the database, but the number was sometimes recorded in the free text *Notes* field.
8. This line of questioning was eventually discarded for the project because it focuses on individual level information which required the individual to be identified. It is noted that in the Emergency Department Information System (EDIS) repeat presentations are captured as routine and an injury or presentation trajectory can be described, and that this is similarly possible using the police QPRIME system which has the capability to perform analyses on a *person identifier* level: an individual offending or victimisation trajectory can be described. Regarding the licensed premises, it was reported that some venues capture details regarding repeat troublemakers in that venue, but that this is generally not the case; even in individual venues, when it is done it is done sporadically.
9. The SIMS database had a separate field available in each record for the camera operator to detail the crime report number, but there was no simple *yes/no* field describing whether a crime report had been submitted to the police. Camera operators stated that the *crime report number* field was supposed to contain the QPRIME number of the crime as provided to them by the police. Often in the *crime report number* field, the report number was recorded as a value of 1 to indicate a crime report had been provided to the police, and often there was no record. CCTV management stated that if no crime report had been provided to the police, the camera operators were tasked with recording that fact in the *crime report number* field (see Chapter 9 for commentary on related camera operator performance).

Police automatically capture precise time-specific, demographic and locational data on assaults due to prosecution requirements. The police only record assault incidents that are reported to them. Police collect information for evidentiary purposes, including a specific field noting the attending officers' judgement regarding whether the offender had consumed alcohol, and the geo-spatial location of the alleged offence. In EDs, the involvement of alcohol in presentations is inconsistently recorded and capturing whether the assault occurred in the NTE is problematic as the location is not clinically important. The ED captures information only due to the presentation of an injury problem by a patient. Data from the CCTV system does not show whether alcohol was involved in the incident, but the precise location of the incident in the NTE is captured, as is the time and whether or not the incident is an assault. The demographics of participants is restricted to gender in the CCTV database as age cannot be reliably determined by operators.

Collecting information from licensed venues proved to be a sensitive issue, as assaults on licensed premises are recorded by the liquor licensing office and could be used to lodge grievances against the venue. Licensed venues are required under the *Liquor Licensing Act* (Queensland Government, 2002) to keep incident logs relating to each security shift for seven years after that shift. Venue security is required to record significant incidents in this logbook, which can be regularly examined by the liquor licensing authorities. While the venue and private security representatives had given in principle support to providing data in the follow-up to initial interviews, they decided to wait and see the results of the data collection workshop before formally committing to providing the information, and

agreeing to a process to provide it to the research team. The sections below describe specific results regarding data collection processes within the ED, the police, and the CCTV system.

6.3 Emergency Department

Within the ED, information about patient presentations to the ED as a result of an ARA is contained within information linked to the presenting patient's medical record. Finding a way to de-identify this data and generate accurate aggregate level data required extensive consultation with ED staff. Other data collection challenges identified in Study 1 reflected those found in the literature. The priority for ED staff was rapid and effective triage of each patient into appropriate treatment. Information could not be sought in the ED about the specific locations where the violent incidents occurred, nor about the particular incident that caused the patient's injury. Further, the patient's possible level of intoxication was often not of direct clinical importance, and was seldom measured, unless the information was used in diagnosing an injury or to inform treatment need. During the interviews, the ED medical staff noted that the head, face, and hands are the bodily areas most often injured through ARAs. There were few protocols facilitating the routine sharing of information with enforcement agencies about incidents in which ED patients are involved, the exceptions being child protection matters and sexual assault protocols. EDs have limited capacities and resources for research, with one doctor noting in a conversation during the observational session that community-based research was a waste of time.

Importantly, during interviews with the ED Nurse Unit Manager and ED nurse colleagues, participants reported that a majority of assaults on nurses occurred during the weekend peak periods, and these assaults usually involved patients who had been participants in physical violence in the NTE immediately prior to presentation. It was also acknowledged that with accurate information about the nature and location of these assaults, community and agency-specific resources could be appropriately targeted to reduce the number and severity of these results, considerably reducing the workload of staff particularly during peak weekend times. If reducing the number and severity of those NTE assaults reduced the number of presentations to the ED, a further flow-on to a reduction in the number of assaults on staff within the ED was proposed by staff. Directly relating the research project to these two impacts on ED nursing staff was a significant factor in gaining supporters of the project in the ED. These findings were used to frame the in-service education sessions to the ED nurses. During these sessions, a range of ethical and logistical issues regarding the research project were raised by the nurses as well as perceptions about the causes of ARA and the effect it had on the ED staff and operations. A number of possible interventions were also suggested by the nursing staff.

Staff agreed that ongoing education presentations on the progress and results of the study be conducted.

Emergency Department staff confirmed that for information to be collected in the ED, external resources and a collaborative approach between researchers and ED staff was required. Data collection in the ED for this project therefore required minimal burden on staff. Protection of patient confidentiality and related privacy information considerations were identified as critical. During the interviews ED nurses and doctors reported that in the Cairns ED, patients had previously taken offense about possible stigma if alcohol problems are linked with their clinical records. Staff were concerned that the attribution on a clinical record of any behaviours or activities during an incident in which a patient was involved, especially if that behaviour were illegal or stigmatised, could lead to complaints from patients. While this could only occur if the patient became aware that such a record existed, this theme was common among staff. Therefore, it was essential that information routinely collected about the ARA incidents leading to the presentation was de-identified and contained no inference of an alcohol use disorder in the person experiencing the incident.

Interviews and the observational session also identified what staff referred to as the *patient journey.* In Cairns, when a patient presented to the ED, notes were entered on the Emergency Department Information System (EDIS) at reception, and again at triage by a nurse (or only at triage if the patient is brought by ambulance). The patient is then seen by a treating physician. Nurses and doctors attending the patient enter chart notes and clinical information onto the EDIS as appropriate in their professional judgement. Following treatment, the patient is then discharged from the ED, either to a hospital ward, or by leaving the hospital. No patient could be discharged from the Cairns ED without information being entered onto a compulsory *Diagnosis* screen in the EDIS that contained a number of mandatory fields. During interviews, the EDIS Data Manager suggested a research question could be attached to the Diagnosis Screen as an automatic, compulsory pop-up screen for patients over 16 years of age. This meant that a patient diagnosed with the identified ICD codes relating to ARA could not be discharged from the ED without the treating physician answering the question, "*In your opinion is this presentation the result of an alcohol-related assault in the Cairns CBD?"* The possible answers were: "*yes, no or unsure*" and required one mouse click for completion. Following this single mouse click, the physician was returned to the diagnosis screen and routine data entry for patient discharge was resumed.

Prior to the insertion of the software project into the EDIS, a number of in-service education sessions were conducted with ED staff to inform them of the project and the defined boundaries of the NTE (see Table 3, p.70 above). Posters describing the research project and delineating the boundary of

the NTE were also placed on the ED walls. A trial run to collect this data was conducted in November (see Section 6.7, p.102, below). A retrospective report was compiled in a *Microsoft Excel* spreadsheet and emailed by the EDIS Data Manager. The software gathered data using triage nurses and other clinicians' knowledge and impressions, with no clinical diagnosis or other note made about a specific identified patient. After the data was provided, the linking records were deleted from the hospital computers making it impossible for the data to be linked with any patient.

6.4 Police

Once written approval was given by the *Far Northern QPS District* Assistant Commissioner of Police, and the *Ethical Standards Command* of the QPS, endorsement from local officers quickly followed. During the interviews with the police officers responsible for liaising with licensed venues and enforcing liquor laws within the NTE, and their commanding officer, the Cairns *District Inspector*, agreement to provide de-identified intelligence information was given. Police interviewees had indicated that collating information relating to individual incidents in a de-identified manner was a relatively simple process. De-identified police information relating to individual assault incidents could be compiled by the police Intelligence Officer into a Microsoft *Excel* spreadsheet. Existing QPRIME report generation capabilities were amended by incorporating the defined NTE boundary. The results could be emailed on a monthly basis. Figure 7 on page 95 below illustrates this data.

The frequency of data provision depended on the needs of the research balanced by workload requirements for the Intelligence Officer. The police data captures only incidents where charges were laid. Each ARA incident was identified as unique by providing all charges laid as a result of each incident. All data was de-identified, eliminating the prospect that any patron in the Cairns NTE would be identified as either intoxicated or having been involved in an assault. In-service education sessions were proposed but rejected by the QPS as unnecessary. Figure 7 below shows a screen shot of initial police data relating to ARA incidents in Cairns NTE (as amended). The *I.D. number* column on the far left is the number assigned to the incident by the police for their tracking purposes through the research project. In the second column from the left, QPRIME refers to the Queensland police incident and person database. The agreement with the police required that the number identifying the incident within QPRIME (the *occurrence number),* be removed for the purposes of this thesis due to confidentiality requirements, even though it was originally supplied by the police. Each of the 22 QPRIME occurrence numbers has been replaced with the text *Individual QPRIME #*, prior to the screenshot. All other data provided has been left unaltered. The third and fourth columns indicate where the incident occurred. The third column lists landmarks in the Cairns NTE, and the fourth column is the street address of the offence. Each of the listed locations lies within the boundary of

the NTE as defined through the qualitative research. The gender of the person charged, and their age is recorded. The final right hand column contains the list of assaults and other charges which were laid in each instance. These categories were what triggered the retrieval of the incident from the QPRIME database for the purposes of this project.

Figure 7.

Police data relating to ARAs in Cairns NTE in November (amended)

Id Number	Occurrence Number	Place Name	Address	Gender	Age	Occurrence Type
QPS_1	Individual QPRIME #	Cairns Hilton		Male	37	Assault occasioning bodily harm[1]
QPS_2	Individual QPRIME #		Abbott Street	Male	21	Assault occasioning bodily harm[1];Assault occasioning bodily harm[1];Assault, Common[1]
QPS_2	Individual QPRIME #		Abbott Street	Male	21	
QPS_3	Individual QPRIME #		54-60 Abbott Street	Female	39	Assault occasioning bodily harm[1]
QPS_4	Individual QPRIME #		Shields Street	Male	34	Assault, Common[1];Public Nuisance - Violent[1]
QPS_5	Individual QPRIME #		22 - 24 Shields Street	Male	34	Assault occasioning bodily harm[1];Wilful damage (not elsewhere classified)[1];Liquor Act 1992[1]
QPS_6	Individual QPRIME #		Lake Street	Female	22	Assault occasioning bodily harm[1]
QPS_7	Individual QPRIME #		Shields Street	Male	29	Assault occasioning bodily harm[1]
QPS_8	Individual QPRIME #		Abbott Street	Male	34	Assault, police (PPRA)[1];Resist arrest, incite, hinder, obstruct police[1];Public Nuisance - Disorderly[1]
QPS_9	Individual QPRIME #		Shields Street	Male	51	Grievous Bodily Harm[1];Assault occasioning bodily harm[1]
QPS_9	Individual QPRIME #		Shields Street	Male	48	
QPS_10	Individual QPRIME #		22 - 24 Shields Street	Male	29	Assault occasioning bodily harm[1]
QPS_11	Individual QPRIME #		24 Shields Street	Female	25	Assault occasioning bodily harm[1]
QPS_12	Individual QPRIME #		Abbott Street	Male	66	Assault occasioning bodily harm[1]
QPS_13	Individual QPRIME #		77 Lake Street	Male	26	Assault, police (PPRA)[1];Wilful damage (not elsewhere classified)[1];Liquor Act offences/other liquor offences[1]
QPS_14	Individual QPRIME #		87 Lake Street	Male	22	Assault occasioning bodily harm[1];Liquor Act offences/other liquor offences[1]
QPS_15	Individual QPRIME #		Esplanade	Male	15	Assault occasioning bodily harm[1];Assault occasioning bodily harm[0];Assault occasioning bodily harm[0]
QPS_16	Individual QPRIME #		25 Spence Street	Male	23	Assault, Common[1]
QPS_17	Individual QPRIME #		Abbott Street	Male	23	Assault occasioning bodily harm[1]
QPS_18	Individual QPRIME #	Reef Hotel Casino		Female	35	Assault, minor (not elsewhere classified)[1]
QPS_19	Individual QPRIME #		24 Shields Street	Male	21	Assault occasioning bodily harm[1]
QPS_20	Individual QPRIME #		70 Abbott Street	Male	28	Assault, serious (other)[1];Shop stealing, unlawfully take away goods[1]

6.5 CCTV

An early finding of Study 1 was the capacity for the system to detect and document incidents of person-to-person violence to augment information from the ED and police. Again, this supported the findings of previous research (Sivarajasingam et al., 2003). Further, interviewees suggested that street and venue security often either quelled a potentially violent situation, or intervened to limit the potential harms from an ARA. This intervention was suggested as routine, with interviewees stating

it was achieved through camera operators observing disturbances and deploying private security officers to the site through the radio communication network. Direct observation in the CCTV camera room supported these reports. Studies examining this intervention had been reported with police officers (Sivarajasingam et al., 2003; Piza et at., 2017), but an examination of the literature found no research on how this may work with private security officers. Chapter 8 details Study 5, which specifically examined these two aspects of the Cairns CCTV system impacts on NTE ARAs. During the interviews, the Cairns Council *Inner City Facilities Manager* noted there had been no external evaluation of the effectiveness or operations of the CRC CCTV system in the fourteen years of its operation.

Similar to the process agreed with police, information relating to individual assault incidents could be extracted from the SIMS into a Microsoft *Excel* spreadsheet using existing report generating software and emailed to the research team on a monthly basis by CCTV management. Figure 8 on pages 97 to 99 below shows the data provided by the Council's CCTV system (as amended). It contains records linked to database entries relating to incidents from five days in the month of November. The names of the nightclubs and licensed premises have been removed (hence the label, *amended*), with each identified licensed premise being given a number instead. The names of the columns describe the information captured in that field. Data in the *Minor Incident* column was based on a subjective assessment by the camera operator, who recorded the number '1', if they judged the incident to be minor, and '2', if it was a major incident. Major incidents were defined in theory as involving multiple people or if first responder services (i.e. police and/or ambulance) attended the incident. The *Last Drinks* field attempted to capture the last venue patronised by an individual prior to involvement in an incident. *Duration* recorded how long the incident lasted, and *Camera* denoted the number corresponding to the physical location of the camera.

The process outlined in Sections 6.2 to 6.5 enabled incident level data to be contributed and collated from three sources on a monthly basis, giving what was believed to be a more accurate, monthly picture of the number of assault incidents in the Cairns NTE. The next stage was testing the multi-agency monitoring concept through a retrospective incident linking exercise.

Figure 8.

Data from CCTV SIMS database (amended)

Incident Date	Notes	Minor Incident?	Crime Report #	Last Drinks	Duration	Incident Type	Camera
1/11/2009	Inform Esplanade Officers of a disturbance on Spence St side of the Nightclub 1. This involves a large number of ATSI persons. Venue security from Nightclub 4 and Nightclub 1 arrive on site, followed by Esplanade Officers. Esplanade Officers inform me that it is over a male being kicked out of the Nightclub 4, and a female who didn't. City Beat drive past and stop. They all appear to know each other. City Beat move them on.	1		Nightclub 4 (Spence St)	0	03. General Disturbance	City Place (Lake Street - City Place)
2/11/2009	Police receive information from a taxi driver, of a large brawl on the street in front of Nightclub 2. I scan the area and see a large group, with several males who appear to have been fighting. Police arrive on site. We check time-lapse and observe the incident start. That has been bookmarked on Camera 48.	1		Nightclub 2 (Grafton St)	0	03. General Disturbance	Nightclub 2
2/11/2009	Nightclub 3 requests I get a visual on three males walking through City Place. They inform me that they have been ejected for fighting. I get a visual and observe them as they are refused entry to NIGHTCLUB 5 then Nightclub 6. The males eventually depart the CBD in taxi 93.	1		Nightclub 3 Nightclub (Shields St - City Place)	0	02. Request from Lic Venue	City Place (Lake Street - City Place)
3/11/2009	Received a call from Tobacconist on Shields St concerning an Intox c/c male wearing brown shirt and blue shorts, This male was harassing people walking past. City Beat also were looking for this male earlier on. Observed the male on Lake St outside Commonwealth bank then lost sight of him as buses were in the	1		(N/A)	0	03. General Disturbance	Woolworth's (Lake Street)

	way, 307 on site and took up with another ATSI male whilst in the area.						
4/11/2009	L/G informs me that he just removed a female from the male toilets at the lagoon, This F was in the cubicle with another male.	1		(N/A)	0	05. Other (See note)	Amenities Toilets (Esplanade Lagoon)
4/11/2009	Lagoon guard informs me that he just spoke to a c/c male busking in front of the First aid room at the lagoon, He was advised to head over to the ICFM office and get a permit as required,	1		(N/A)	0	00. Patrol Log ^	(N/A)
4/11/2009	Gavin informs me of a intox c/c male harassing people in the courtyard of the lagoon, This male then headed north and was spoken by L/G and Gavin, They disposed of a beer off him in area 4.	1		(N/A)	0	00. Patrol Log ^	Aquarius (Esplanade opposite Aquarius)
4/11/2009	Received information from (female Council Employee) CRC concerning a c/c male sitting in his car acting sus, No shirt on and just in shorts with a mobile phone looking like he was taking photos, car Rego number (deleted by candidate), Citybeat were informed and took up with this male.NFA	1		(N/A)	0	00. Patrol Log ^	Fogarty Park North (near Old Police Beat Toilets)
4/11/2009	Esplanade officer request visual of a c/c male in black clothing who is yelling out to members of the public got a visual of him, male then headed down towards the lagoon area where officers took up with him, male has then headed back to the transit mall, where 307 took up with male and took him away.	1		(N/A)	0	00. Patrol Log ^	City Place (Lake Street - City Place)
4/11/2009	CP Officer informs me of an assault that occurred inside the Nightclub 3, cp officer took up with both party and took down their details as there was no complaint at this stage.	1		Nightclub 3 Nightclub (Shields St – City Place)	0	09. Alleged Assault	Qantas Corner
5/11/2009	CP Officer request visual of the entry to Nightclub 3 as there appears to be a male being forcefully removed from venue, got visual of this it then appears that the male has then head-butted venue security, cp and Esplanade officers took up with male around on Abbott St just north of the big apple, informed comms of this. the group then departed in taxi	1		Nightclub 3 Nightclub (Shields St - City Place)	0	00. Patrol Log ^	Qantas Corner

	no#301 on the cnr of Aplin and Abbott St, cp officer obtained his details, and they said they were staying at the Lakes Resort.						
5/11/2009	Esplanade officer assisted some tourist with a flat battery in the lagoon carpark.	1		(N/A)	0	00. Patrol Log ^	Public Amenities
5/11/2009	Lagoon officer asked for a visual of 2 Caucasian males walking towards area 1. These male were asking for food off people at BBQ tables whilst they were walking past, They both looked very intox as they headed to the wharf.	1		(N/A)	0	04. Public Drunkeness	East end of Amenities Biulding)
5/11/2009	C/P maintenance/Cleaner informs us of a fight in the Transit mall between 2 ATSI males outside the Westpac bank, Got no visual of the fight as cam was on opposite side.L/G,307 attended,2 ATSI males arrested.	1		(N/A)	0	03. General Disturbance	Woolworth's (Lake Street)

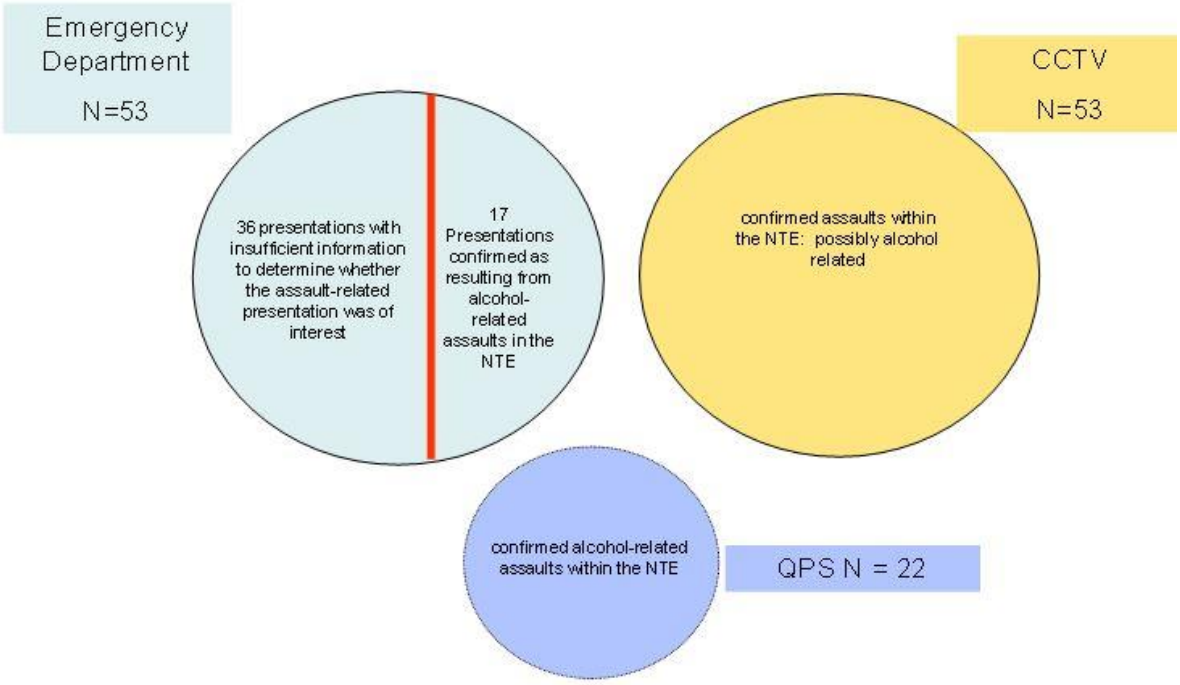
6.6 Retrospective data for all Agencies

Ten months after the initial interviews were conducted, managers in the QPS, the CCTV system and the ED provided a set of retrospective data pertaining to NTE ARA incidents occurring in the previous month. An analysis of retrospective data collected during the month of November by each agency was conducted. Data from CCTV system management and police were provided by the process outlined above. The retrospective data on the ED presentations was provided by a chart study done concurrent with Study 2 by two registrar doctors in the ED (see Clough et al., 2013).

Figure 9 below shows the results of the retrospective data analysis for November. A total of 92 ARAs in the Cairns NTE were recorded, an average of 3.1 per day. The CCTV camera operators recorded 53 assaults; more than half of all assaults that were captured (57.6%). The police recorded 22 ARAs: approximately 23.9% of all recorded. The ED recorded 17 eligible ARAs, approximately 18.5% of the total number of assaults. The total number of potentially relevant presentations to the Cairns ED was 53. This is explained on pages 100 and 101 below Figure 9.

Figure 9.

Retrospective analysis of possible Cairns NTE ARAs, November, 2009



The summary of every incident provided by the ED registrars was examined. The number of potentially relevant assaults recorded in the ED are shown in the teal rectangle in the top left corner of Figure 9. The ED circle in Figure 9 is divided into two segments. The left-hand segment contains the number of identified assault-related presentations to the ED in which it was unclear whether the presentations met the inclusion criteria to be categorised as NTE ARAs. That is, there was insufficient information in the clinical charts to determine whether the assault involved alcohol, and/or that the location of the assault was unclear. For 36 cases (68%) of the total 53 assault presentations, the information contained in the clinical chart relating to that incident was insufficient to classify it as a NTE ARA. The right hand segment shows that the information contained within the chart for 17 presentations (32%; 17/53 of potential NTE ARA incidents identified within the ED through the retrospective chart analysis) was sufficient to ascertain that the injury presentation was the result of an ARA within the boundary of the Cairns NTE. That is, the chart reported details which showed that:

1. the injuries were the result of an assault (as recorded by either the triage nurse or the attending physician),
2. alcohol was involved, and
3. the address of the incident occurrence was within the defined NTE boundary.

Complete data within the case notes for the purposes of this study were found only for the variables: *date and time of ED arrival, age and gender of patient*. Information about the incident location was completed in 37.3% of case notes and information about alcohol use was found in 73.2% of cases (Clough et al., 2013).

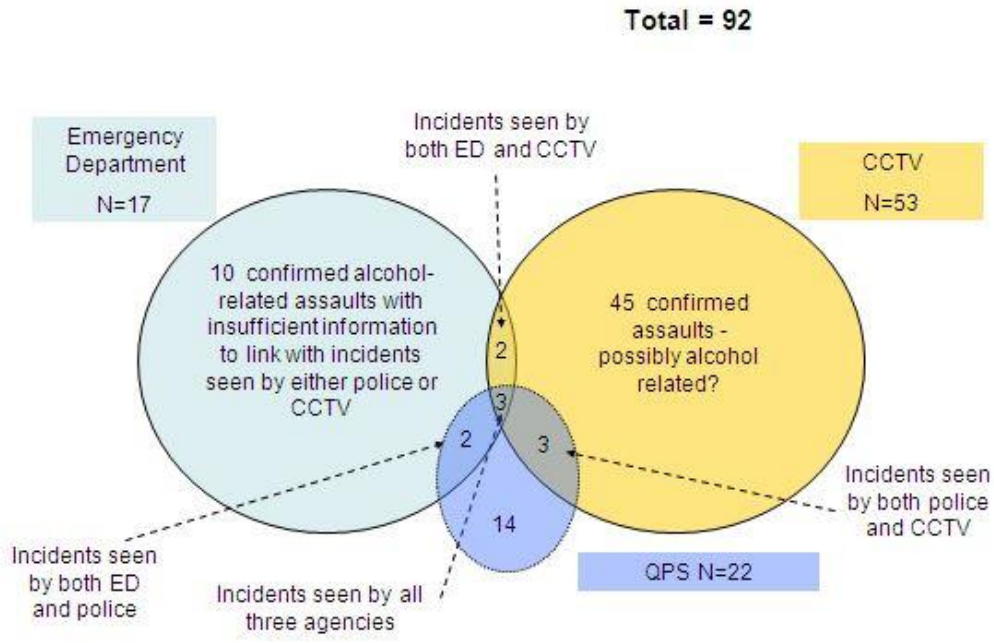
The CCTV system recorded 53 assault incidents in November. The information regarding the recording of assaults on the CCTV SIMS database was of questionable quality (see Figure 8, pp. 97-99 above, also Chapters 7, pages 111 to 114, and Chapter 8, pages 140 to 145). To address this, CCTV management provided a spreadsheet containing the details of every incident recorded on the database for November. Every incident in this "data dump" was manually examined. To identify accurately coded assault incidents, the description of the incident by the camera operator in the *Notes* field of every incident record was examined and then cross checked with whether or not the incident was recorded as an *assault* in the *Incident Type* field in the SIMS database. To validate the accuracy of the information contained within the *Notes* field of each record, the footage associated with a random sample of nine incidents was viewed, including a random sample of three of the incidents identified as assaults. Based on the examination of incident records on the SIMS database and the associated footage, information on 53 NTE ARAs were documented by the CCTV system. Incidents are only recorded in the SIMS database by camera operators if they see the incident occur; or, when they are alerted to it by radio contact from external agencies, such as private security on the street, licensed venue security or police. Further, information regarding whether or not alcohol was involved in these assaults cannot be captured by the CCTV system. Finally, due to their field of view, the council CCTV cameras in the Cairns NTE cannot capture incidents which occur inside licensed premises.

The method and indicative results were presented to stakeholders as the study progressed (see Table 3, Chapter 5, p.70). Working through the complications and complexities in the analysis of data from November provided sufficient confidence to apply the probabilistic method to the retrospective data (see Chapter 8 for elaboration; also Downing et al., 2005; Méray et al., 2007). The results are shown below in Figure 10. Figure 10 again shows the numbers of assault incidents captured by each of the ED, CCTV and police, and highlights the incidents that included sufficient linking variables to suggest the incident was seen by more than one of these agencies.

Of the 92 ARAs recorded within the Cairns NTE during November, 10 were seen by more than one agency (10.9%). A total of three assault incidents (3.3% of all recorded incidents) were seen by the QPS, CCTV camera operators and the ED. These three incidents contained enough detail as recorded by all three agencies to link the incidents as the same occurrence across the three databases.

Figure 10.

Retrospective linkage of possible Cairns NTE ARAs, November



The ED circle contains the 17 confirmed ARAs within the Cairns NTE as described in Figure 10. Of these 17 assaults recorded within the ED, ten (59%) were seen only by the ED and no other agency, seven ED presentations resulting from an NTE ARA (41%), included sufficient information to match the presentation with assault incidents recorded by either police or CCTV, or both. Linkage suggested that five assault-related ED presentations were also seen by the CCTV operators (29.4%), but not recorded by the police. Five assaults (29.4%) were recorded by both the ED and the police, but not seen by the CCTV camera operators. Eight of the 22 relevant incidents (36%) recorded by the QPS were also documented by either the ED or the CCTV system. Three (14%) incidents recorded by the QPS were able to be linked to assaults recorded by the CCTV camera operators. Sufficient detail was available to link two incidents with presentations to the ED (9%), but not to the CCTV system. Fifty-three assault incidents were seen and recorded on the SIMS database by CCTV camera operators in the period. Eight of these 53 assault incidents (15%) were also recorded by either the police, or in the ED. As noted above, three of these incidents were seen by all three agencies (5.6%), with two assault incidents seen by both the ED and the CCTV operators (3.8%). An additional three assault incidents were recorded by both the CCTV camera operators and the police (5.6%). The higher the number of assaults recorded by an agency, the lower the percentage of these incidents that were seen by other agencies. A total of three assaults (3.3%) were seen by all three agencies (the police, CCTV camera

operators and the ED), and between five and six (5.4% - 6.5%) incidents were seen by any given two agencies of the three; e.g. police and ED, or CCTV and ED, or police and CCTV.

The focus of the retrospective linkage exercise was to test the method, rather than analyse any temporal or spatial pattern of these assaults in November. Analysis of quantitative results from the multi-stakeholder monitoring tool is reported in Chapter 8. The quality of the ED data reflected normal practice in the ED, rather than a specific focus by staff on accuracy regarding ARA and NTE locational data for the assault presentation. The importance of having the example of Figure 10 to show to ED staff at the in-service education sessions (see Table 3, p.70 above), and to partner agencies at the data collection workshop (see Section 6.7, pages 101 to 104 below), emerged through the course of this research.

In summary, the retrospective data linkage exercise highlighted further complexities, both within the context of each data collecting agency, and within the NTE ecology. Nevertheless, the results showed that the retrospective linkage method was feasible. This led to the refinement of the monitoring data collection tool, and the establishment of the routine collection tool in the three above databases. One refinement was added to the monitoring tool compared to the retrospective data collection: the addition of assault incidents recorded by venue security as occurring on licensed premises. This occurred following the all-stakeholder workshop described as stage 5 of Study 2. Based on the findings of the retrospective analysis, the fourth stage was the compilation of a mock-up example of what the completed linkage tool may look like. The probabilistic linkage tool including the dummy examples of incidents captured by the tool was presented at a workshop involving all data collection agencies. The workshop and the results are described in section 6.7 below.

6.7 Multi-agency data Collection workshop

Twelve months after the initiation of Study 1, data provision stakeholders met to discuss implementing the tool in their agencies. The invitees and attendees are listed in Table 8 below. The workshop was held in the auditorium of the Cairns Hospital. The master schedule originally included information collected by the QAS. However, although invited, there was no response from Ambulance services. The workshop agenda was designed to be worked through within three hours. The aims of the workshop were to summarise what had been found to date, test agreement among stakeholders on identified data gaps and the probabilistic linkage method so that every incident was captured for the study, once only, and gain agreement on implementation.

Table 8.

Attendees at data workshop

AGENCY & ROLE	ATTENDANCE STATUS
Emergency Department	
Doctors	Two doctors accepted and attended
Head of ED	Did not attend and sent apologies
Head of Nursing	A proxy attended
Data Manager	Attended
ED Staff Specialist and Head of Research	Attended
DABIT	Did not attend and sent apologies
Queensland Police Service	
NTE Liquor Enforcement & Proactive Strategies Unit	One officer attended
Officer in Charge Citybeat Police Station	The District Inspector attended as proxy
Cairns Tactician	Attended
Cairns Intelligence Officer	Attended
Ambulance	
Area Director	Accepted but did not attend nor send proxy
Data Manager	Accepted but did not attend nor send proxy
Queensland Security Providers	
Operations Manager	Attended
Cairns Regional Council	
Inner City Facilities Manager (Manager of CCTV system)	Attended
Community Safety Officer	Attended
Office of Liquor and Gaming Regulation (liquor licensing)	
Manager	Attended
Cairns City Licensees Safety Association (Inner-city Liquor Accord)	
President	Attended

Upon commencement of the workshop a quick recap of the theoretical basis for the project and methodological approach was given. This was followed by a summary of the roles and agencies of interview participants, and a summary of the qualitative results around the identified themes of location, causes and solutions. The maps with the defined boundary of the CBD and the locations of hand drawn hotspots (Figures 4-6, pages 73 to 75, Chapter 5), was presented to all attendees and discussion invited.

Participants then worked through an overview of the *Data Collection Table* (Figure 11, page 106 below) to arrive at a combined data framework that could identify specific incidents. An overview of the data provided by each agency for November 2010 was then worked through sequentially in the following order:

1. Emergency Department
2. Queensland Police Service
3. Cairns Regional Council CCTV

The dummy example of results of the multi-stakeholder monitoring tool was presented (Figure 11, below). Understanding of the data gap analysis, the need for monitoring data capture, and agency-specific information sharing policies was checked for accuracy with attendees. The logistics for data provision by the ED, QPS and CCTV were confirmed. Security providers to the licensed venues had not provided any data at that stage. They spoke to the data presented by the other agencies, and elaborated on a potential collection process. It was agreed that supervisors in the company which provided private security at six licensed venues would record all incidents on a form devised for that purpose; and collected weekly by an associated researcher (see Hayes-Jonkers et al., 2012). The engagement process with licensed premises owners and managers has been published elsewhere (Hayes-Jonkers et al., 2011; 2012).

The data collection process was agreed to run for three months, commencing on 1st April 2010. The first three agencies agreed to email data in a spreadsheet every fortnight. The project commenced on the agreed date and ran for the planned three months, although data was not collected from the licensed venue security in June Year 2, the last of the three months. Data was collected by the other three agencies for the full three months. The results are detailed in Chapter 7.

6.8 Summary

This chapter described the process used in Study 2 to overcome identified barriers in an attempt to more accurately and responsively measure the number and location of ARAs in the Cairns NTE. Gaining the partnership of staff and managers from different agencies was a five-stage process that happened in tandem with other relationship building activities, including some of the feedback sessions in Study 1, and individual negotiations to overcome complexities specific to each relevant agency flagged in Study 1. Reporting interim results as the research progressed, using the evidence-base to show how the project could lessen their workload and resource commitments, as well as how

Figure 11.

Mock-up example of NTE ARA data linkage tool

RESEARCH RECORD NUMBER	Source (for our records)	Episode or occurrence number (e.g. EDIS tracking number, QPRIME)	Date of occurrence or presentation	Time of occurrence or presentation	Date assault occurred	Time assault occurred	Age of person/people	Gender of person/people	CBD or NOT?	Location within CBD - more specific	Alcohol involved	Other agency involved	Other notes, observations or indications that could give clues about time, date location and what happened and kinds of people involved
1	ED	21	1/11/2009	2.44	1/11/2009	2.16	37	Male	Yes	Marlin Parade City	Yes	QPS/QAS	Attacked by a relative - body part - aggressive in presentation– injury severity 2 - admitted to hospital
1	QPS	887	1/11/2009	2.30	1/11/2009	2.10	34	Male	Yes	City - corner Marlin Parade and ?	Yes	QAS	Male aged 34 taken into custody for attacking older brother– ambulance called
1	QAS	665	1/11/2009	2.35	1/11/2009	2.15	37	Male	Yes	Marlin Parade City	Yes	QPS	Male aged 37 taken to ED after being kicked
2	ED	94	6/11/2009	4.30	6/11/2009	4.00	20	Male	Yes	Spence/Abbot	Yes	QPS/QAS	Attacked by several strangers-body parts-not aggressive in presentation - injury severity 6 - admittted
2	QPS	888	6/11/2009	4.15	6/11/2009	3.50	28	Male	Yes	Spence/Abbot	Yes	QPS/QAS	Attack on 20 year old male - ambulance attended
2	QPS	889	6/11/2009	4.15	6/11/2009	3.50	26	Male	Yes	Spence/Abbot	Yes	QPS/QAS	Attack on 20 year old male - ambulance attended
2	QAS	666	6/11/2009	4.20	6/11/2009	?	20	Male	Yes	Spence/Abbot	?	QPS	20 year old male taken to CBH-ED after attack
2	CCTV	100	6/11/2009	3.50	6/11/2009	3.50	?	Male	Yes	Spence/Abbot	?	QPS/QAS	Group of young men attacked another group of men - one man injured
2	VENUE SEC.	50	6/11/2009	3.50	6/11/2009	3.50	?	Male	Yes	Spence/Abbot	Yes	QPS/QAS	Broke up fight between two groups of young men - one man injured and taken to hospital - police called
.	ED	84	21/11/2009	15.51	20/11/2009	22.30	26	Male	?	?	?	?	Attacked by relative with a blunt object - not aggressive on admission - injury severity 4 - admitted
.	QPS	999	21/11/2009	16.00	20/11/2009	22.15	26	Male	No	.	Yes	ED	Attacked by relative with a blunt object - charges laid

the project could address issues raised as important to each stakeholder, was crucial in obtaining this engagement. The follow-up visits after initial interviews and feedback sessions to ED staff (see Table 3, p.70, Study 1), were vital. Observation sessions in the ED and CCTV camera room also allowed a better understanding of the difficulties faced in their operations by each agency, and also built rapport.

One private security firm, the QAS and the 24-hour medical centre declined to be involved in the study. This is a limitation. Other identified core agencies were engaged. Data provision processes were agreed and implemented in the ED, police, CCTV and six licensed venues. The information was compiled from routinely collected sources with little or no additional resources, except in the case of the licensed venues, which required manual transcription into a special research form from manually compiled incident logbooks. Software projects were written to extract de-identified data from ED, QPS and CCTV information. Validation of the data required manual checking of the free text field for each incident in the ED and CCTV reports. However, there was no way to validate police or venue data, and the summary reports provided were the only source of data. The data was able to be shared monthly with stakeholders providing and/or using the information, as well as stakeholder groups mandated to reduce NTE ARAs in Cairns; the CCLSA (the inner-city liquor accord), and the CBD Safety Summit. A probabilistic cross-matching methodology using precise location, time and date of the incident to form the basis of incident identification and analysis was designed. The results of the retrospective data linkage suggested the method could efficiently detect unique ARAs in the Cairns NTE. Through the above processes, feasible methods for each agency to collect real-time data and provide fortnightly separate reports were separately established for ED, QPS and CCTV data. Feedback from all staff involved (see Table 3, p.70, Study 1), was that the project was not intrusive to their core business. Study 2 suggested data could be contributed and collated from four sources on a monthly basis, giving what was believed to be a more accurate picture of the number of unique ARAs in the Cairns NTE. Chapter 8 reports the quantitative results of the pilot trial of the tool. These results have been previously published (Clough et al., 2013).

Chapter 7. Study 3: Quantitative results of the ARA monitoring tool

7.1 Introduction to the Chapter

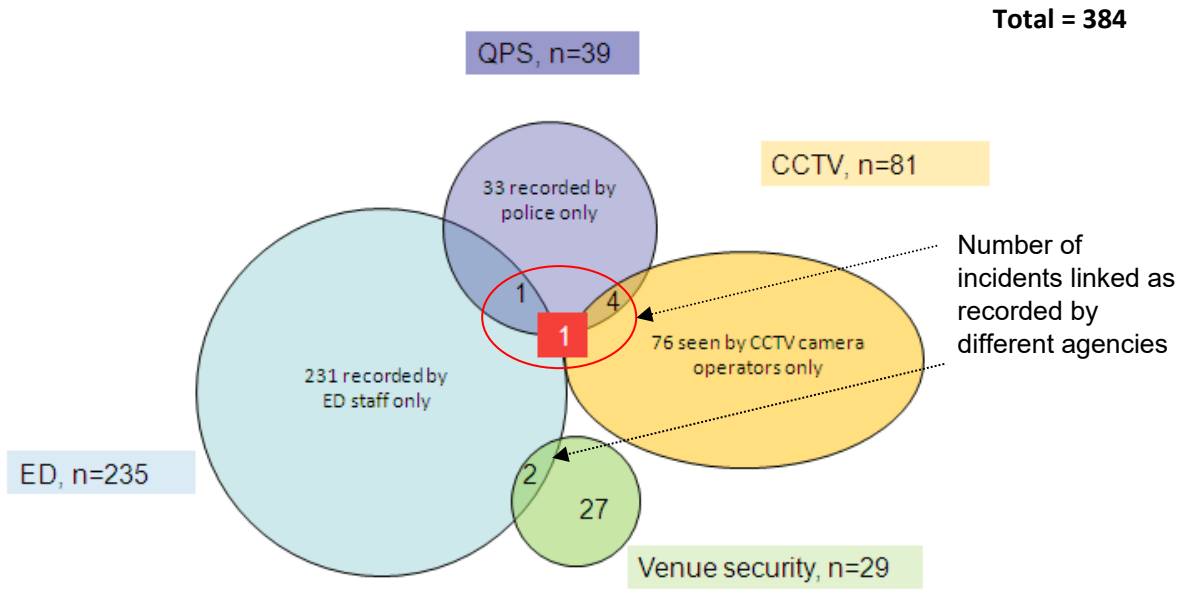
This chapter reports the quantitative results derived from the multi-stakeholder monitoring tool for a three month period. Section 7.2 shows the overall results for ARAs within the defined boundary of the Cairns NTE over the 91 days. Section 7.3 examines the CCTV results in more detail. Section 7.4 summarises the study.

7.2 Results of monitoring tool data collection and analysis for April, May and June

The data collection period for the ARA monitoring tool was between 12.00am on 1st April to 11.59 pm 30th June, a total of 91 days. April was the single month for which the licensed premises (n=6) provided data. The ED, police and the CCTV system provided data for the full period. Figure 12 below describes the aggregate results as well as the number of NTE ARA incidents captured by, and linked across, each of the four stakeholder databases.

Figure 12.

Combined incidents of alleged ARA in Cairns NTE – April, May, and June 2010



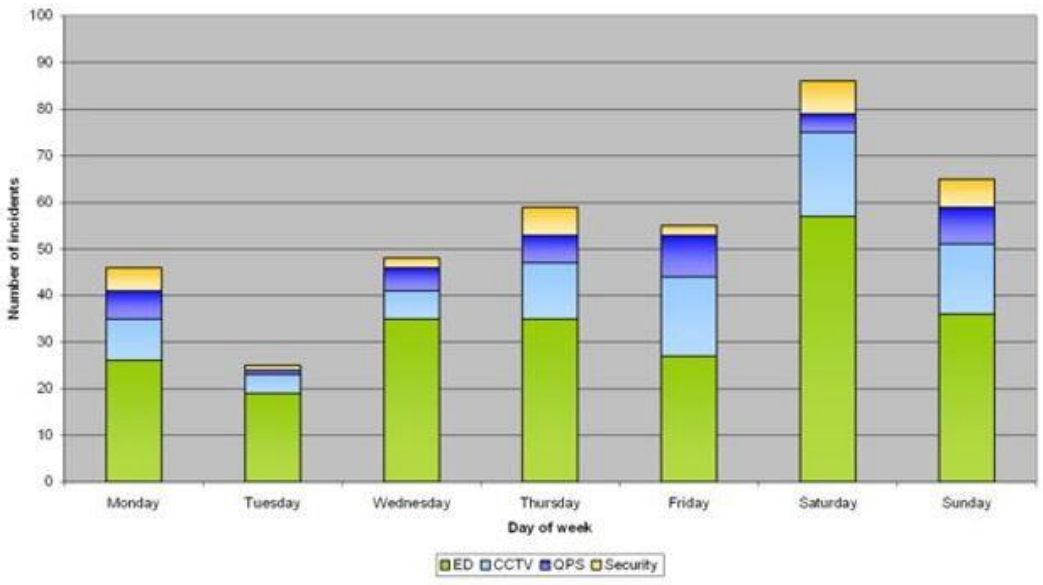
Over the 91 days a total of 384 separate ARAs were recorded within the defined boundary of the Cairns NTE. This was an average of 4.22 per day. Over the period the ED recorded treatment of patient injuries arising from 235 separate ARAs within the NTE (66.4% of all recorded assault incidents). Cairns

police recorded 39 separate ARAs in the NTE (8.6%); and the CCTV system recorded 81 relevant assaults (17.8%). Venue security operating on participating licensed premises recorded a total of 29 assaults on participating premises in April 2010 (the single month for which they provided data). As shown in Figure 12 above, of the 384 incidents a total of eight assault incidents (2.1%) were linked across more than one database. One incident was seen by the police, CCTV camera operators and the ED (0.3%). Five other incidents were recorded on both the police and the CCTV databases (1.3%). A further two incidents that were recorded as occurring on licensed premises[1] resulted in patients attending the ED for treatment (0.5%).

Figure 13 shows the number of incidents by day of week and data source over three months. The highest number occurred from Saturday through to Monday and with a subsidiary peak on Thursday–Friday. Of the 384 assault incidents recorded, 86 (22%) occurred on Saturday night/Sunday morning, and approximately one quarter of relevant ED presentations occurred during these days (57 out of 235 presentations). The most concentrated load in the ED was represented in the data for the Saturday–Sunday period during which 24-hour period around one quarter (24%=57/235) of all relevant presentations to the ED were seen. The number of incidents recorded by the CCTV camera

Figure 13.

Number of incidents by day of week and data source



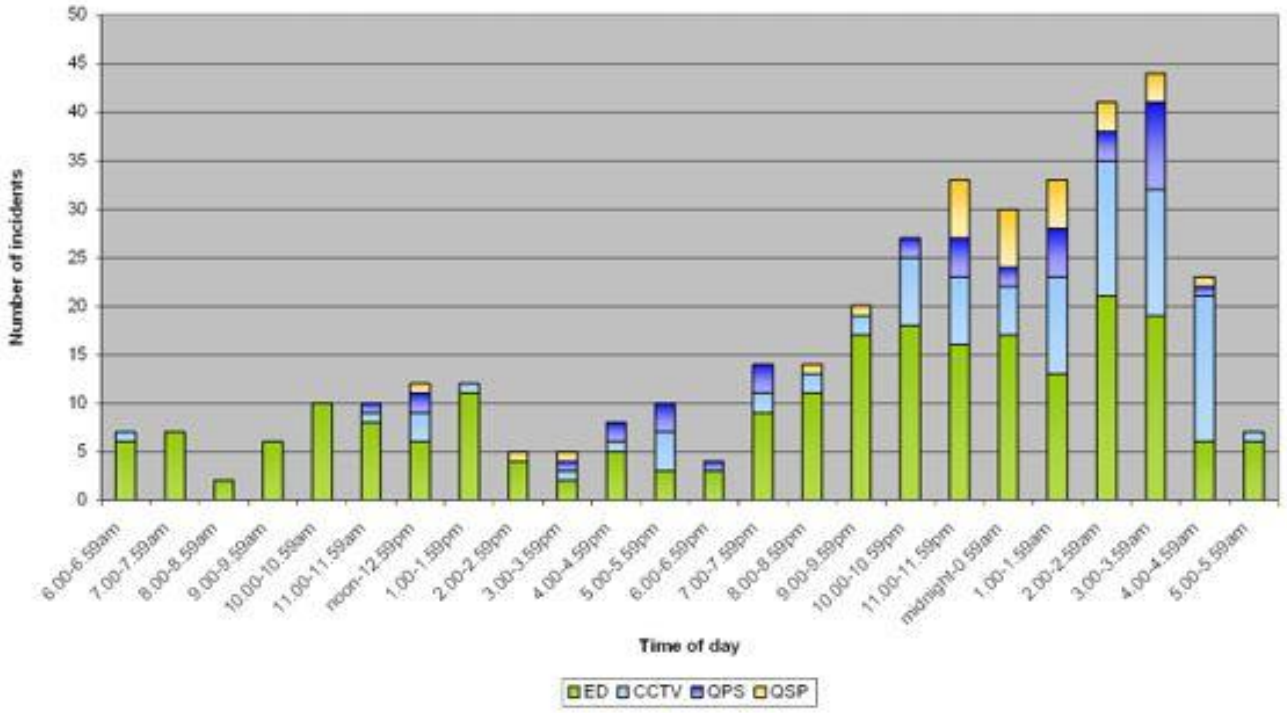
[1] Six licensed venues in the Cairns NTE participated in the study. At the time of the study the total number of venues licensed to trade after midnight in the Cairns NTE was 26. These six venues provided data for one of the three months: April 2010.

operators and by the licensed venue security officers was highest between Thursday–Friday to Sunday–Monday. The police dealt with similar numbers of incidents most days throughout the week except for a lower number during the Tuesday evening–Wednesday morning period, approximately 80% lower than the weekend.

Figure 14 shows the occurrence of incidents at different times during a day (when these times are averaged across a week during the recording period). The number of incidents tended to climb steadily from around 7 pm to a first peak around midnight. This was mainly driven by a rise in presentations to the ED. Following a drop in assaults in the hour after midnight, the trend climbed again to a larger peak in the hour before, and the hour after, the 3am lockout.

Figure 14.

Number of incidents by time of day and data source



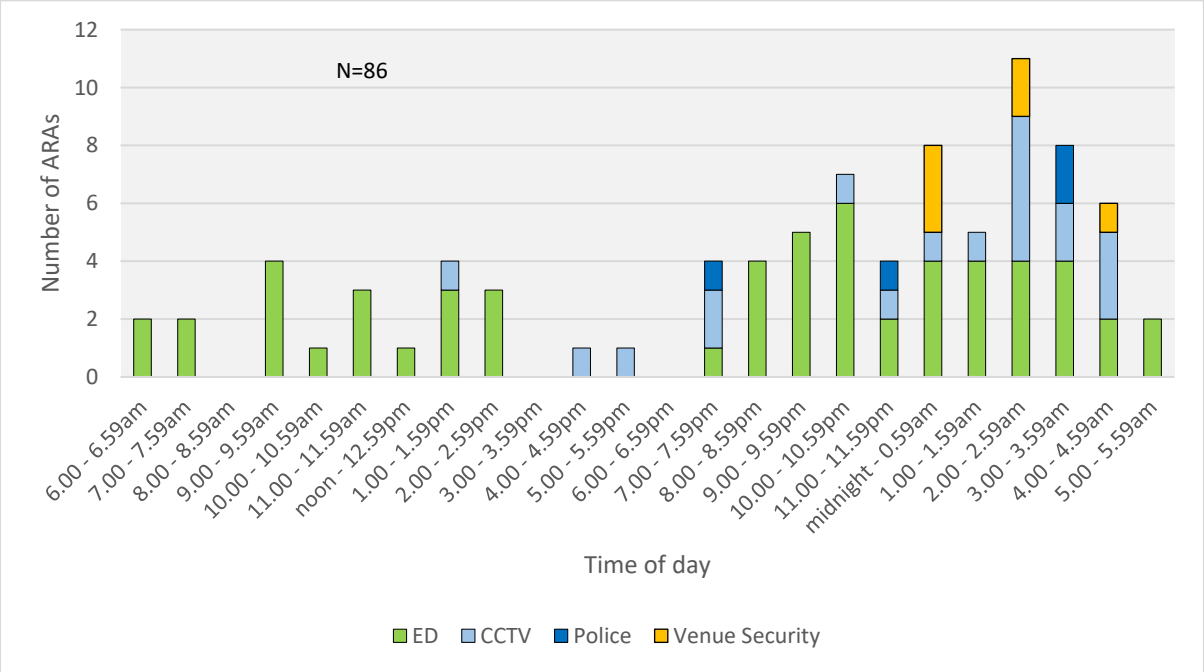
The 7-8pm period saw an average of one assault per hour recorded by both the police and CCTV, and two recorded within the ED. From 8pm until 10pm, most ARA incidents were recorded by the ED. In the hour between 10 and 11pm, six out of seven assaults (85.7%) were recorded in the ED, with the other assault recorded by CCTV. Figure 14 also highlights the significant number of presentations to the ED during the early part of the day, many of which may have been related to violence occurring the previous night (Friday and Saturday nights). From 11pm until 5am, venues began recording assaults happening on-premises. CCTV continued to record ARAs on the street, peaking between 2am

and 5am, with police recording a sizeable proportion of the multi-stakeholder aggregate between 3am and 4am (the hour following the lockout). The first peak was followed by a larger peak in the number of assault incidents recorded in the hour before, and the hour after, the 3am lockout. Viewing the ED data in isolation, there was also a subsidiary peak during the day evident from around 9am up to 1pm.

Figure 15 indicates the concentration of incidents during the Saturday evenings and late night hours, rolling into early Sunday mornings (when averaged across the period). The number of incidents seen by all agencies again tended to climb steadily from around 7pm to 3am, peaking at 11 assaults an hour between 2am and 3am, before sharply trending downward again. There were two drops in the upward trend, 11pm to midnight, and 1am-2am. Again, the early evening peak was mainly driven by a rise in presentations to the ED, before these stabilised between midnight and 4am, then halved between 4am and 8am. No other stakeholder recorded assaults between 5am and 2pm. The hour after midnight saw a spike in on-premises violence. A small number of venues were licensed to trade until 5am.

Figure 15.

Saturday & Sunday, number of Incidents by time of day and information source



The concentration of assault numbers in the hour before and after the 3am lockout is not as pronounced in Figure 15 (Saturday and Sunday), as it was in Figure 13 (whole of week), suggesting the

lockout drove ARAs on Thursday and Friday nights. Again, ED data shows a subsidiary peak during the day, which extends two hours longer, from around 9am up to 3pm.

7.3 Quantitative CCTV results

The accuracy of data captured by camera operators (e.g. Sivarajasingam et al., 2003), and the proportion of assaults first identified by camera operators were examined see Section 4.5.3, page 60). These are reported for each of the three months before being summarised in Table 9 on page 113.

7.3.1 April

A total of 16 assault incidents were observed and recorded by the CCTV camera operators within the NTE boundary in April 2010. A total of 47 incident reports were provided by CCTV management using the agreed method and were assessed by two researchers (see Section 4.5.3, page 60). Of these 47 reports, 31 were duplicates. Of the remaining 16 records, every incident that was classified as an assault (based on the description of the incident by the camera operator in the free text field in the report) had been categorised within the CCTV database as an alleged assault: that is, the classification of the incident by the camera operator was correct. Of the 16 assault incidents in the NTE, five were first seen by the camera operators (31.3%), eight were first observed by venue security who alerted the camera operators (50.0%), and three were first observed by venue security who requested camera operators monitor the incident (18.7%). There were no requests by police for assistance of the camera room in April.

7.3.2 May

A total of 25 assault incidents were observed and recorded by the CCTV camera operators within the NTE boundary in May 2010. A total of 670 Incident Reports were provided by CCTV management using the agreed method and assessed using the same process as described in Section 7.3.1 above. Of these provided reports, 631 were duplicate records of the same incident. A further 14 incidents were not able to be categorised as assaults when compared with the free text description provided by the camera operator within the incident reports, and were more accurately classified as “general disorder”. Disregarding the duplicate records, the proportion of true positives was 25 out of 39 (64.1%). This was a reduction from the 100% of true positives recorded in April.

Of the 25 assault incidents in the NTE that were recorded in the CCTV incident database in May, two occurred within venues and the camera operator was asked by venue security to monitor the alleged offenders as they left the premises (8.0%). Of the remaining 23 incidents, eight were first seen by the camera operators (34.8%), and one was overheard on the police radio by camera operators who then

recorded the aftermath of the incident in case police required footage (4.3%). Five assault incidents were first observed by police who alerted the camera operators (21.7%). It appears charges were laid by police for only one of these incidents. Three further incidents occurred outside licensed premises, but within sight of venue security who requested camera operators monitor the incident (18.7%). Four incidents were first seen by the roving street security (private security contracted by Cairns Regional Council) and reported to the camera operators (16.0%).

7.3.3 June

A total of 40 assault incidents were recorded by the CCTV camera operators within the NTE boundary in June 2010. A total of 825 Incident reports were provided to the candidate by CCTV management using the agreed method. Of these 631 were duplicate records of 195 separate incidents. Of these 195 incidents, 55 incidents were categorised as 'assault' on the SIMS database. Of these, 15 incidents were not able to be categorised as assaults when compared with the free text description provided by the camera operator within the incident reports, and would have been more accurately classified as 'general disorder'. They were excluded, bringing the number of verified assault incidents in the NTE to 40. Disregarding the duplicate records, the proportion of true positives was 40 out of 55 (72.7%). This was a reduction from the 100% of true positives recorded in April, but an increase in the proportion of true positives in May (64.1%).

Of these 40 assault incidents in the NTE that were recorded in the CCTV incident database in June, nine occurred within venues and the camera operator was asked by venue security to monitor the situation (22.5%). Of the remaining 31 incidents, 14 were first seen by the camera operators (45.2%), eight requests for observation and assistance were made by the private street security employed by Cairns Regional Council (25.8%) and nine requests were made by police to monitor incidents in case police required footage (29.0%).

Table 9:

Camera operator performance, data accuracy and identification of possible ARAs

Month	Percent of true positives for incidents recorded as ARAs (duplicate records removed)	Proportion of street ARAs reported as first seen by camera operator
April	100%	31.3%
May	64.1%	34.8%
June	72.7%	45.2%

7.4 Summary

The data collection for the monitoring tool occurred between 12.00am on 1st April to 11.59 pm 30th June, a total of 91 days. Over these three months a total of 384 separate ARA incidents were documented in the Cairns NTE, an average of more than four ARAs per day (4.26). These incidents were unique as far as could be ascertained. Eight unique ARA incidents, 3.1% of all ARAs, were recorded by more than one agency. The CCTV system recorded six of these eight linked incidents, with five of these linked to police records, and one with the ED. The ED also recorded two assaults for premises that happened on licensed premises. The licensed premises provided data for only 30 days during the period. Further, only six out of 26 NTE venues provided data for the study. The limited involvement by venues suggests that a significant proportion of the true number of NTE ARAs in Cairns were not captured during the period, and supports previous studies that venues may be wary of providing data that may be used to sanction their commercial operations.

The highest number of recorded ARAs (n=86; 22.4%) occurred from midnight Saturday morning through to midnight Monday morning, with a subsidiary peak on the evenings spanning Thursday–Friday. This supports previous research into the temporal patterns of this violence (e.g. Descallar et al., 2012). Nearly a quarter of all relevant ED presentations occurred in this period (22.9%), representing a concentrated workload for the ED. On Saturdays, the number of presentations to the ED for NTE ARAs injuries tended to climb steadily from around 7pm, before peaking at six per hour by 11pm. These assaults tended not to be documented by any other agency. Between midnight and four am on Sunday, an average of four new patients every hour were treated in the Cairns ED for NTE ARA injuries. There was also a small, but significant number of presentations to the ED during the early part of the day, many of which may have been related to violence occurring the previous night. While this trend was most evident on Sunday and Monday mornings until post lunch-time (Friday and Saturday nights), it was also apparent when numbers were averaged across the week. Overall, treating injuries caused by NTE ARAs caused a significant workload in the ED. While the total number of all presentations was not available for comparison, not one hour went by without ED staff treating a patient for injuries caused by this type of violence. During daylight, these averaged 6.8 per hour, while the average rose to 14.25 in each of the twelve hours of night-time.

Cairns police recorded 40 ARAs in the NTE (10.3% of all recorded assaults); and the CCTV system recorded 81 (21.1%). The results of the monitoring tool support research regarding the proportion of this type of assault that is reported to police (Carcach, 1997; Menendez et al., 2015). This was also similar to findings from previous naturalistic observation research in Cairns (Hauritz et al., 1998; Homel, 2011). The number of ARA incidents recorded by CCTV camera operators rose month by

month, from 16 in April, to 25 in May to 40 separate incidents recorded in June, a 66.7% rise. The CCTV camera operators also saw, and the police and licensed venues security dealt with, the highest number of assaults in the NTE between midnight Friday morning and midnight Monday morning. Police dealt with approximately one third fewer assaults on Thursdays than on the weekend, and approximately half the weekend number on Mondays. Over Tuesdays and Wednesdays, they dealt with approximately one fifth the weekend daily number.

When viewed across the week, the number of assaults tended to climb steadily from around 7pm to 3am, peaking at 11 assaults an hour between 2am and 3am, before dropping relatively sharply. There was a smaller peak around midnight. The hour after midnight saw a spike in on-premises violence during the month of April. Following a drop in assaults in the hour after midnight, the total number of assaults climbed again to a larger peak centred around the 3am lockout. From 11pm until 5am, venues began recording assaults happening on-premises. CCTV continued to record ARAs on the street, peaking between 2am and 5am, with police recording a sizeable proportion of the multi-stakeholder aggregate between 3 and 4am (the hour following the lockout). The concentration of assault numbers in the hour before and after the 3am lockout is not as pronounced on Saturday as it was when compared with the whole-of-week, suggesting the lockout drove ARAs on Thursday and Friday nights. Apart from the ED, no other stakeholder recorded assaults between 5am and 2pm.

This second peak supports the results of previous Queensland research into the lockout strategy (Palk et al., 2012). The finding reflects that the peak times and localities within the NTE for violent incidents are when patrons are walking around on the street and crossing paths. Participants nominated a zone where most ARAs were perceived to occur. This zone included two large venues, the taxi rank and late-night food establishments. Apart from these locations, most identified hotspots were at intersections. Interview participants identified these locations as places where the clientele from different styles of venues mixed while they were walking on the street. If patrons are locked out of venues, more of them are on the streets, making themselves available for incidents of violence (Townsley & Grimshaw, 2013). The lockout times are applied to all venues, allowing pedestrians or groups of pedestrians with different social norms and cultures to encounter each other.

This chapter described the results of a monitoring surveillance tool across multiple agencies. The purpose of the tool was to compile strategically useful, timely data on incidents of NTE ARA in a way that provided information to the stakeholder network mandated with implementing and evaluating interventions to reduce this type of violence. The monitoring tool was successfully implemented in three front-line agencies, was low cost and involved no intrusion for any patient or NTE patron. The data were collected at minimal impost to the participating agencies, but analysis was resource

intensive. Importantly, the research found a way for ED data to be made available and shared in a de-identified fashion. The failure of the current study to capture ongoing data from licensed venues highlights that most interventions require licensed venues to be the subject of interventions that often impact on their business model.

Apart from lack of involvement by licensed premises, the study had many limitations (see Chapter 10). Nevertheless, no similar study was found in the literature. An updated literature search conducted in July 2020 found a systematic review by Droste, Miller and Baker (2014), that reported on multi-agency, data collection and surveillance for NTE ARAs, that involved ED data (see Chapter 1, page 6). That review identified a number of studies, all from the United Kingdom apart from the study reported in this chapter. None of those studies, with the exception of Warburton and Shepherd (2006), captured data from the ED, the police, and CCTV. The establishment of a multi-stakeholder, ARA monitoring tool involving CCTV (and with limited involvement of venues), was a novel outcome of Phase 1 of the research program. The literature contains examples of retrospective multi-stakeholder quantitative analysis (Descallar et al., 2012; Miller, Tindall, et al., 2012; Wiggers et al., 2004). The descriptive quantitative findings reported in this chapter support previous research. The quantitative results suggest the probabilistic linkage method has potential to improve understanding of ARA incidents. If the methodological limitations can be overcome, the tool is potentially useful for monitoring and evaluating the effects of targeted intervention strategies. The results regarding CCTV camera operators supported previous research and the results of Study 1 regarding the potential importance of this data source (e.g. Sivarajasingam et al, 2003), and the role of operators to direct physical presence to limit assault duration (Piza et al., 2017; Sivarajasingam et al, 2003). Examination of factors impacting on this comprised Studies 4 to 6.

Chapter 8: CCTV Results

8.1 Introduction

Studies 1 to 3 described the centrality of the CCTV data to the establishment and utility of the ARA monitoring tool. Study 1 also detailed the importance ascribed to the CCTV system in responding to ARAs in the Cairns NTE by many stakeholders. Interviewees from most stakeholder groups, with the exception of ED staff, stated the CCTV system had made a positive impact on violence levels in the NTE. Many of the interviewees raised specific aspects of the CCTV system as important crime prevention measures within the NTE. Police officers spoke mainly about the cameras in terms of footage provision to assist in investigations and prosecution, and in terms of real-time, on-site intelligence regarding incidents that were provided by the live video feed to the police communications room. The local government inner-city place manager, venue owners and private security all mentioned the real-time communication radio system between camera operators and private security, and the disruption to an assault incident caused by quickly contacting a person who was mandated to intervene in a disturbance. None of the ED staff mentioned the CCTV system reflecting the lack of connection between these stakeholder systems. Studies 2 and 3 examined the accuracy of incident reports compiled and stored in the system's *Security Incident Management System* (SIMS) database. In addition to recorded footage, these reports consisted of incident descriptions and coded assessments of incidents entered by the camera operators. As noted in Chapter 5, no external evaluation of the CCTV system has been undertaken in the fourteen years of its existence. Initial inspection of the SIMS data found it contained inaccuracies and inconsistencies, with limited adherence to confidentiality principles).

Section 8.2 examines *Study 4*, which aimed to compare Cairns CCTV system practices against operational good practice as defined in the literature. Section 8.3 examines *Study 5,* which aimed to explore the curtailment and possible prevention of ARA incidents through the efficient deployment by camera operators of an on-site physical presence. Sections 8.2 and 8.3 introduces a discussion of CMO configurations identified through retrospective application of Realist theory to the results of Studies 4 and 5. Each of those studies began to define contexts, mechanisms, and outcomes of aspects of the Cairns CCTV system. Section 8.4 documents the results of Study 6, the first study in this thesis with an *a priori* design according to Realist Evaluation principles. Study 6 was an exploratory evaluation of the accuracy of data captured by camera operators within the CCTV SIMS using defined outcomes and contexts to identify possible mechanisms. Study 6 focuses on theory formation and development regarding camera operators' application to tasks and activities. Section 8.5 discusses the three studies and draws conclusions.

8.2 Study 4: CCTV operational good practice mapping versus Cairns operations

This section is based on a peer-reviewed publication which examined CCTV operations (Pointing et al., 2011). The study retrospectively attempted to define initial Realist contexts for NTE CCTV as an intervention, with limited attention paid to either mechanisms or outcomes within the initial configurations. The application of the realist lens did not attempt to theorise any mechanisms, nor was linked to observed outcomes. This section also incorporates commentary on a recent systematic review and meta-analysis (Piza, Welsh, Farrington & Thomas, 2019) which updated an earlier review and meta-analysis cited in Study 4 (Welsh & Farrington, 2008; see below) with studies from an expanded number of jurisdictions incorporated.

The search terms used to review literature were framed around the CRC's request to audit operational practices (see p.61, Chapter 4, Section 4.6). Papers which did not report on "recommended practices" in the Abstract were excluded. A total of 29 publications were examined for Study 4, 19 from the United Kingdom, and 10 from Australia, including reports and conference presentations as well as peer-reviewed studies. With the exception of one meta-analysis (Welsh & Farrington, 2008), only publications pertaining to the United Kingdom and Australia were included, given their similar legal systems, policy environments (van Krieken, Habibis, Smith et al., 2006), and focus on NTE assaults and disorder. Welsh and Farrington (2008) incorporated a limited number of evaluation studies from the United States of America and Europe as well as several United Kingdom papers. The principal recommendations for the operation of CCTV systems were extracted from the literature and tabulated. Elements of the CRC's *Operational Procedures Manual* were assessed for their compliance with the tabulated good-practice elements. Using standard qualitative data analysis procedures (Gibbs, 2008), codes were developed to aid in thematic analysis of the notes of the observation sessions and focus groups, and the descriptions of incidents in spreadsheets. The data was then coded into topics; these were checked by other researchers associated with the study. Links between key components of good-practice models and these topics found in the textual data were mapped (Table 10, pages 120-125 below). The initial assessment regarding compliance was discussed with CCTV management, and key themes were confirmed with CCTV management in a reflexive process of feedback and refinement of concepts.

Recommendations in the Literature

Generally, the literature in Australia and the United Kingdom points to the need for actively monitored CCTV to be embedded in a multi-tiered, co-ordinated community-wide suite of interventions. The installation alone of CCTV does not prevent offences (Brown, 1995; Piza et al., 2019). CCTV in general is reported to work best when there is a real time physical response on the ground (Brown, 1995; Gill

& Spriggs, 2005; Welsh & Farrington, 2009), where there is wide publication of the system's capabilities and aims, and regular anonymised case studies of successful prosecutions and other information disseminated through the media (Welsh & Farrington, 2008, 2009).

While CCTV evaluations had previously been described as methodologically weak (Welsh & Farrington, 2008), rigorous empirical designs have been increasingly used in the intervening decade (Piza et al., 2019). Nevertheless, the literature continues to highlight the lack of convincing evidence for the use of CCTV to reduce crime. CCTV is associated with a significant and modest decrease in property crime, most effectively in car parks although there is an increasing body of research showing effective crime reduction in residential areas (Piza et al., 2019). The literature indicates that the primary crime prevention mechanism through which CCTV has been studied is deterrence. Other identified ways CCTV may work include enhanced natural surveillance and citizen awareness (Welsh & Farrington, 2002). There is little research examining if, or how, CCTV enhances public perceptions of safety, with few studies incorporating community perceptions of the existence and operation of CCTV in public spaces (Gill, Bryan & Allen, 2007; Piza et al, 2019; Wells, Allard & Wilson, 2006). Increased apprehension of offenders is another means of crime reduction often suggested in the literature. The processes identified within the literature comprise provision of footage to assist in investigations and prosecution, and the deployment of an on-the-ground response (Piza et al., 2019). There is evidence that CCTV limits the severity and duration of assault incidents when combined with real-time enforcement response on the ground (Sivarajasingam et al., 2003). Further, studies have found that although CCTV systems document higher rates of assault and disorder offences due to enhanced surveillance and detection (Gill & Spriggs, 2005; Shepherd & Sivarajasingam, 2005; Wilson & Sutton, 2003; Wilson & Wells, 2007), lower presentation rates to accident and emergency departments have been attributed to its use (Sivarajasingam et al., 2003).

Few studies have analysed specific offences in specific time frames and places following the implementation of CCTV. Place-based property offence prevention may be an effective use of CCTV particularly when combined with *Crime Prevention Through Environmental Design* (CPTED) principles and other interventions (Gill, Allen et al., 2005; Gill, Spriggs et al., 2005; Tilley, 1993; Wells et al., 2006; Welsh & Farrington, 2008), although spatial or temporal displacement of crime, as well as diffusion of benefits into surrounding areas need to be taken into account (Clarke & Weisburd, 1994; Skinns, 1998; Welsh & Farrington, 2009; Welsh et al., 2010). Findings suggesting displacement occurs, when it does, due to the choice-making decisions of motivated rational offenders in order to meet utilitarian needs (Piza et al., 2019).

The literature recommends that statistical and other information from the CCTV system is shared with police for intelligence purposes (Brown, 1995; Wells et al., 2006) and through a steering committee comprising police, service agencies, businesses and local councils for strategic purposes (Gill & Spriggs, 2005; Wilson, 2008). A number of papers have called for outcome measurement to be validated and for social and philosophical questions to be incorporated into evaluations of CCTV effectiveness (Taylor, 2010; Wilson, 2008; Piza et al., 2019). A survey of Australian local governments (Hulme et al., 2015a), suggested that there has been no slowing of the trend for rapid uptake of CCTV; staffing of continuously monitored CCTV systems may create a significant impost on local governments in Australia.

Recommended practices and results of the Cairns evaluation

Identified recommendations for CCTV operations are summarised in Table 10 below, along with a summary assessment of the compliance of the Cairns system with these guidelines. The key results of this evaluation as detailed in the right-hand column of Table 10 are explained in more detail below. As can be seen below, the Cairns system broadly meets recommended standards identified through the literature, with strengths in police and community involvement, monitoring room management, and real-time communication with agencies on the ground. There were major gaps in camera operator training and system evaluation.

Table 10.

Identified recommendations for CCTV operations.

Australian and International Operational Recommendations		**Evaluation of Cairns CCTV Operations**	
	<u>Context A. System Outcomes Clearly Defined</u>		
Recommendations identified in literature		**Council (CRC) Compliance**	**Explanation**
A1.	Clear and precise definitions targeting specific offences/injuries within the local context.	No	The aims and objectives of the system were loosely defined. Multiple similar incidents were described using different categories and different operators used categories differently.
A2.	Clarifying outcomes of the system for evidentiary purposes, perceptions of safety, offence and injury detection and prevention.	Partial	Evidentiary protocols with police were being formalised; community surveys on perceptions of safety were conducted quarterly. See also A1. Above.
A3.	Identify and document risk factors and processes to contextualise incident types.	No	There were no identified processes for this within the CRC system, although it

			was identified as a need to be addressed in future CCTV development.
A4.	Internal and external agreements and procedures for proactive and reactive use of information.	Yes	MOUs between CRC, CCLSA and QPS. CRC operations and policies in place.
A5.	Integrated, multi-agency approach to crime and injury prevention.	Yes	CRC hosts a number of co-ordinating groups which plan and act upon community safety issues.
A6.	Implement CCTV as a package of improved lighting & CPTED principles.	Yes	CPTED principles are a part of Councils planning strategies.

Context B. Police Involvement

Recommendations identified in literature		CRC Compliance	Explanation
B1.	Identifying role and capacity for police involvement with the system.	Partial	This was part of the planned future system expansion.
B2.	Identifying system utility for police purposes (evidence, perceptions of safety, detection, deterrence, and prevention).	Partial	More information sharing was planned.
B3.	Clearly communicating these aspects of utility to CCTV management, and camera operators.	Partial	See 2, 4 & 5 in Section A above.
B4.	Offence analysis prior to establishment and in conjunction with system evaluation.	No.	First four CCTV cameras were installed in 1997. These studies were the first evaluations undertaken.
B5.	Procedures agreed for ease of access to images for evidentiary purposes.	Yes	Procedures in place for this.
B6.	Regular real-time communication with control room, particularly during peak periods.	Yes	Monitoring room radio (one-way) to QPS, phone link to QPS Communications Room. Radio to venues and all security.
B7.	Live feed to police communications and dispatch.	Yes	Police can request changes to monitored spaces, and request operators to view time lapse footage.
B8.	Potential for police officer to be present in staff monitoring room during peak periods.	Yes	This occurs only when significant events are being held in or near the CBD.
B9.	Familiarisation visits and training in Monitoring Room processes.	Yes	This is currently being enhanced.
B10.	Establish processes to use CCTV system for proactive intelligence gathering.	Partial	Enhanced roles planned for dedicated liquor enforcement officers and future operations.
B11.	During system set-up, information on hotspots fed to CCTV manager.	Yes	Future system expansions will include this.

B12.	Formal recognition by police of arrests made due to camera operators work.	No	This is done on an informal basis by individual police officers.
B13.	Standard operating procedures covering communication and liaison between CCTV and police.	Yes	This is currently being further enhanced.
B14.	Participate in external independent evaluation and monitoring of processes and practices.	Partial	This is the first external evaluation.
B15.	Determining the appropriate level and priority of responses according to available resources and priorities.	Yes	Monitor operators were knowledgeable about the processes and protocols for this.

Context C. Monitor Room Staffing and Operations

Recommendations identified in literature		CRC Compliance	Explanation
C1.	Operator task analysis conducted (active searching, active monitoring, general surveillance).	Yes	Future evaluations designed to enhance performance on this component.
C2.	A structured, hierarchical management structure is required.	Yes	Recent improvement through the creation of a City-Safe Officer (CSO) role.
C3.	Established procedures and codes of practice.	Yes	Formal documentation of these is occurring.
C4.	Low camera to operator ratios.	Partial	Only 2 operators (during peak times) for 81 cameras, although many cameras captured the same area from different fields of view.
C5.	Effective real time communication links with external agencies.	Yes	Observations in monitoring room and in the street indicate that this is adequate.
C6.	Police present during peak periods.	Partial	This was a rare occurrence.

Context D. Camera Operator Training

Recommendations identified in literature		CRC Compliance	Explanation
D1.	Operator awareness of bias in surveillance.	No	Evidence observed of gender and cultural bias in reporting and recording.
D2.	Data entry and report generation.	No	No formal training – on the job.
D3.	Understanding of police operational requirements to minimise requests for police assistance.	No	No understanding of police or operational processes among camera operators. No training in this.
D4.	Monitoring strategies (active, routine patrolling etc).	No	No formal training – on the job.
D5.	Use and control of camera management systems, recording	Partial	Limited formal technical training– mostly on the job.

	systems and database report entry systems.		
D6.	Identification and prediction of potential events.	No	No formal training - on the job. Operators rely on experience and instinct. Training acknowledged as potentially useful by operators.
D7.	Familiarity with the local area and identified potential trouble spots.	Yes	No formal training – on the job. Previous security training and local knowledge learned on the job, over time.
D8.	Police policy and procedures relating to recording of information, exhibit handling and incident reporting.	No	Was being assessed by Council's Community Safety Officer.
D9.	Accountability (e.g. possibility of freedom of information requests), confidentiality and privacy requirements.	Partial	Currently being assessed by CRC Community Safety Officer. These requirements had been flagged with camera operators.
D10.	Emergency response agency (ambulance & fire) procedures.	No	No formal procedures
D11.	Mix of on-the-job and external, specialised training.	Partial	Currently most training is on the job, with camera and database training provided for certification prior to commencement in Monitoring Room.

Context E. Community Information Strategy & Strategic Communication Networks			
Recommendations identified in literature		**CRC Compliance**	**Explanation**
E1.	High visibility and distinctive signage.	Partial	Signage has deteriorated over the past few years.
E2.	Anonymised case studies through media of offenders prosecuted with the assistance of CCTV footage.	No	This has never been part of this system operation.
E3.	Surveys of usefulness and perceptions of safety.	Partial	Perceptions of safety surveys conducted quarterly by Council for five years.
E4.	Business direct phone link with Monitoring Room.	Yes	Researchers observed quick response to calls from businesses - assisting to maintain local confidence in utility of the system.
E5.	Regular consultation with crime prevention/community safety committees and stakeholders/ service agencies.	Yes	Council reports provided to committees. This process was being enhanced.
E6.	Education on system effectiveness to identified priority users of space.	Partial	End of year school celebrators educated about CCTV. Education of other groups was being considered in the planned system upgrade.
E7.	Link with local community crime prevention/safety committee.	Yes	Has always been a part of CCTV practice.

E8.	Representatives of special interest and specific community or service groups included.	Yes	Has always been a part of CCTV practice.
E9.	Regular communication of CCTV results to liquor accord, licensed venues and other businesses.	Yes	Has always been a part of CCTV practice.
E10.	Inform public of outcomes of systems.	No	Has never been done on a regular basis.

Context F. Real-time Communications with Agencies on the Ground			
Recommendations identified in literature		**CRC Compliance**	**Explanation**
F1.	Two-way radio link with Police.	No	Camera operators listened to police radio. There was a direct phone link with the Police Communications Room and the local beat.
F2.	Live video feed to Police Communications Room and local station.	Yes	Has always been a part of CCTV practice.
F3.	Direct phone link with Police Communications Room and local station.	Yes	Has always been a part of CCTV practice.
F4.	Two way radio contact with private security providing guardianship in and around venues.	Yes	Has always been a part of CCTV practice.

Context G. Referral and Outcome Recorded			
Recommendations identified in literature		**CRC Compliance**	**Explanation**
G1.	Substance misuse services or other public health or ambulance service outcomes recorded.	Partial	These are not systematically recorded, but currently recorded depending on individual camera operator.

Context H. Regular Internal Audit and External Evaluations			
Recommendations identified in literature		**CRC Compliance**	**Explanation**
H1.	Effectiveness in meeting outcomes, particularly highly defined offence/injury specific outcomes.	No	Neither internal audits nor external evaluations had previously been conducted. See also A 1 & 2 above.
H2.	Continuous process quality improvements.	Partial	Currently meet these standards.
H3.	Cost effectiveness and cost benefit analysis.	No	This analysis has never been conducted.
H4.	Technical and maintenance.	Yes	Is a part of CRC's good-practice.
H5.	Review displacement effects (spatial and temporal).	No	This has never been evaluated.

H6.	Perceptions of community safety.	Yes	Quarterly surveys are conducted every year.

Context I. Legislative & Regulatory Requirements Met			
	Recommendations identified in literature	**CRC Compliance**	**Explanation**
I1.	Complaints procedure in place.	Yes	Processes are in place for complaints management.
I2.	Code of practice and operating procedures drawn up to meet legislative requirements.	Yes	These are being enhanced as part of continuous quality improvement process.

Out of 61 assessed measures across 9 domains in Table 10, the Cairns system was assessed as partially meeting recommendations 13 times (21.3%), and not meeting identified recommendations 10 times (16.4%). The Cairns system met recommended practices identified in the literature in 38 areas (62.3%). In terms of professional management and operation, real-time and strategic communication with police and other stakeholders, CRC's CCTV system performed well. Clearer definitions of system aims and outcomes, as well as improved training for camera room operators, regular internal audits and external evaluations to improve practice were identified as crucial. For improvement, more strategic consultation with stakeholders, monitoring operator activities to maintain standards of ethics and privacy protection, and education of the community regarding the capabilities and goals of the system were all recommended. Each of these domains are explored in more detail below.

A. System outcomes should be clearly defined.

CCTV operations in Cairns required more precisely defined outcomes. CCTV systems should be implemented as a package of complementary measures involving both the managing agency and other stakeholders (see for example Brown, 1995; Attorney General's Department, 2006; Hulme et al., 2015; Piza et al., 2019). Clearly defined key objectives are essential (see for example Gill & Spriggs, 2005; Gill et al, 2005c; Wilson, 2008; Wells et al., 2006). These need to be significant for, and relevant to, the local context (AIC, 2004; Anderson & McAtamney, 2011; Taylor, 2010). Internal and external agreements should be implemented to support community action projects (see for example Brown, 1995; Attorney General's Department, 2006). Clarifying system capacities and articulating limitations for generating evidence for criminal prosecutions is recommended in the literature (Brown, 1995; AIC, 2009; Piza et al., 2019).

There are Memoranda of Understanding (MOUs) in place with the inner-city Liquor Accord, the CCLSA. A MOU with the QPS addressed police access to CCTV footage, although clearer protocols for QPS to

access this as evidence were required. As previously reported, Cairns Council hosted several co-ordinating groups which were informed by regular reports from the CCTV data. During Study 4, Council management stated that use of the system had been focused on enforcement with almost no focus on prevention (this is in contrast with the findings of Study 1; see also Study 5 below). Council used CPTED principles in its planning for CCTV expansions and lighting upgrades in the city centre, and after the initial installation of the system had increasingly used crime statistics to inform camera placement. A more systematic approach was needed to categorise and report offence types or injury types. For example, camera room operators used the descriptor 'medical assist' to describe a range of injury types and offences linked with these injuries, without the requirement for a more detailed description. Different operators also used the available categories in different ways. A standardised system of describing and categorising incident types, and training in this, may improve operators' data recording practice. Recording details of any precursors leading up to an incident may be beneficial. Analysis of these factors may assist to uncover patterns to inform prevention efforts.

B. Police involvement.

CCTV practice in Cairns was strong in this domain and enhancements were being explored. Police have been stationed in the monitoring room during special operations. Refinement of existing protocols to provide footage and intelligence to police were scheduled. However, CCTV data is not used routinely for intelligence purposes. Relationships between CCTV operators and police were sound with considerable scope for enhanced collaboration. For example, identifying the role and capacity of the system to provide intelligence as well as information for evidentiary purposes is recommended (see for example Keval, 2006; QSGA, 2010; Wells et al., 2006). Police tacticians and intelligence officers, as well as liquor enforcement officers, would benefit from regular aggregate level data reports from CCTV systems (Brown, 1995). Regular placement of police officers in these roles in the monitoring room during peak activity periods may enhance operations for both parties (Keval, 2006; Gill & Spriggs, 2005; Gill et al., 2005a). Refined protocols for providing information to police would improve practice (see Gill & Spriggs, 2005). Involving CCTV management in community steering committees is also desirable for successful planning and outcomes of the system (see for example AIC, 2004; AIC, 2006; Welsh & Farrington, 2008; Huey, 2010).

The literature suggests that ongoing formalised workshops between council and police management be conducted to enhance relationships and improve communication (Brown, 1995; Hulme et al., 2015). It is recommended these be conducted separately to the existing processes associated with liquor accords or other community safety partnerships. The focus could be on enhancing real-time communication between the camera room and police on the ground in order to improve speed of

deployment for the physical response. Some studies (e.g. Gill et al., 2005b), suggested that both Council and police consider methods to quantify and measure any changes in the response time and feed information on these changes back to their partner organisation. Formalisation of police management procedures to acknowledge the support provided to them in their operations by camera operators was recommended in several studies (e.g. Brown, 1995; Hulme et al., 2015). Camera operator motivation to detect and respond to assault incidents, and on the utility of footage provided to police was either harmed (Hulme et al., 2015; Piza, Caplan & Kennedy, 2017), or maintained due to effective police response (Wells & Wilson, 2006). See pages 146 to 156 in Chapter 9 for elaboration on these points).

CCTV incident data can gather quantitative and contextual data on hotspots of assault or other incidents (Piza, et al., 2015). Sharing of this data about assaults and public disorder offences and incidents, can inform decisions which more efficiently channel resources, both in real-time and for intelligence-led policing and community crime prevention partnerships. In Cairns, the possibility of formalised workshops between Council CCTV management and police regarding the sharing of aggregate level, de-identified crime hotspots and trends could be further explored. More broadly, this could occur in NTEs with active monitoring of cameras. These conversations should canvass what type of information can be shared, and the forms in which this needs to be communicated. Ideally, ED management from the local hospital, civil liberties representatives and representatives of people using the space, as well as relevant non-government agencies would be involved in these conversations.

C. Camera room staff and operations.

A structured hierarchical management system to co-ordinate the different levels of communication, and to analyse performance of the different aspects of the system is recommended (see for example Gill & Spriggs, 2005; Gill et al., 2005c; Keval & Sasse, 2008). Training of operators is vital to their competencies (Wilson & Wells, 2007), as well as the integrity of the data. There is a growing literature on monitoring-room ergonomics, analysis of operator tasks and other monitoring room processes, as well as broader social considerations regarding CCTV (Keval & Sasse, 2006; Gill & Spriggs, 2005). Piza et al. (2019) explored this is some detail, and found that while this domain is closely related to the overall effectiveness of CCTV systems, research has separated operator functions from CCTV crime prevention outcomes. They linked operator activity to a number of outcomes, including arrests in response to CCTV detections, crimes reported to police by CCTV operators, and intelligence or evidence captured by the system. While that study reported on operator activity and its impact on

crime; procedures, polices and other management functions set the scene and provide the framework for this activity.

CCTV in Cairns generally meets recommendations in this component. A new management position overseeing CCTV operations and functions had been created in Cairns Regional Council within a few months prior to this study being undertaken. The monitoring room was a comfortable working space, with a low operator-to-screen ratio (1:8 during peak times), and a manageable operator-to-camera ratio. Camera footage can be directly patched to local police stations at the request of either police or camera operators. Camera operators' awareness of the integration of the CCTV system into community partnerships is important, as is accurate definition and measurement of the system's aims. All the camera operators were male. Data entry and report generation were observed to be generally satisfactory, and the use of the CCTV system for active surveillance and general monitoring strategies appeared to be performed at a high level of competency.

Operator biases in surveillance and written reports were found in the Cairns system; different approaches to observation and reporting were often taken by camera operators to different cultural groups, and males and females. The finding is not unusual in the literature (see Piza et al., 2019), although proactive targeted surveillance in Cairns did not appear to be age-related. This may have been a function of the research design, which focused on NTE activity with most patrons observed being of a similar age. Piza et al. (2019) note that operator activity is impacted by lack of motivation, high camera-to-operator ratios, lack of formal training, and operators being required to perform tasks unrelated to proactive monitoring. Study 4 found high motivation among operators, and a low level of tasking unrelated to monitoring of cameras. The complex range of tasks that operators perform includes surveillance and active monitoring, administration and self-reflection to monitor their own objectivity while applying partner agencies' policies and procedures (Norris & Armstrong, 1998; Wilson & Wells, 2007). Operators are often required to perform multiple tasks under pressure at peak periods (for example see Keval & Sasse, 2006; Wilson & Wells, 2007; Gill et al., 2005b). Awareness of legislative requirements and a good knowledge of the local social context are also recommended (for example see Wilson, 2008; Taylor, 2010).

It is recommended that local government councils which conduct real-time monitoring consider expanding the number of cameras and screens to a degree that accords with the number of operators available to monitor the screens (Hulme, et al., 2015; Piza et al., 2019). Councils which conduct real-time monitoring could consider scheduling regular team meetings which involve all camera operators and managers of the system. This has resource and rostering implications but will assist in ensuring camera operators categorise incidents of concern and understand and follow protocols and codes of practice in consistent ways.

D. Camera operator training.

This was the poorest aspect of the Cairns system. Training in all aspects of the system was "on-the-job" and *ad hoc*. Camera operators require a specific security licence, but were essentially left to train and inform themselves. The 'on-the-job training' and concurrent lack of formal training for CCTV operators in Cairns is, however, consistent with reports in other studies, including Australia (Gill, Spriggs, Allen, Hemming, et al., 2005; Gill, Spriggs, Argomaniz, et al., 2005; Taylor, 2010; Wilson & Sutton, 2004; Wilson & Wells, 2007). A reliance on 'on-the-job training' alone is not seen as good practice (see for example Gill et al., 2005b; Wells et al., 2006, Keval & Sasse, 2010).

E. Community information strategy & strategic communication networks.

High visibility, distinctive signage is recommended to raise awareness among users of the space of the system's existence (Attorney General's Department, 2006; QSGA, 2010), as well as formation of a CCTV steering committee comprising business and community safety and crime prevention practitioners, and community advocates (Gill et al.,2005a; Welsh & Farrington, 2008). Case studies of successful prosecutions in the media (Brown, 1995), community surveys of CCTV usefulness and reporting back on the perceptions of the users of the space are also recommended (Wilson, 2008). Street signage painted on the footpath accompanied the initial implementation of CCTV in Cairns in 1995, with the last update prior to the study in 2006. All camera operators identified renewal of signage as an efficient, cost-effective way to enhance system effectiveness. Engagement with stakeholders and education about the system's technical capabilities commenced soon after conclusion of the study. For example, in 2010 system capacities were demonstrated to 250 final year school students in the lead-up to traditional celebrations by high school graduates. Perceptions of safety surveys have been conducted by CRC for five years, but with no focus on informing the public or seeking peoples' views on the CCTV system. Internal governance processes across organisational units in local councils could be reviewed to maximise the use of hotspot and crime trend information contained within CCTV incident databases. For example, the CCTV system is sometimes managed by information and communication technology units of Councils, or property and facilities management functions (Hulme et al., 2015). Some CCTV systems within community safety/crime prevention units of council had networks with non-government partners in the community who could use this information for project design and evaluation (Hulme et al., 2015; Morgan & McAtamney, 2011).

E. Real-time communication networks.

Direct phone links and radio contact with police communications and dispatch rooms (e.g. Piza et al., 2014), and with street and venue security are recognised as good practice, as is the ability to provide a live video feed to police (for example see Wilson, 2008). CCTV in Cairns performed very well on this component. During observational sessions (28 hours) resource deployment as a direct result of the system's real-time communication capabilities was observed on 83 occasions (see Study 5 below for elaboration). These included arrests, the interruption of violent incidents and facilitating security presence in anticipation of violence. For example: at approximately 8pm on a Saturday, security at a licensed venue had radioed through a description of a man suspected of selling drugs in the venue's toilets. At approximately 12.15am, one of the camera operators saw a man fitting the description on the street, and dispatched the relevant security officer to the man's location by radio. Security confirmed it was the suspect and radioed police. Police took up with the man, and during questioning, he tried to escape. He was detained, searched and arrested.

F. Referral and outcome recorded.

Recommendations to document outcomes of interactions between patrons of, and services in, NTE precincts have been made (Huey, 2010; Marx, 2002). This is partly met in Cairns. Categories of outcomes recorded by operators such as 'person moved on', or 'offender arrested', appeared to be thoroughly recorded, but the outcomes of other interactions of patrons with police or other service delivery agencies were not well-documented. Aggregated data describing outcomes could be shared with non-government and government agencies to inform resource allocation and other operations (see also A3, A4 & A5 in Table 10 above).

G. Regular internal audit and external evaluations.

Internal performance audits and external evaluations are repeatedly recommended in the literature (for example, see Piza et al, 2019). Clearer definition of system outcomes, and better measurement of whether the system is meeting these outcomes are also stressed as evaluation criteria (Welsh & Farrington, 2008; Wilson & Sutton, 2003). Continuous improvement in monitoring room practices are suggested (Gill & Spriggs, 2005; Keval & Sasse, 2010, Piza et al., 2019). The Cairns system only met this recommendation through commencement of the current study. Some studies have recommended that evaluations include psychological and sociological effects on a community population living with open-space CCTV systems (Fopp, 2002; Hier, 2004; Huey, 2010; Taylor, 2010), as well as evaluating operational processes and each CCTV system's impact on crime specific offence figures (Wells et al., 2006; Welsh & Farrington, 2008).

H. Legislative and regulatory requirements met.

Different jurisdictions have different privacy and evidentiary requirements, as well as regulations governing the accreditation of camera operators, access to footage, complaints procedures and dispute resolution. Codes of practice and operating procedures should be drawn up for each system to meet these requirements (Gill & Spriggs, 2005; Attorney General's Department, 2006a, 2006b). While this evaluation did not specifically measure the performance of the Cairns open-space CCTV system on this dimension, a code of practice and operating procedures exist, and system management reported these were being refined using a continuous quality improvement approach.

Conclusions

This section reported on the development of a good-practice CCTV operational guide, as well as having evaluated the performance of the Cairns system against it. No published evaluations of CCTV were found applying the approach used in this evaluation. The study also attempted to retrospectively apply the realist approach in relation to system operations, providing an initial iteration of operational contexts within a context/mechanism/outcome configuration. This is discussed further in Chapter 9, on pages 146 to 156.

Generally, the Cairns CCTV system met recommended operational guidelines, but improvements were possible. In terms of professional management and operation, real-time and strategic communication with police and other stakeholders, CRC's CCTV system performed well. Clearer definitions of system aims and outcomes, as well as improved training for camera room operators, regular internal audits and external evaluations to improve practice were identified as crucial. For improvement, more strategic consultation with stakeholders, monitoring operator activities to maintain standards of ethics and privacy protection, and education of the community regarding the capabilities and goals of the system were all recommended.

Each of the nine *Recommended Practice Elements* (headings A to I in Table 10, pp. 120-125), can be seen as clusters of related operational concepts. In this initial attempt to retrospectively apply Realist principles, each may be considered a Realist Context, or a set of salient aspects of relevant Contexts. Further thinking about mechanisms in each domain may yield insights (see pages 146 and 147, Chapter 9 below). One of the CCTV *context/mechanism/outcome* configurations originally identified by Tilley (1993), included the real-time deployment of security staff or police officers to areas where the behaviour of interest was occurring. This resulted in the crime incidents being interrupted, offenders

being stopped, and their criminal behaviour disabled (see also Brown, 1995). As described earlier, CCTV systems which incorporate real-time communication links between camera room operators and security on-the-ground may limit injuries resulting from assault in NTEs through limiting the duration of the assault and the number of blows inflicted or exchanged (Sivarajasingam et al., 2003). The next chapter describes a study which aimed to explore how this might occur in the Cairns NTE (Pointing, Hayes-Jonkers, Bohanna & Clough, 2012).

8.3 Study 5: CCTV ARA prevention through deployment of private security

As noted above, operational practices in open-space CCTV camera rooms have been identified as critical for promptly detecting antisocial behaviour and violence, and is a growing area of research (Piza et al., 2019). The results for Study 3 found that of all recorded assault incidents, camera operators saw them first nearly one third of the time (31.3%). Further, ethnographic research suggests violence in Australian NTEs is a staged process (Barker, 2010) and that observers of CCTV footage can differentiate between behavioural sequences ending in violence and matched sequences which do not (Troscianko et al., 2004). The literature examined in Chapters 2-4, Study 4 above, as well as the results of Study 1 (detailed in Chapter 6), each highlighted the importance of the real-time communication links between camera operators and agents able to provide physical, on-site security presence at the time of an incident. Three operational parameters in the Cairns NTE through which this intervention may work were identified:

1. Two-way radio contact with private security providing guardianship in and around venues,
2. Live video feed to Police Communications Room and local station,
3. Direct phone link with Police Communications Room and local station.

These three channels of communication had been in operation in the Cairns NTE for over ten years (see Chapter 6). Study 5 examined the interruption of assault incidents by physical on-site responses as directed to all assaults seen by CCTV camera operators over a total of 22 days. Footage of 30 assault incidents and operator records relating to these incidents were assessed and semi-structured discussions were conducted by two researchers with camera room operators during the assessment period. Selected case studies below are drawn from observational sessions in the Cairns CCTV monitoring room and analysis of footage pertaining to assault incidents in the Cairns NTE illustrate processes involved. The potential for further reductions and recommended strategies to achieve this are discussed.

Summary of camera room observations:

Peak incident periods demanded quick, efficient multi-tasking by camera operators, combined with acute situational awareness and high-level observation skills. Case Study 1 is an example of such skills. Camera operators all reported they were trained 'on the job', and relied on personal experience and intuition. The categorisation of incidents, including *assault* is applied by each operator according to their own interpretation, with no protocols in place to guide the decision. The decision to observe an incident was initiated spontaneously by camera operators in 53% of the incidents, with 47% of observations initiated by after an incident occurred by requests from police, venue security and other external agencies. The outcome of external agencies attendance at an incident was not consistently recorded by camera operators within the SIMS.

Security Incident Management System database:

A total of 169 incidents were logged on the SIMS for the 22 day period. Of these incidents, camera operators logged 30 unique assaults. Eighteen of the 30 assaults (60%) occurred at night between midnight Friday and 6am Sunday, with a further four (13%) occurring during daylight over the same period. Almost all assaults (93%) were male on male. Six of the incidents (20%) escalated to involve three or more males prior to the arrival of security. The assault incidents were categorised as follows:

Category A: There were thirteen (43%) assault incidents recorded that happened too quickly for camera operators to direct street security to intervene. These incidents ended quickly with no time for any direct action to be taken by security. Case Study 1 in *Text Box 1* illustrates Category A and highlights the potential for a skilled operator, knowledgeable about the local context, to initiate actions based on minimal environmental cues.

Category B: In 12 incidents (40%) camera operators alerted street security who then intervened to curtail the violence or prevent its escalation (e.g. Case Study 2 in *Text Box 1*). In three of these incidents there was potential to direct street security to the scene prior to the assault occurring, potentially preventing the incident. In Case Study 2 the assault occurred out of the range of view of street security and would probably have continued without the arrival of street security, who were alerted by the camera operators. Security arrived within two minutes of being alerted by camera operators. Approximately five minutes elapsed between the initial identification of a potential ARA situation in the camera room and the arrival of street security, with confirmation of the initial assessment of potential danger by camera operators taking three minutes.

Category C: In a further five incidents (17%) there was potential to intervene to prevent the initiation of violence. Combined with the three similar incidents in Category B, which were judged as preventable and where street security intervened after violence was initiated, 27% of assault incidents could have been prevented through improved surveillance and response. In Case Study 3 (*Text Box 1*), although street security were not alerted by the camera operators, they arrived less than one minute after the assault commenced, indicating that prevention may be possible.

Text Box 1

Case study 1

At approximately 7.15pm on Thursday night during an observational session, a camera zoomed in on a small gathering of people who were partly obscured by a traffic sign. The lighting was poor, but the scene was in the vicinity of a known violence hotspot. The camera observed the beginning of a scuffle in which a person was knocked to the ground. Street security officers were nearby and arrived before the Camera Room could alert them by radio. When asked why the camera had zoomed in on the obscure, poorly lit area where nothing was happening, the operator replied that he had seen "a flash of movement".

Case study 2

At 4.15am on Saturday morning during routine scans of identified violence hotspots, camera operators noticed two bare-chested men (A and B) talking with a third man (C). A and B had adopted aggressive postures and were gesticulating at C. A and B walked away then returned, continuing to shout and gesticulate. This period took approximately three minutes. A then ran toward C, aiming a flying kick at him. B also ran toward C. The camera operator alerted street security via radio. There was an exchange of glancing blows between the three men; B and C then fell to the ground at the roadside and wrestled. At this point, three street security officers and two venue security staff (from a venue 300 metres away) arrived and separated the scuffling men. The arrival of street and venue security took less than two minutes from the first kick. Security restrained A on the ground and verbally detained B with minimal physical contact until police arrived less than five minutes later. C waited a number of metres away during this time then spoke with police. The footage ended.

This hotspot is 200 metres from the general gathering point for contracted street security. It is unknown whether street security were at the gathering point or attending another incident in the

area. The street corner where the scuffling men fell lies on a main traffic route through the NTE. Discussion of the incident with the camera operators revealed their opinion that "anything could have happened" had security not intervened. Operators suggested examples such as: the men falling on the cement kerbing and striking their head; those involved being hit by a passing car; or continued kicking that may have resulted in serious injury.

Case Study 3.

At 2.45am on Sunday morning, a female and male couple were waiting at the counter in an open-front, late night takeaway food shop. Another male left a group of three other men and approached the couple. They exchanged words and the male from the group appeared to become more aggressive in his posture and verbal behaviour for approximately 90 seconds. The male and female couple disengaged and turned back to the counter while the male from the group continued to confront them. Approximately three minutes later the male from the group punched the male from the couple in the face. Street security arrived less than one minute later and calmed the situation. It appeared neither of the couple wished to involve police or other agencies. The group of males left the scene.

Proximity of the incident to the main gathering point for security (80 metres) and from the nearest licensed late night venue (200 metres), suggests opportunities for possible intervention during the four minute period prior to the punch being thrown, in which the situation appeared to the candidate to be escalating.

Discussion

Direct effects of the CCTV system in reducing the impacts of violent incidents in the NTE were observed. In 22 days, 30 assaults were logged by the CCTV system in the Cairns NTE. Injury consequences for those involved in the assault were limited by system intervention in 40% of these incidents. Over the same period, intervention by security could have prevented 27% of all assaults. Extrapolation from this study sample suggests that if assault rates and system intervention were consistent across 2010, there may have been approximately 500 assaults, with injury consequences contained in 40%, or approximately 200 of these incidents. Around 135 assaults (27% of 500) could potentially have been prevented. Although 43%, or around 215 assaults, may have happened too quickly for intervention, these findings suggest the CCTV system contributes to limiting number of NTE ARAs, and injuries as a consequence of assault in the NTE. The current study expands previous research suggesting the interruption of assault incidents by police limits the duration of incidents and

therefore the number of blows in each assault, limiting the injuries sustained (Sivarajasingam et al., 2003). The presence of the CCTV system in Cairns NTE may make it more likely that a physical security presence will attend any specific ARA incident, but each assault may not be recorded as this often depends on a person involved laying a complaint with police.

The deployment processes found in this study support results regarding police directed by camera operators in metropolitan United Kingdom and the United States (Sivarajasingam et al., 2003; Piza et al., 2017). Studies examining the role of private security in this capacity were not found, although studies have described the importance of camera operators deploying private security in other contexts (e.g. Norris & McCahill, 2006). The findings regarding police dispatch to interrupt assaults (Sivarajasingam et al., 2003; Piza et al., 2016) seemingly conflict with one Swedish study into alcohol-related disorder in an NTE (Gerrell, 2016). That study found mixed results from CCTV systems where police monitored cameras and directed other police to assaults in an NTE (Gerrell, 2016). Systematic reviews (e.g. Piza et al., 2019; Alexandrie, 2017) have often attributed these mixed findings to factors in ecological contexts, including national differences in policy and culture. However, camera operator knowledge and understanding of the physical environment, and behavioural flow and context of an NTE has been found to be important to their ability to notice and accurately categorise an actual or potential crime (e.g. Donald, 2019; Howard, Troscianko, Gilchrist, et al., 2013; Piza et al., 2017; Piza et al., 2017). While details of the length of experience or training of police camera operators were not reported by Gerrell (2016), this interpretation is supported. Trained CCTV operators showed greater consistency in understanding locational and behavioural contexts and greater consistency in judgements about the suspiciousness of behaviour than untrained observers (Donald, 2019). The mechanism through which this occurs has been suggested as increased understanding in knowing what to look for (Howard et al., 2013). Reframing these empirical findings through a Realist Evaluation lens suggest the possible explanation that police, untrained or superficially trained in the technological aspects of CCTV systems, and with little experience in this operational context and knowledge of the local NTE ecology, were less effective than specialised CCTV operators (see Donald, 2019). Indeed, the longer the Swedish intervention proceeded, the fewer assaults were recorded (Gerrell, 2016 p.192). Again, reporting of assault may have influenced these results, with Gerrell (2016) providing no commentary on whether police could record these offences independent of victim reports.

Australian research (Barker, 2010) suggests most assaults in NTEs involve a four-stage process:

1. victim selection (the victim must be appropriate),
2. baiting (or the interview, e.g. “what are you looking at?”),
3. violence and

4. aftermath.

Case Studies 2 and 3 exemplify the potential for camera operators to detect an imminent assault and also illustrate the progression of each incident through the first three stages. The victim selection and baiting stages took a total of approximately three to four minutes. The arrival of security or police on the scene during the victim selection or baiting stages may prevent initiation of any violence. Training to enhance camera operators' awareness of critical behavioural cues during the victim selection and baiting stages may enhance responsiveness and reduce the time taken for security to arrive at the assault location. Future research testing this premise is recommended. Councils which conduct real-time monitoring consider implementing a system which measures if an incident is first seen by a camera operator, and the time taken from when an operator first detects an incident until the arrival on scene of police or other agency (in cases where that agency has been notified by the camera operator).

This study identified a range of outcomes which are important to this dimension of CCTV operation. These are nested below a measure of CCTV effectiveness which is often used, that of "number of incidents". These outcomes were focused mainly on the performance of the CCTV camera operators and correlated with some of the areas of evaluation that had been previously documented in the literature, including analysing the proportion of active monitoring by camera operators (Norris & Armstrong, 1999; Norris & Wilson, 2005; Wilson, 2005, Piza et al., 2019), and the factors which have an impact on the attention of camera operators (Donald & Donald, 2008; Piza et al., 2019), as well as other factors that influence their ability to notice an incident while it occurs, or the precursor behaviours in the lead up to the incident (Gill, Spriggs, Allen, Hemming, et al., 2005; Keval & Sasse, 2008; Norris & Wilson, 2005; Troscianko et al., 2004). Other outcomes of relevance related to the real time communications, particularly around shared language and operational protocols between police and private security (Golsby, 1998; Prenzler, Earle & Sarre, 2009), legal powers of private security (Prenzler, Sarre & Earle, 2008) and coalition approaches to prevention (Jones 2006; Treno & Holder, 1997; Zedner, 2007). Each of these has an impact on effective dispatch of physical interventions on the scene of an assault.

Study 5 reported on a specific type of CCTV intervention; the real-time dispatch of a physical presence to the scene of an assault with the aim of disrupting the incident. This type of intervention had been identified through the qualitative study reported in Chapter 7, as well as in the literature. The study led to the identification or refinement of a number of outcomes that are important to the efficacy of this intervention type: specifically, the ability of operators to detect an incident, the efficiency of real-time communication and dispatch processes, and the time taken by the security officers to reach the site of

an incident. Each of these outcomes relies on a set of mechanisms operating within the relevant contexts, as defined by Pawson and Tilley (1997). For example, the ability of camera operators to detect assault incidents depends on their individual psychological and cognitive processes (Donald & Donald, 2008), and the operational procedures and management of the CCTV control room (Gill, Spriggs, Allen, Hemming, et al., 2005; Norris & Armstrong, 1999; Norris & Wilson, 2005; Wilson, 2005).

8.4 Study 6: Realist Evaluation study into CCTV camera operator data accuracy

Section 8.4 reports the results of Study 6, which was prompted by the quality of data provided by the camera operators for the monitoring tool. As described in Chapter 7, Section 3, pages 111 to 112, the results for Study 3 found that between 64% and 100% of incident reports that recorded an incident as an assault, were correctly categorised by camera operators. Study 6 aimed to measure changes to the quality of SIMS data that was triggered by the camera operator awareness that the quality of this data was to be evaluated. This study was the first study in this thesis designed according to Realist principles. The initial hypothesis was *awareness among camera operators that the accuracy of their data was about to be audited would lead to an improvement in data accuracy*. The CMO configuration was postulated as follows:

- The salient aspect of the Context was *Camera room staff and operations*. There were no changes to camera operator personnel (n=6), or operational procedures between the two data collection periods,
- The Outcome to be analysed was the accuracy of information contained within incident reports in the SIMS,
- The Mechanisms would be those triggered through the communication to camera operators that the accuracy of the data each of them entered into the SIMS incident report was to be audited.

For Study 6, the baseline sample comprised 69 SIMS incident reports and associated footage randomly selected from reports completed over ten days, between Friday, 20 August, and Monday 30 August 2010 with the exception of Friday, 27 August when data was not made available for evaluation. Despite questioning of operators and management it is unknown why reports for this day were unavailable. The accuracy of each SIMS record was assessed on three dimensions.

Accuracy of Incident Categorisation

An assessment was made by two researchers as to whether the categorisation of the incident accurately reflected the footage of the incident. This was coarsely categorised as either *Accurate, Approximate*, or *Inaccurate* (see Chapter 4, Section 8, p.64). There were statistically significant

improvements in each dimension of data accuracy of the SIMS incident reports following the intervention. Accurate categorisation of *Incident Type* by camera operators improved substantially between the two data points, (see Table 11). Incidents assessed as *Accurate* increased by approximately 13%. Incidents assessed as *Inaccurate* decreased by nearly 10%, and the *Approximate* category (with 80% correct fields ticked), also increased.

Table 11.

Change in categorisation of Incident Type by camera operators, baseline and follow-up.

Incident Categorisation	September No. (%)	January No. (%)
Accurate	34 (49.2%)	62 (62%)
Approximate	22 (31.9%)	29 (29%)
Inaccurate	13 (18.9%)	9 (9%)
Total	69 (100%)	100 (100%)

Accuracy of descriptive information

The accuracy of descriptive information contained within the free-text *Notes* field was compared to the footage (on a six-point Likert scale; see p.64). The accuracy of data entered by camera operators into the *Notes* field improved: see Table 12 on page 140 below. The range that included "relevant detail," and above (4, 5 & 6), improved from 68.1% (47/69), to 94% (94/100). Records categorised as less accurate (range 1 - 3 range) decreased from 31.9% to 6% (22/69 to 6/100).

Internal Consistency

The *Internal Consistency* between the information contained in the free-text *Notes* field and the other five main information fields in each SIMS record was rated on a 1 out of 5 ratio (see Chapter 4, p.64). If details or ecological information about each incident was recorded in the *Notes* field, the other 5 fields should have also contained information. *Internal Consistency* improved considerably between September and January (see Table 13, below). The data accuracy range, "4 of 5 categories accurately recorded", and above, improved from 34.8% to 81% (24/69 to 81/100); the data accuracy range, "3 of 5 categories inaccurately recorded", and below, reduced from 65.2% (45/69), to 19% (19/100).

Table 12.

Accuracy of descriptive information in the Notes Field; baseline and follow-up

Rating	September	January
1 (No footage of the logged incident)	6	2
2 (Inaccurate or meaningless)	7	0
3 (Notes do not provide significant relevant details)	9	4
4 (Provide relevant detail)	10	28
5 (Concise and accurate: includes notes on initiating request)	22	39
6 (Concise and accurate: includes notes on initiating request and action taken by responding agency)	15	27
Total	**69**	**100**

Table 13.

Internal Consistency of SIMS Report; baseline and follow-up

Rating	September	January
0 of 5	0	0
1 of 5	2	0
2 of 5	11	2
3 of 5	32	17
4 of 5	14	21
5 of 5	10	60
Total	69	100

Overall

This section reported an exploratory case study evaluation, focusing on theory formation and development (Pawson & Tilley, 1997). This initial CMO configuration was sufficient to postulate research directions through which to identify and refine Mechanisms for intervention, and the subsequent formulation of a testable hypothesis which can be replicated in approximately similar contexts. There may be scope to transfer this method to other aspects of the CCTV camera operator training.

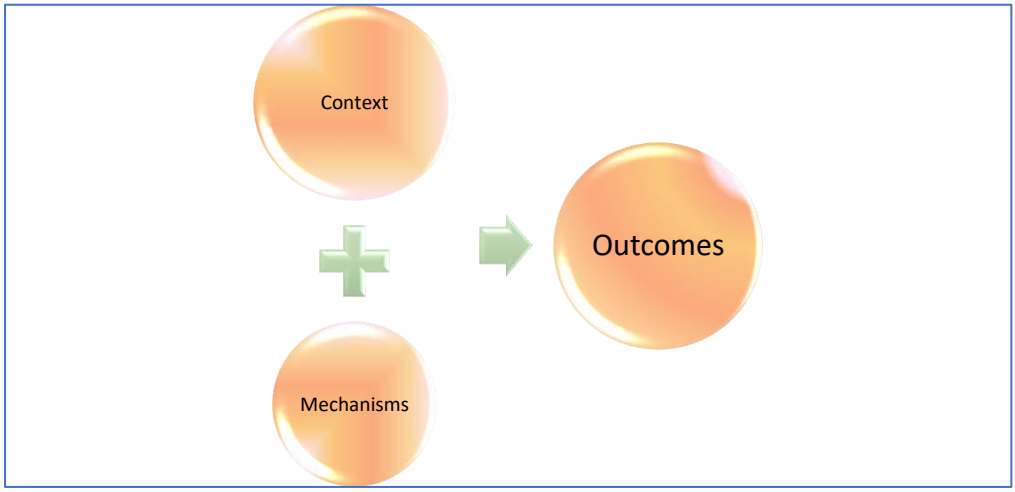
Study 6 was an initial attempt to begin to refine and isolate CMO configurations in one small range of CCTV efficacy. The initial realist hypothesis was that *awareness among camera operators that the accuracy of their data was about to be audited would lead to an increase in data accuracy*. The

Outcome measured through this study was the accuracy of information contained within incident reports in the SIMS. Three sub-outcomes were used to triangulate the overall accuracy of this information. The empirical results suggest tentative confirmation of the initial realist hypothesis: *awareness among camera operators that the accuracy of their data was about to be audited would lead to an increase in data accuracy.*

The Outcome was the accuracy of information entered by the camera operators entered into the incident reports in the SIMS. The accuracy of data contained within each of the three sub-outcomes used as measurements improved substantially. The overarching Context defined for Study 6 was *Camera room staff and operations*. Staff members, operational practices, and management structures and practice remained unchanged between baseline and follow-up as far as could be ascertained through informal interviews and observations. The intervention which varied the Mechanism was the *communication* to camera operators that the accuracy of the data that each of them entered into a SIMS incident report was to be audited. A classic realist statement is: outcome equals context plus mechanism. Figure 16 below displays the statement in diagrammatic form. Figure 17 on page 142 illustrates Study 6 in this form.

Figure 16:

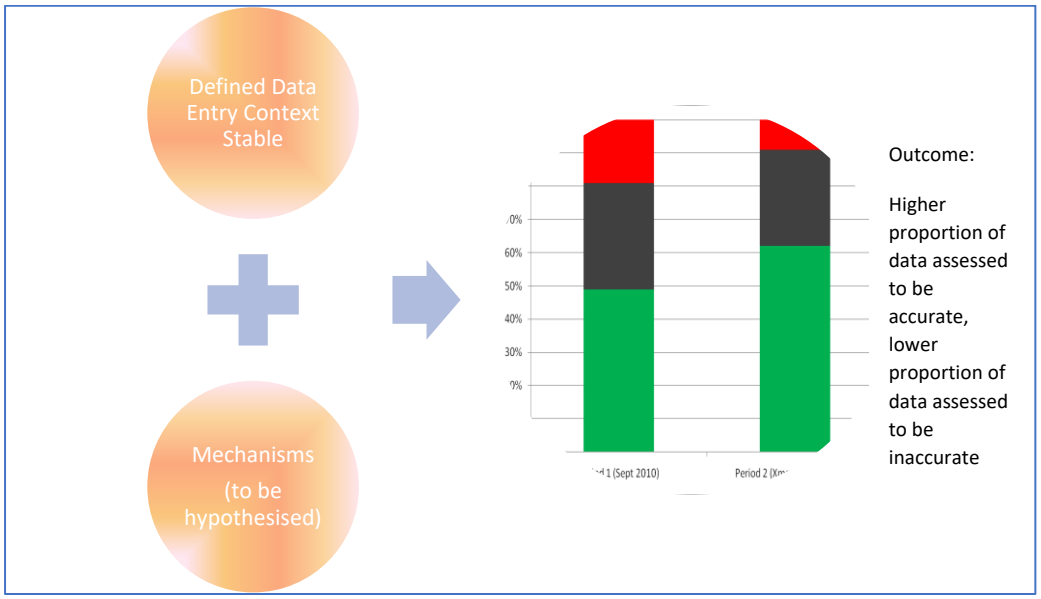
Graphical representation of CMO configuration



The outcome was the reported results: *Accuracy of Incident Categorisation.* The Context was *Camera room staff and operations*. The mechanisms through which the intervention caused the outcome are yet to be hypothesised. However, studies in organisational management and human resource

Figure 17:

Graphical representation of CMO configuration for Study 6.



literature (e.g. Arthur, Bennet, Edens et al., 2003) suggest the mechanism may fall within what is known as 'behavioural criteria', where performance is affected by the task-related environment in which one works. At this point it can be speculated that one mechanism may inhere in operators' reasoning that they should intensify their efforts to more closely precisely describe incidents within the report. The unexplained disappearance for data for Friday the 27th of August is consistent with this interpretation as it suggests operators made their own judgements about their performance for that day and decided to provide a nullity for the evaluators. It is unlikely this interpretation could be validated, as questioning at the time received stonewalling on the reasons for the absence of the data.

Study 1 showed that the SIMS data was used to generate aggregate level reports of crime and other incidents, which are then supplied to Police and other stakeholders to design and implement crime-prevention programs. The accuracy of each SIMS report thus has an impact on analysing offence patterns, and the resultant allocation of scarce crime prevention resources. Studies 2 and 3 above suggested the importance of accurate data capture on assault incidents within the SIMS.

8.5 Summary

This chapter reports a case study into aspects of CCTV evaluation that each have an impact on the number of NTE ARAs recorded in Study 3. The chapter also reports on attempts to retrospectively apply realist evaluation principles to these aspects of CCTV evaluation, and then design a realist evaluation study into CCTV. Study 4 mapped good CCTV operational practices identified in the extant

literature, and compared the performance of the Cairns NTE CCTV system against these. Study 4 also started the initial attempt to begin coarsely defining Realist contexts for NTE CCTV as an intervention. Each of the nine *Recommended Practice Elements* (headings A to I in Table 10, pages 120-125), are clusters of related operational concepts. In this initial attempt to retrospectively apply Realist principles, each may be considered a Realist Context, or a set of salient aspects of relevant Contexts. Limited attention was paid to mechanisms and outcomes, nor to these as facets of any configurations. Two CMO configurations regarding camera operator performance suggested by Studies 1 – 3 were further explored in Studies 5 and 6.

Camera operator performance has a considerable impact on crime reduction outcomes (Piza et al., 2019); Studies 5 and 6 explored two aspects of this performance. While no previous studies specifically relating to the importance of accurate data capture and entry by camera operators were found, a growing body of research into the operations and work practices of operators has been conducted. Similarly, previous research identified real-time communication with agents on the ground as instrumental in addressing ARAs in city centres (e.g. Brown, 1995; Sivarajasingam et al., 2003).

The empirical findings of Study 5 support previous research that had identified these processes as instrumental in addressing ARAs in city centres or NTEs (Brown, 1995; Gill, Spriggs, Allen, Argomaniz, et al., 2005; Wells et al., 2006; Wilson & Wells, 2007). Studies suggesting the ability of camera operators to identify behavioural sequences leading to an assault (Troscianko et al., 2009), when combined with findings that NTE ARAs are a four stage, sequenced process (Barker, 2010), suggest examination of CMO configurations regarding the ability of camera operators to identify potential assaults, as well as communicating this to agents able to respond on the ground may be fruitful.

Study 6 was a small scale, highly specific pilot case study, that demonstrated the utility of the realist evaluation approach using coarsely defined CMO configurations suggested by Studies 4 and 5. A hypothesis was generated. The first iteration of context definition allowed the definition of salient aspects of the *Camera Room Operations* context; with clearly defined outcomes and a simple intervention, these were sufficient to refine dimensions for exploration in order to identify relevant mechanisms. The results suggest there is scope to transfer this method to other aspects of the CCTV system, for example those explored in Study 5.

Chapter 9: Discussion and conclusions of realist evaluation CCTV case study

9.1 Introduction

Phase 2 of the current research attempted to examine the applicability of realist evaluation into NTE ARAs using CCTV as a case study. This chapter draws together the findings of Studies 4, 5 and 6 into the Cairns CCTV system, as well as relevant results from Study 1. It then incorporates the findings of Studies 2 and 3 to explore how realism may enhance research into community action approaches to reduce the problem. This chapter aims to demonstrate how the realist approach may help in advancing thinking about NTE ARAs. The content of the sections in this chapter is as follows:

- Section 9.1 provides an introduction and outline.
- Section 9.2 examines the use of a realist case study (Koenig, 2009) to describe how the process will be used in this chapter. The process used in this chapter was guided by Pawson and Manzano-Santaella (2012). The structure of the chapter conforms closely to the reporting standards for realist evaluations (Wong, Westhorp, Manzano et al., 2016). Items such as ethics approval, details of participants and the environment surrounding the evaluation have been detailed in previous chapters and will not be repeated here. The focus of this chapter is continuation of an iterative analysis process (Wong et al, 2016).
- Section 9.3 will then apply this analysis to a CMO configuration framed around deterrence of NTE ARAs through CCTV to examine the utility of that theory to ARA in the NTE.
- Section 9.4 begins an initial description of CMO configurations/rough theories based around identified operational contexts of CCTV to reduce NTE ARAs (see Table 10, Chapter 8, pages 120-125. The section re-examines the findings of Study 4 into the overarching operational domains of CCTV systems and compiles the findings of studies 4, 5, and 6 into CMO configurations focusing on the capability of camera operators using the real-time communication radio system to quickly get a person to the site of a disturbance to de-escalate potential assault incidents or disrupt assaults. As realist inquiry is iterative, these initial configurations are necessarily coarse.
- Section 9.5 illuminates the arguments of Sections 9.2 to 9.4 in diagrammatic representations,
- Section 9.6 addresses the findings of Studies 1 to 6 to frame initial, coarse CMO configurations regarding the problem of NTE ARAs. This section lists findings from those studies suggesting how further realist research may enhance interventions that have been repeatedly implemented.
- Section 9.7 summarises the chapter.

9.2 Realist case study analysis and quality standards

The case study methodology has been used to examine CCTV operations directing police enforcement activities as an early intervention mechanism to disrupt precursor risk factors to violence (Piza et al., 2017). The methodology has also been used to further interrogate identified mechanisms within high level theories in community-based alcohol-harm reduction interventions (Hunter, Maclean & Berends, 2012), although CMOs were not identified in that study. Case studies have also been used to illustrate what makes a rigorous realist evaluation (Pawson & Manzano-Santaella, 2012). Pawson and Tilley (1998) stress that realist evaluation is a theory of research approach and study design. Campbell (1975) and Koenig (2009) confirm the selection and use of case study analysis to test and build theory. This analytic approach has been selected for this chapter to test the applicability of realist evaluation to study the social problem of NTE ARAs given that realist evaluation has been used to study CCTV.

Realist Evaluation is designed to be methodologically agnostic (Pawson & Tilley, 1997), and there is no perfect inquiry, realist or otherwise (Pawson & Manzano-Santaella, 2012). Realist evaluation searches for and refines explanations about what it is about a theory that works for whom in what circumstances and why (Pawson & Manzano-Santaella, 2012), and can be applied retrospectively (Pawson & Tillet, 1997). Limitations of the case study method are well documented (Piza et al., 2017). In contrast, the case study method has been shown to be useful in better understanding the scope and nature of a social phenomenon, including in problems related to policing (Sparrow, 2011, cited in Piza et al., 2017, p251). A single case represents a critical test of a theory (Koenig, 2009), and a well-conducted case study can be used to assess explanations and to refute theories (Campbell, 1975). Section 9.3 applies this approach to deterrence using realist logic (Pawson & Manzano-Santaella, 2012). There is not room in this thesis to examine current contestations within the realist research community, for example, categorisation of a particular phenomenon as either a context or a mechanism (e.g. Dalkin et al. 2015). This chapter focuses on the formulation of initial rough theories and early iterations of CMO *configurations* to address NTE ARAs.

9.3 Deterrence

Study 1 found that community education on the role and scope of CCTV was suggested as an intervention by a number of interviewees (Chapter 5, p. 79). That suggestion appears to implicitly rely on the theory of deterrence. This is in contrast with the evidence that interviewees who mentioned CCTV all noted alternative explanations as to how CCTV addresses ARAs in the Cairns NTE, rather than deterrence.

As noted in Chapter 2, pages 31 and 32, Priks (2014) found that planned crimes in and around subway stations were deterred; offences in these settings reduced by a significant level, and that crimes were

displaced to nearby locations with no cameras. Assaults and drug-related incidents were not reduced (Priks, 2014). The study assumed those involved in drug-related incidents were affected by drugs, and that assaults were "heat of the moment" crimes, classified as irrational offences (Priks, 2014). This interpretation of the results supports findings in studies such as Piza et al. (2019), which suggest a reduction in property crime, but not inter-personal violent crime. Piza et al. (2019) examined CCTV effects across different settings and crime types in different countries (see Chapter 2, pages 30 and 31). Rather than examining effects of CCTV across different crime contexts in terms of offender motivation and rationality, they incorporated additional moderator variables into the previous reviews and meta-analyses (Welsh & Farrington, 2002; 2009). As noted in Pawson and Manzano-Santaella (2012, p.179), the number of mediating variables introduced in this way is potentially very large.

Priks' analysis (2015) from a behavioural economics standpoint (see Chapter 2, p.31) framed deterrence theory into a behavioural economics equation that a rational, motivated offender must solve to decide if committing a crime is worth the risk (see Priks, 2014, p.1175, for the equation). While Priks did not explore motivated irrational offenders, the results supported the rational/irrational dichotomy (Priks, 2014). Indeed, based on Tilley (1993), Pawson and Tilley (1997, p.79) suggested that cameras work in car parks by instigating a chain of reasoning and reaction. Combining Priks' (2014) findings with findings regarding executive functioning (Giancola, 2004), the cluster of cognitive processing abilities that involves the self-regulation of goal-directed behaviour, we can begin to frame these different crime types as different CMO configurations to provide a first refinement of how CCTV may reduce crime. For the purposes of the below framing, *supporting human processes* refers to active monitoring of cameras and the presence of enforcement agencies that have the power to impose sanctions. It may be hypothesised as:

1. The existence of CCTV cameras and supporting human processes will deter rationally motivated offenders who commit utilitarian crimes as part of routine activities,
2. Introduction of cameras will not deter offenders for whom some interruption is occurring to the optimal or standard CM configuration regarding executive functioning.

This continues to guide us toward what works for whom in what circumstances. Parts 1 and 2 of the above hypothesis can be empirically tested. Findings of studies, when they report sufficient details, support both parts of the hypothesis. Table 14 below, shows a first draft of iterations of these configurations, in locational settings as labelled by Piza et al. (2019). Row a) summarises the findings of Piza et al. (2019) as reported. Row b) reframes them through a realist lens. A sample of empirical studies with quantitative results that support this interpretation are noted in each row, and listed below Table 14.

Table 14.

Initial rough CMO configuration for deterrence as a CCTV mechanism

Row	Outcome	Setting	Mechanism	Empirical findings support
a.	Offence numbers (all crime)	City & town centres	Deterrence (framed through a situational crime prevention theory)	No[1]
		Public housing	Deterrence	Yes[1]
		Public transport hubs and car parks	Deterrence	Yes[1,2,3]
	Outcome	Context	Mechanism	
b.	Offence numbers (all crime)	Rationally motivated, routine activity crime, for example burglary or other property crime	Deterrence (framed through situational crime prevention theory)	Yes[1,2,3,4]
		Offences in which some mechanism governing rationality shuts down	Deterrence (framed through a cognitive impairment theory)	No[2,4]

[1] Piza et al. (2019)

[2] Priks (2014)

[3] Tilley (1993)

[4] Allard et al. (2008)

This configuration supports the finding of Piza et al. (2019) for the continued need for CCTV to be targeted on vehicle and property crime, as they frame this within the theory of deterrence. As this thesis examines NTE ARAs, deterrence will be examined no further. The findings of Studies 1 and 4 in this thesis however contradict the further finding of Piza et al. (2019), that there is a continuing need for CCTV to be narrowly targeted on these crimes (Piza et al., 2019, p.135). Section 9.3 deals with CMO configurations of CCTV that were suggested or supported by studies 1, 4, 5 and 6. The CMO descriptions regarding the ability of camera operators to direct capable guardians to the scene of assaults are examined in detail in section 9.4.

9.3 Overarching operational contexts; CCTV for NTE ARAs

An *initial rough theory* is needed to guide the research and develop potential CMO arrangements for examination (Pawson & Manzano-Santaella, 2012; Pawson & Tilley, 1997). Study 1 found that only

police mentioned the evidentiary function of footage in prosecutions. Council officers, venue owners and private security all mentioned the CCTV system in terms of the real-time communication radio system, and the disruption of assault incidents due to quickly getting a person to the site of a disturbance. Neither of these findings rely on deterrence as a mechanism to address NTE ARAs. The findings of studies 1, 4, and 5 suggest two *initial rough theories* as to how CCTV may reduce NTE ARAs:

1. *Using CCTV to reduce ARAs in NTEs does not rely on deterrence of intoxicated patrons, but through detection of incidents by camera operators for;*
    i. *real-time communication to actors on-the-ground to de-escalate potentially violent incidents, to interrupt assaults in progress, and*
    ii. *supplying additional quantitative and qualitative data points to inform evaluations of community action interventions.*
2. *Prevention may also occur through the removal of repeat offenders and prosecution using CCTV footage as evidence.*

Refining the initial theories requires working forward and backward to follow theoretical threads and empirical evidence (Pawson & Tilley, 1997). Rough theory 2, that offences may be reduced through tertiary crime prevention (Brantingham & Faust, 1976), using CCTV evidence (Ashby, 2017; Hulme et al, 2015) will not be examined in any detail here. Briefly however, Piza, Caplan and Kennedy (2017, p.258) noted that reporting or capturing a crime is triggered by operator choice making, and that this is affected by communications and relationships with police. Hulme et al (2015, p.8) quoted a number of Australian operators complaining that police did not give sufficient feedback regarding provision of footage and resultant prosecution consequences. In contrast, Ashby (2017) noted that investigators sometimes did not request footage where it was available. This gives some directions around framing possible CMO configurations regarding for example, the context of communications between police and camera operators, or how the self-efficacy of camera operators may be affected by this communication to improve proactive provision of footage by operators. See p.148 for the explanation as to why Rough theory 2 is not explored in further detail.

Returning to the results of study 4, it is possible to begin refining the coarsely identified operational domains into initial rough CMO configurations (see Pawson & Manzano-Santaella, 2012; Pawson & Tilley, 1997). Table 10 in Chapter 8 (pp. 120 to 125) identified nine operational domains of relevance. These were further refined through the findings of studies 5 and 6. A number of operational domains were found to not be relevant to NTE ARAs during this initial assessment and were removed. These were:

- *Domain G. Referral and Outcome Recorded,*

- *Domain H. Regular Internal Audit and External Evaluations,*
- *Domain I. Legislative & Regulatory Requirements Met.*

Removal of these domains does not imply removal or modification of any other aspects of CCTV operation referred to in Table 10 in Chapter 8. Below, Table 15 addresses the overarching outcome of NTE ARAs, and only that overarching outcome. Other configurations could be developed to address property crime from cars for instance, or privacy and perceptions of safety for users of the space. Aspects of operational domains would be retained or modified as required. A number of other domains were modified.

If the first CMO iteration is specifically described as operational domains to address NTE ARAs, technological factors to do with camera resolution and quality can be ignored, as well as other factors relating to ICT equipment. The issue of operator to screen ratios is well researched, and there is not space to explore this in any depth here. The focus of this section is to begin to formulate initial CMOs descriptions, not refine existing CMOs.

Donald (2019) divided operator monitoring of cameras as reactive (post event analysis), and proactive (e.g. active searching). Guided by this, the CMO configuration to explore is the efficacy of proactive surveillance: that is, camera operators must be able to identify potential or occurring ARA incidents. This focus on proactive monitoring is the reason part 2 of the initial rough CCTV ARA theory identified on p.147 above is not explored in detail above.

Focusing on proactive monitoring removes aspects of *Domain E. Community Information Strategy & Strategic Communication Networks* (although this domain is crucial for the broader community action CMO; see initial theory 1i. on p.147 above. The remaining operational domains to address NTE ARAs are shown in Table 15 below.

Table 15.

Operational Contexts through which CCTV addresses NTE ARAs

Context A. System Outcomes Clearly Defined			
Operational (logistical) recommendations identified in literature		**Remove, retain, or modify for CMO configuration**	**Explanation for removal or modification**
A1.	Clear and precise definitions targeting specific offences/injuries within the local Context.	Retain	n/a

A2.	Clarifying outcomes of the system for evidentiary purposes, perceptions of safety, offence and injury detection and prevention.	Modify	Context of proactive monitoring rather than reactive monitoring (post event analysis)
A3.	Identify and document risk factors and processes to contextualise incident types.	Modify	"incident types", refined to NTE ARAs
A4.	Internal and external agreements and procedures for proactive and reactive use of information.	Modify	MOUs between CRC, CCLSA and QPS. CRC operations and policies in place for proactive monitoring only
A5.	Integrated, multi-agency approach to crime and injury prevention.	Retain	n/a
A6.	Implement CCTV as a package of improved lighting & CPTED principles.	Remove	CPTED principles only relevant when, and so far as, they impact on proactive monitoring.
Context B. Police Involvement			
B1.	Identifying role and capacity for police involvement with the system.	Modify	Based on A5. above, incorporate other stakeholders, specifically including private security.
B2.	Identifying system utility for police purposes (evidence, perceptions of safety, detection, deterrence, and prevention).	Modify	Based on A1. above, identifying system utility for the integrated, multi-agency approach to NTE ARA prevention (crime and injury outcomes).
B3.	Clearly communicating these aspects of utility to CCTV management, and camera operators.	Modify	Based on modified A5. and B2. above.
B4.	Offence analysis prior to establishment and in conjunction with system evaluation.	Remove	Incorporate into A1. above, and include injury analysis as well as offence analysis.
B5.	Procedures agreed for ease of access to images for evidentiary purposes.	Remove	Context of proactive monitoring rather than reactive monitoring.
B6.	Regular real-time communication with control room, particularly during peak periods.	Remove	Incorporated in F3. Below.
B7.	Live feed to police communications and dispatch.	Remove	Incorporated in F2. Below.
B8.	Potential for police officer to be present in staff monitoring room during peak periods.	Retain	n/a
B9.	Familiarisation visits and training in Monitoring Room processes.	Modify	Based on modified A1., A5. and B2. above.
B10.	Establish processes to use CCTV system for proactive intelligence gathering.	Modify	Based on modified A1., A5. and B2. above.
B11.	During system set-up, information on hotspots fed to CCTV manager.	Remove	Incorporated into modified A1., A5. and B2. above.

B12.	Formal recognition by police of arrests made due to camera operators work.	Retain	n/a
B13.	Standard operating procedures covering communication and liaison between CCTV and police.	Modify	Based on modified A1., A5. and B2. above.
B14.	Participate in external independent evaluation and monitoring of processes and practices.	Retain	n/a
B15.	Determining the appropriate level and priority of responses according to available resources and priorities.	Remove	Incorporated into modified A1., A5. and B2. above.
Context C. Monitor Room Staffing and Operations			
C1.	Operator task analysis conducted (active searching, active monitoring, general surveillance).	Retain	n/a
C2.	A structured, hierarchical management structure is required.	Retain	n/a
C3.	Established procedures and codes of practice.	Retain	n/a
C4.	Low camera to operator ratios.	Retain	n/a
C5.	Effective real time communication links with external agencies.	Remove	Incorporated into modified A1., A5. and B2. above.
C6.	Police present during peak periods.	Remove	Incorporated into modified A1., A5. and B2. above.
Context D. Camera Operator Training			
D1.	Operator awareness of bias in surveillance.	Modify	Further refinement of operator attitudes and beliefs would specify these aspects as CMO configurations.
D2.	Data entry and report generation.	Modify	As above in D1.
D3.	Understanding of police operational requirements to minimise requests for police assistance.	Modify	As above in D1.
D4.	Monitoring strategies (active, routine patrolling etc).	Modify	As above in D1.
D5.	Use and control of camera management systems, recording systems and database report entry systems.	Modify	As above in D1.
D6.	Identification and prediction of potential events.	Modify	As above in D1.
D7.	Familiarity with the local area and identified potential trouble spots.	Modify	As above in D1.
D8.	Police policy and procedures relating to recording of information, exhibit handling and incident reporting.	Modify	As above in D1.

D9.	Accountability (e.g. possibility of freedom of information requests), confidentiality and privacy requirements.	Modify	As above in D1.
D10.	Emergency response agency (ambulance & fire) procedures.	Modify	As above in D1.
D11.	Mix of on-the-job and external, specialised training.	Modify	As above in D1.
Context E. Community Information Strategy & Strategic Communication Networks			
E1.	High visibility and distinctive signage.	Remove	This appears to be based on deterrence theory: signage would need to be retained to meet legislative requirements and recommendations regarding privacy for users of the space.
E2.	Anonymised case studies through media of offenders prosecuted with the assistance of CCTV footage.	Remove	This appears to be based on deterrence theory.
E3.	Surveys of usefulness and perceptions of safety.	Remove	Still potentially valuable for other management and deterrence reasons.
E4.	Business direct phone link with Monitoring Room.	Remove	While still potentially valuable for other management and deterrence reasons.
E5.	Regular consultation with crime prevention/community safety committees and stakeholders/ service agencies.	Remove	Incorporated into modified A1., A5. and B2., and B10. above.
E6.	Education on system effectiveness to identified priority users of space.	Remove	This is based on deterrence theory, so may be useful for rational offending.
E7.	Link with local community crime prevention/safety committee.	Remove	Incorporated into modified A1., A5. and B2., and B10. above.
E8.	Representatives of special interest and specific community or service groups included.	Remove	Incorporated into modified A1., A5. and B2., and B10. above.
E9.	Regular communication of CCTV results to liquor accord, licensed venues and other businesses.	Remove	Incorporated into modified A1., A5. and B2., and B10. above.
E10.	Inform public of outcomes of systems.	Retain	n/a
Context F. Real-time Communications with Agencies on the Ground			
F1.	Two-way radio link with Police.	Modify	Further refinement of communications processes would specify non-technological aspects as CMO configurations.
F2.	Live video feed to Police Communications Room and local station.	Modify	As above in F1.
F3.	Direct phone link with Police Communications Room and local station.	Modify	As above in F1.

F4.	Two way radio contact with private security providing guardianship in and around venues.	Modify	As above in F1.

Drawing from Table 15 provides four domains through which to initially configure CMO descriptions. Clearly defining CCTV system outcomes to prevent NTE ARAs, and/or reduce the injury consequences by limiting the duration of incidents that were not prevented is critical. For example, resource limitations may require that interventions based on some configurations, while theoretically applicable to all ARAs in the defined NTE, are only applied on weekend nights, in certain places within the NTE. The four domains for CMO configuration are:

1. Real-time dispatch of agents on the ground,
2. Camera Operator Training,
3. Monitor Room Staffing and Operations,
4. Community action (strategic multi-stakeholder communication and information sharing, see Section 9.5, below).

The next section provides theoretical focus for exploration of CMO configurations the first three domains: it does not proceed to the $C_1M_1O_1$ – $C_2M_2O_2$ level of detail (Pawson & Manzano-Santaella, 2012). For the purposes of the below CMO description, domains 2 and 3 specifically support domain 1. Nomination and discussion of aspects of domain will be limited to the configurations applying to real-time deployment by camera operators of guardians capable of intervening in a potential or actual NTE ARA.

9.3.1 Real-time deployment of agents on the ground

Operator actions may impact crime in a number of ways (Piza et al., 2019). The findings in Studies 1 and 4 regarding this capability to de-escalate potential assault incidents or disrupt assaults supports similar results regarding police directed by camera operators (Sivarajasingam et al., 2003; Piza, Caplan & Kennedy, 2017), but seemingly conflict with Gerrell (2016) (see p.135 in chapter 8). The proactive monitoring ability of CCTV operators (Donald, 2019) is important in discovering and reporting incidents (Piza, Caplan & Kennedy, 2017), although the field of view shed by cameras is also important (Piza, Caplan & Kennedy, 2014). Intricate knowledge of this view-shed has an impact of the number of assaults or other offences detected by camera operators (Piza, Caplan & Kennedy, 2014). This may lead to initial CMO configurations such as:

1. Quick deployment of physical presence to the site of a potential or actual assault (outcome) is the result of camera operator understanding and knowledge of NTE behavioural and physical ecology (context), and performance regarding proactive monitoring (mechanism).

2. Training to improve camera operator ability (mechanism) to detect and classify potential or occurring assault incidents, combined with improved communication practices (context), will increase the number of incidents prevented, or limited in duration or severity (outcome).
3. Training (mechanism) to improve knowledge of the local NTE ecology, attentional improvement techniques and communication practices (outcome), should be part of operational policies and practices (context).

This example adheres to the process described by Pawson and Manzano-Santaella (2012, p.184) and helps iteratively refine the initial theory: closer analysis of camera operator performance regarding proactive monitoring, and camera operator knowledge and understanding of NTE behavioural and physical ecology may be useful. Recent reviews (Donald, 2019; Piza et al. 2019; Philpot et al., 2019), shed some light on this.

Operator activity is often low (Piza, Caplan & Kennedy, 2017). Reasons given for this finding include the high camera to operator ratios (Keval & Sasse, 2010; Piza et al., 2012), a lack of formal training, and lack of operator motivation (Norris & McCahill, 2006), and tasks that operators are required to perform other than proactive monitoring of cameras (Donald, 2019). Increasing research effort has also been turned to task disengagement and links with operator performance (e.g. Donald & Donald, 2015), and other cognitive demands on operator attention (see Donald, 2019). Nevertheless, the discovery of assaults by camera operators, and their immediate reporting to police, may be irrelevant if the time between reporting and arrival on the scene (police response time), is too long (Piza et al., 2017). This may explain why none of the interviewees in Study 1 reported the role of police in interrupting or preventing assaults in the Cairns NTE.

Regarding suspiciousness leading to proactive surveillance of individuals, some studies have suggested that appearances, notably race, ethnicity and styles of dress provoke operator attention and lead to higher levels of surveillance, rather than behaviour (Piza et al., 2019). This was not a finding in the Cairns study. It is suggested however that related attitudes and worldviews are an important part of operator recruitment, training and evaluation as they may affect pro-active and reactive monitoring through selection of targets for surveillance (Donald, 2019; Hier, 2010; Keval & Sasse, 2008; Norris & Armstrong, 1999).

An set of initial rough CMO configurations regarding the real-time dispatch of agents on the ground is described in Table 16 below, followed by brief commentary. *Camera Operator Training*, and *Monitor Room Staffing and Operations* could be tabulated in a similar way. These areas of program activity are domains which could be explored to further identify and refine CMOs.

Table 16.

Initial CMO for real-time dispatch of agents on the ground

	Outcome	Context	Intervention (mechanisms yet to be defined [resources plus reasoning])
i)	Improved real-time communication with police	Shared definition of priority outcomes Shared language (including an ability to provide real-time on the scene intelligence to police as to circumstances of the assault while police are on their way). Mutual understanding of work practices, core responsibilities and requirements Mutually agreed shared responsibility	Identifying role and capacity for police and camera operator involvement with the system. Shared education and training Policies and procedures Evaluation Formal recognition by police of operator work and contribution
ii)	Improved real-time communication with private security mandated to intervene, where available	Shared definition of priority outcomes Shared language Mutual understanding of work practices, core responsibilities and requirements	Mutually agreed shared responsibility Shared education and training Policies and procedures Audits and evaluation
iii)	Improving camera operator ability to detect priority incidents	Proactive monitoring activity patterns Attention, cognitive capacity, task-focus	
iv)	Improving camera operator ability to classify potential or occurring assault	Behavioural sequencing of patrons Activity patterns Attention, cognitive capacity, task-focus	Attention etc. Training in suspiciousness[1] behavioural patterns
v)	Patrol placement in identified hotspots	Reduced travel time once notified	Strategic information sharing through community action CMO

Hypotheses could be developed for empirical testing through appropriate quantitative studies to examine the following:

- The number of crimes reported to police by camera operators (e.g. Piza et al, 2012),
- the proportion of true positives as measured through arrests in response to CCTV detections (e.g. Ditton & Short, 1999; Norris & Armstrong, 1999),
- evidence or intelligence captured by CCTV (e.g. Waples, Gill & Fisher, 2009),
- operator task activity analysis (e.g. Wilson & Wells, 2007),
- proactive 'targeted surveillances' conducted by CCTV operators (e.g. Wilson & Wells, 2007), and

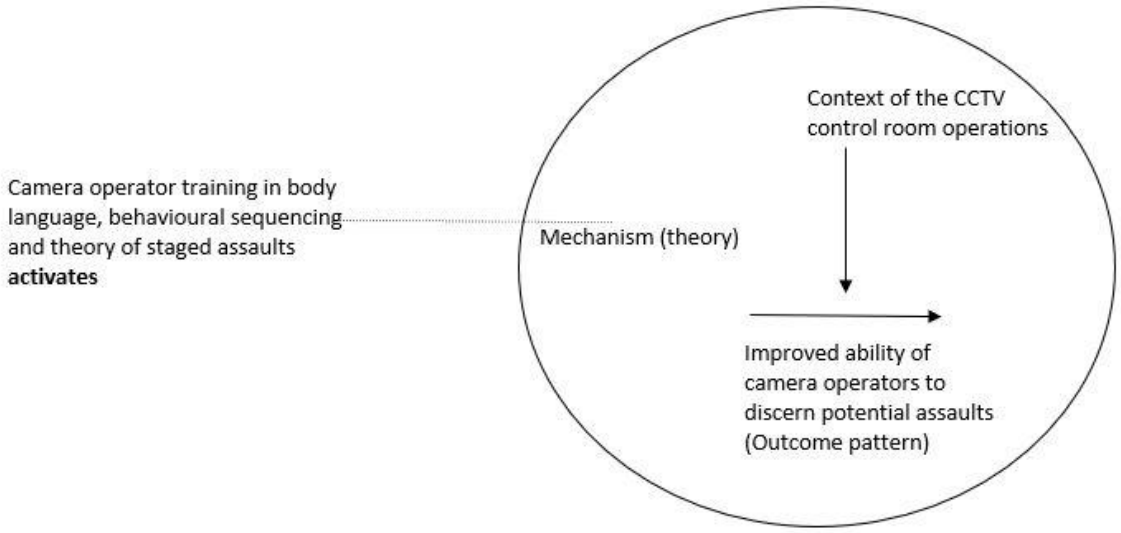
- time from notification to on-scene response (e.g. Piza et al., 2016).

9.5 Diagrammatic representations

To summarise and reframe the above arguments in a diagrammatic form: in any given context, a particular crime prevention measure fires one or more causal mechanisms, which produce a particular outcome-pattern. A suggested CMO configuration regarding the ability of camera operators to recognise a potential or occurring assault (and thus dispatch real-time response to the scene), is represented in diagrammatic form in Figure 18. Figure 18 is amended from a diagram suggesting how CCTV may work to prevent crime in car parks (Tilley, 1993, p.3; Pawson & Tilley, 1997, p.60).

Figure 18.

Amended Realist Evaluation diagram: CCTV for dispatch.



Returning to the diagram regarding Realist Evaluation of CMOs for Study 6 into camera operator data accuracy on page 140, above, the above configuration could be re-designed into Figure 19 below, which could then be further elaborated into something similar to Figure 20, on page 157. In turn this could be compiled into a realist analysis, informed by realist synthesis, of communication, training, and operational aspects within different CMO domains to address NTE ARAs, such as those represented in Figure 21 on page 158.

Figure 19:

Graphical representation of CMO configuration for operator ability to identify ARAs.

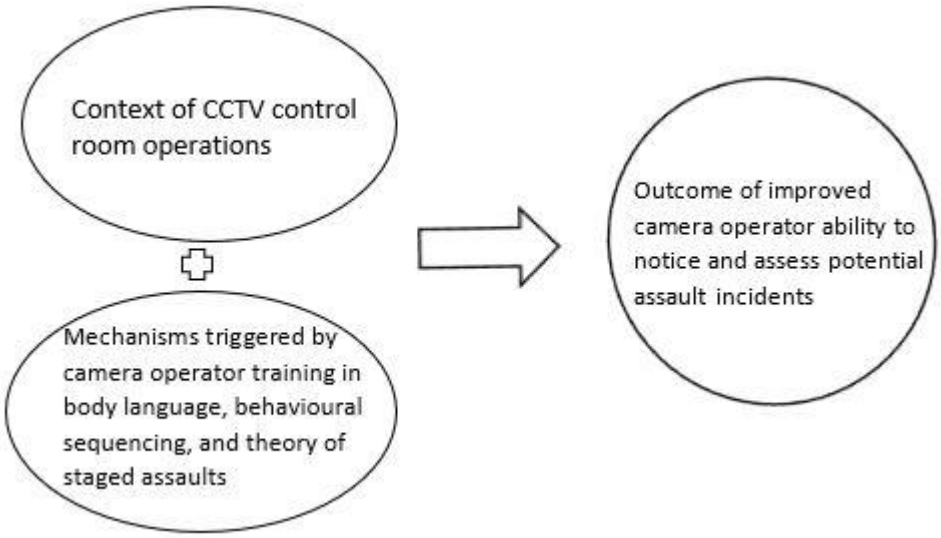
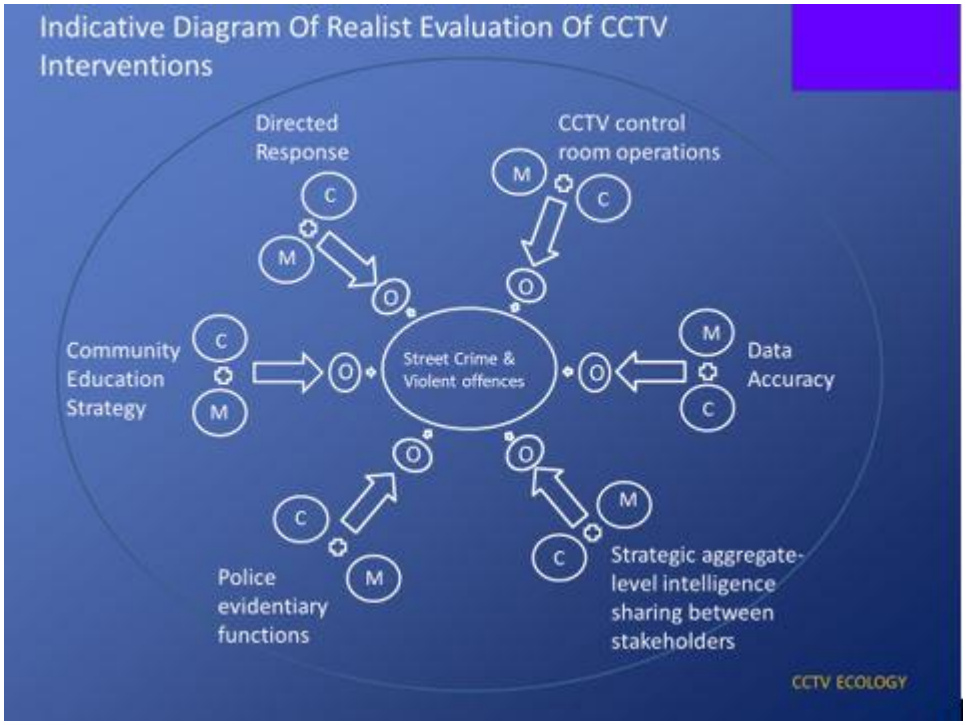


Figure 20:

Overarching ecology of CCTV response to NTE ARAs - CMOs

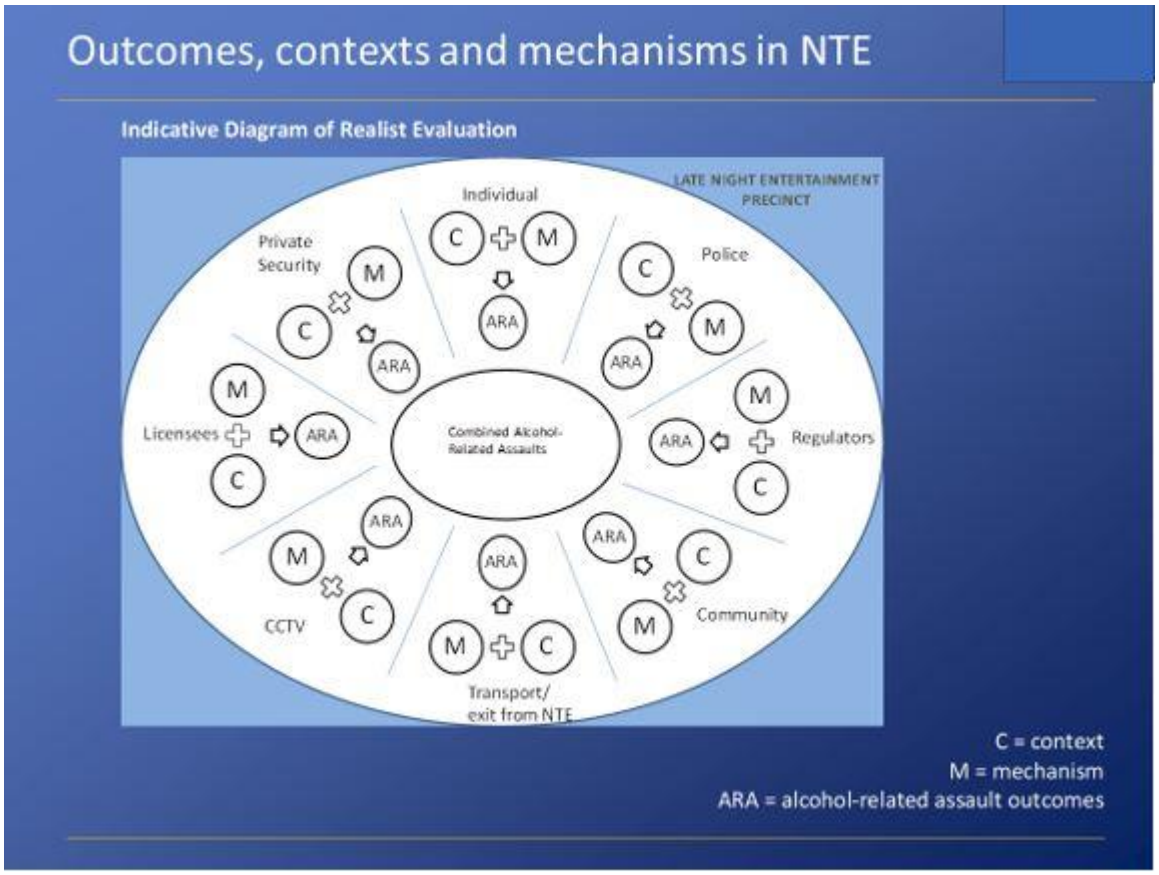


9.6 CMO configurations for community action projects to reduce NTE ARAs.

Sections 9.1 to 9.4 above described an application of realist evaluation principles to the finding of Studies 1 and 4 regarding the real-time dispatch capacity of CCTV to limit assaults. A second finding of Phase 1 of the research was the considerable capacity for the Cairns CCTV system to detect and document incidents of person-to-person violence that could augment information from the ED and police, and the importance representatives from agencies and venues mandated to implement prevention interventions placed on improved data collection and sharing. This was identified as a priority intervention by these interviewees (see Study 1, Chapter 5, pages 73-76). This section illustrates how a realist analysis of community action interventions, specific to CCTV operations other than directed response, may reduce NTE ARAs. What do studies 1-6 above suggest regarding the community action approach, informed by CCTV? How may this work?

Figure 21.

Different CMO domains for investigation for NTE ARAs



As noted on page 46 (Chapter 3, Section 3), Berends et al. (2012) conducted an amended realist synthesis into community-based projects to reduce harms related to alcohol and other drugs. Table 1 on page 45 above presented a modified version of their findings regarding enablers and barriers to successful project implementation (Berends et al., 2012, p.62). Domains for further CMO refinement in community action projects are suggested through comparison of the results of Studies 1 and 2 in this thesis, and Berends et al. (2012). A similar process to that used for CCTV in Section 9.4 above may be used. Domains identified from Berends et al. (2012) may be amended using the results of Studies 1 and 2 to refine configurations to focus on the outcome of improved data collection and sharing. This provides an initial effort in an iterative process (Pawson & Manzano-Santaella, 2012).

Further, applying a realist lens may provide insights into conflicting results. For example, lockouts are categorised as an alcohol-reduction strategy (see Chapter 1, p.11). The second temporal peak of ARAs occurring on the street in the Cairns NTE after the lockout that was found in Study 3 supports the results of previous Queensland research into lockout restrictions (Palk et al., 2012). However the findings of an extensive quasi-experimental study of 20 Queensland NTEs regarding the effects of alcohol restrictions found no changes in recorded serious ARAs, as recorded monthly (Taylor, Coomber, Mayshak et al., 2019). Taylor et al. (2019), collated all serious assaults recorded by police, including those that happened on-premise, and seemed to suggest the lack of reduction in ARAs was due to people already being too heavily intoxicated prior to the restrictions coming into play. This may be the case, as suggested by the theory of aggression being caused by a reduction in executive functioning (Giancola, 2004). However, as suggested by Graham (2007, 2009, 2011), understanding the settings or geographical and locational contexts of individual ARA incidents gives a more rounded understanding of alcohol-related violence, and leads to more targeted, effective interventions. Clearly defining the outcomes required through any ARA reduction intervention is required. The evidence presented in this thesis suggest that pursuing broad-based quasi-experimental studies will continue to hide subtle variations in outcome patterns and the cause of these variations across sites and other contexts. As suggested by Graham (2007, 2009, 2011), and as per Pawson and Tilley (1997), interventions designed according to CMO analysis, and working back from precisely defined outcomes, have a better chance of success.

9.7 Summary

The chapter reported and discussed conclusions regarding the applicability of realist research into the problem of NTE ARAs. The first step was to argue for the rejection of a widely held theory, that CCTV works through deterrence. In realist terms, the first step was the refinement of a CMO configuration

regarding CCTV: CCTV does not reduce NTE ARA through deterrence. The chapter was guided by analytic processes and reporting standards recognised in the realist community (Pawson & Manzano-Santaella, 2012, Wong, Westhorp, Manzano et al., 2016), and other realist inquiries (Koenig, 2009). Chapter 9 demonstrated that realist evaluation could be applied to analyse the problem of NTE ARAs more broadly and provide new insights. Chapter 10 concludes the thesis.

Chapter 10: Summary of findings and recommendations for future research

This thesis explored the use of realist evaluation to better inform research into NTE ARAs. The research was conducted in two phases. Phase 1 applied an empirical approach. Phase 2 used a case study analysis of an NTE CCTV system to test the application of realism to this issue. The CCTV system incorporated continuous monitoring by human beings and real-time communication with agents on the ground. Issues for which testable hypotheses regarding how this type of CCTV system contributes to reducing NTE ARAs were highlighted to guide further research. First iterations of CMO configurations relating to community action programs were described. These are discussed in Sections 10.1 and 10.2 below. Limitations to the study are listed in Section 10.3. Recommendations for further research are listed in Section 10.4. Practice changes in the use of CCTV in NTEs that arose as a result of this thesis are discussed in Section 10.5. Section 10.6 reports practice changes in a number of sites informed by the CCTV research in this thesis.

10.1 Summary of thesis findings

The thesis has found the following:

1. Finding from Studies 1-3:- it is feasible to design and implement a multi-agency monitoring tool to more accurately count and identify spatial and temporal patterns of NTE ARAs across hospital emergency departments, the Police Service in Queensland, and local council CCTV systems. The quantitative results support previous research. Studies 1-3 suggested an approach to overcome difficulties in locational details sufficient to implement and evaluate specifically-targeted interventions.
2. Findings from studies 1 to 6:- realism is an appropriate research approach for investigating ways to reduce NTE ARAs.
3. Finding from studies 1, 4, 5 and 6:- CCTV does not work to reduce NTE ARAs through deterrence, but rather through real-time dispatch of capable guardians on the ground to interrupt or prevent these assaults. Deterrence through CCTV is not a prominent factor in NTE ARAs perhaps because these offenders cannot solve the cost/benefit equation of committing an assault due to their executive functioning cognitive abilities being disrupted.

10.2 Significance of thesis findings

These findings are significant because:

1. The research provides guidance on establishing a multi-agency, quantitative NTE ARA monitoring tool to inform community action programs,
2. The research confirms the applicability of realist inquiry to the social problem on NTE ARAs in order to provide new insights and methodologies.

3. Reasons 1 and 2 have policy implications to reduce this form of violence, where one punch can kill.

10.3 Limitations

The main limitations in this study were:

1. Insufficient resourcing,
2. Lack of realist knowledge at commencement.

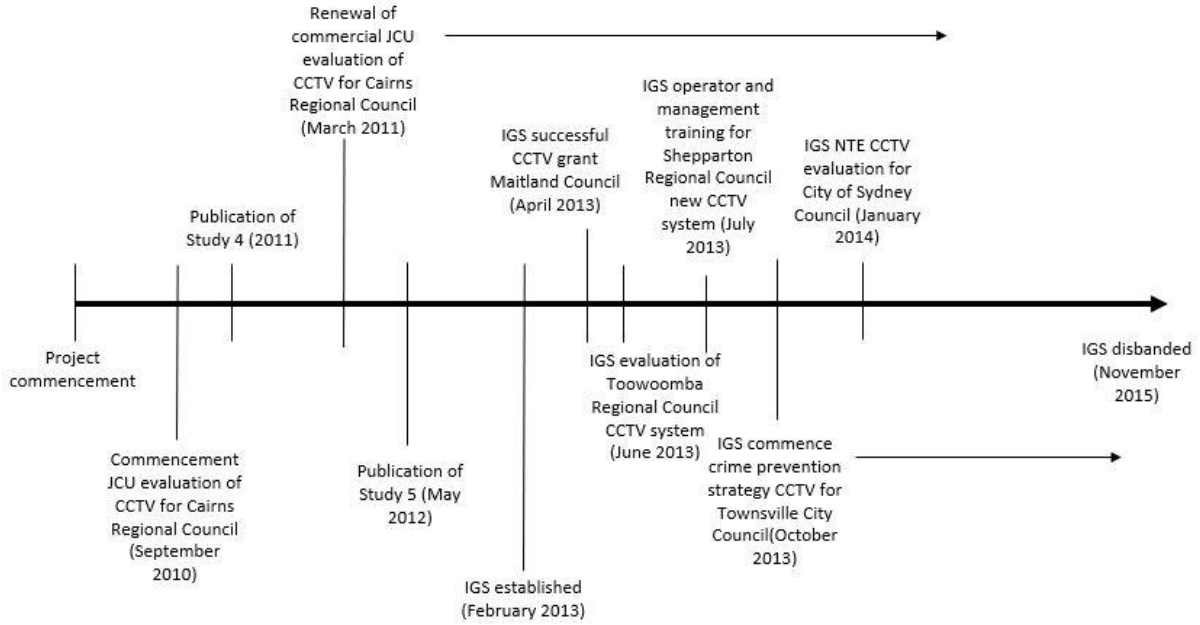
Despite these limitations, this is the first Australian study to confirm the feasibility of establishing a multi-agency, quantitative NTE ARA monitoring tool, and it is the first study to attempt a realist evaluation of NTE ARAs.

10.4 CCTV practice changes as a result of this thesis

Following the publication of the CCTV articles (Appendix 1), the Co-owner and Chief Executive of *Maybo Australia* invested $25,000 to create a new company based on the CCTV research contained in Studies 4 and 5 in this thesis. Maybo specialise in providing violence prevention training among hospital staff, private security and others (Maybo, 2020). The new company was called *Independent Governance Specialists for CCTV* (abbreviated to IGS). Figure 22 below shows the timeline, clients who engaged the company, and the services provided.

Figure 22:

Timeline of practice changes as a result of this thesis



The research findings from Studies 4, 5 and 6 were manualised, and non-technological evaluations of CCTV systems and associated crime prevention interventions were offered on a commercial basis, along with staff training for camera operators and management. Clients of IGS included the City of Sydney Council and Maitland Shire Council (in the Australian state of New South Wales), Shepparton Regional Council (in the state of Victoria), Townsville City Council and Toowoomba Regional Council (in Queensland). Cairns Regional Council continued with an evaluation contract through James Cook University for two years after the research reported in this thesis. The company was cordially disbanded in 2015 following a workload dispute.

10.5 Recommendations for future research

1. Quantitative methods have an important role to play in understanding the prevalence, spatial and temporal dynamics of this violence. Quantitative research should use linkage techniques to routinely capture and synthesise data from:

i. police,
ii. emergency departments,
iii. CCTV (where available),
iv. licensed venues (where available), and
v. other sources such as street services or NGOs (where available).

2. Further research into NTE ARAs should incorporate a realist approach:

i. Quantitative results should be viewed through a CMO lens.
ii. Realist synthesis to refine definitions of outcomes, and understand theoretical domains and results from a diverse set of studies is required.
iii. The theories relating to establishing and sustaining community action projects should be a priority of this synthesis research.
iv. Further qualitative research should use realist evaluation interview methods.

3. Further research into CCTV focuses on identifying and refining CMO configurations. Crime outcomes should be categorised into two over-arching approaches: rational, routine offending and non-rational offending. Iterative CMO configurations beginning with operator attention and task activity, within an operational policy context should be conducted.

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Appendices

Appendix 1: List of peer reviewed and other publications from which this thesis draws.

Peer reviewed publications in which the candidate was lead author					
	Authors	*Title*	*Publication Type*	*Journal/Book*	*Year*
1.	Pointing, S. Hayes-Jonkers, C. Stone, R. Brinn, D. Clough, A. R.	Is it worth emergency departments recording information about alcohol-related assault occurring in inner-city, late-night entertainment precincts?	Letter to the Editor	Emergency Medicine Australasia	2011
2.	Pointing, S. B., Hayes-Jonkers, C., & Clough, A. R.	A Realist Evaluation of open-space, urban CCTV Context to Reduce Alcohol-Related Assaults in the Cairns Late Night Entertainment Precinct.	Original Article	Crime Prevention and Community Safety: An International Journal	2012
3.	Pointing, S. B., Hayes-Jonkers, C., Bohanna, I., & Clough, A. R.	The Role of an open-space CCTV system in limiting alcohol-related assaults in a late-night entertainment precinct in a tropical Queensland city, Australia.	Brief report	Injury Prevention	2012
4.	Pointing, S. B., Hayes-Jonkers, C., & Clough, A. R.	Possible Strategies for Reducing Alcohol-related Assault: Community-Based Methodology in Cairns, Tropical North Queensland (Australia).	Chapter in edited book	K. Bletzer (Ed.), *Assaults: Interventions, Preventative Strategies and Societal Implications* (pp. 169-185). New York: Nova.	2013
Peer reviewed publications in which the candidate was second author					
	Authors	*Title*	*Publication Type*	*Journal/Book*	*Year*
1.	Hayes-Jonkers, C., **E.S. Pointing**, Alan Clough	A letter from Australia: Addressing deficits in venue security officer training in Cairns.	Feature	Crime Prevention and Community Safety: An International Journal	2011
2.	Hayes-Jonkers, C., **E.S. Pointing**, Alan Clough	Comparison of strategic and operational good practice for private security personnel in the night-time economy and the Cairns City model.	Original Article	Security Journal	2012
3.	D. Botterill, **S. Pointing*,** C. Hayes-Jonkers, C. Rodriguez, T. Jones, A.R. Clough	Violence, Backpackers, Security And Critical Realism.	Original Article	Annals of Tourism Research	2013
4.	D. Botterill, **S. Pointing*,** C. Hayes-Jonkers, C. Rodriguez, T. Jones, A.R. Clough	'What makes violence in backpacker tourism possible?' A critical realist study of tourism and the governance of security.	Chapter in edited book	Chapter in Ashgate publishers edited book – Tourism and Violence. Hazel Andrews (Ed).	2016

***Corresponding author**

Published research reports in which the candidate was lead author					
	Authors	*Title*	*Funding Stream*	*Funding Body*	*Year of Publication*
1.	S. B. Pointing, Hayes-Jonkers, C. & Clough, A.R	Inner-city Safety Partnership: CCTV Audit and Evaluation (Pilot)	Contract Research	Cairns Regional Council	2011
2.	S. B. Pointing, Hayes-Jonkers, C. & Clough, A.R.	Implementing a community initiated intervention to reduce alcohol-related violence and associated injuries in the Cairns late-night entertainment precinct (LNEP): Literature review and project report.	Community based injury prevention program	Queensland Injury Prevention Council	2011
3.	S. B. Pointing, Hayes-Jonkers, C. & Clough, A.R.	Inner-city Safety Partnership: CCTV Audit and Evaluation (Stage 1)	Contract Research	Cairns Regional Council	2012
4.	S. B. Pointing, & Clough, A.R.	Inner-city Safety Partnership: CCTV Audit and Evaluation (Stage 2)	Contract Research	Cairns Regional Council	2013
5.	S. B. Pointing, & Clough, A.R.	Embedding community and agency generated interventions to reduce assaults resulting from alcohol-related violence.	Innovative Project Grants stream	Foundation for Alcohol Research and Education	Forthcoming
Published research reports in which the candidate was final author					
	Authors	*Title*	*Publication Type*	*Funding Body*	*Year of Publication*
1.	Clough, A.R, Hayes-Jonkers, C. & S. B. Pointing,	Alcohol, assault and licensed premises in inner-city areas	Monograph (45)	National Drug Law Enforcement Research Fund	2013

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STUDY OF ALCOHOL-RELATED ASSAULT IN INNER-CITY AREAS

INFORMATION TO ACCOMPANY CONSENT FORM

THIS IS FOR YOU TO KEEP

Alcohol-related crime costs Australia around $1.2 billion/year. Assault is the most common of violent crimes with around one in twenty Australians (aged 15 years and over) having experienced an assault within the preceding year, and with half the perpetrators and around 40% of the victims intoxicated. A significant proportion of alcohol-related violence occurs in the vicinity of small numbers of problematic licensed premises in inner-city areas, most commonly late at night or in early morning hours near the end of the week and usually among young adult males. Best-practice policing strategies hold the potential to reduce violence in these settings among these groups. Suitable studies are needed to investigate their implementation and effectiveness.

JCU is conducting Phase 1 of a study which proposes to examine the effects of collaborative police and local community agency interventions since collaboration is regarded as the cornerstone of best-practice in reducing alcohol-related incidents and harms associated with licensed drinking environments.

As part of this project we are asking key personnel working in local agencies with interests in alcohol issues as part of their core business about their views on alcohol-related assault in the inner city area and about their views of options available to reduce the incidence of alcohol-related assault. In particular, we are seeking to find out the extent to which local community agency representatives are willing to collaborate and contribute to a proposed four-year intervention study. If feasible, this study proposes to implement and evaluate a multi-component community-based intervention to reduce the incidence of alcohol-related assaults in the inner-city area.

The information you provide will assist JCU researchers to understand the processes involved in implementing the study's community-based initiatives especially the challenges and opportunities for doing this.

You can say 'no' and you can pull out of this study any time. Call Alan Clough (and your information will be removed from the study. For any concerns and complaints about the ethical conduct of the study contact Chairperson, Professor Michael Humphrey, Human Research Ethics Committee of the Cairns and Hinterland Health Service District.

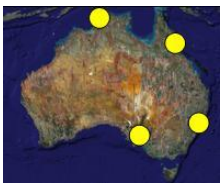
Phone 07 4050 8012, e-mail cairns_ethics@health.qld.gov.au.

STUDY OF ALCOHOL-RELATED ASSAULT, LICENSED PREMISES IN INNER- CITY AREAS

QUESTIONNAIRE

The National Drug Law Enforcement Research Fund (NDLERF) has funded James Cook University (JCU) for the feasibility and establishment phase (phase 1, 12 months) of a 4-year prevention and evaluation study targeting alcohol-related assault.

Aims of the proposed four-year prevention and evaluation study:



In participating jurisdictions, the JCU research team proposes to work with police, local agencies and community safety groups, liquor licensees and their regulators, hospital accident and emergency (A&E) departments.

The research aims to:

1. Assist to develop and implement further targeted strategies to reduce the number of assaults occurring in each inner-city area;

2. Compile and share information between collaborating agencies, especially A&E and police, about the occurrence and nature of assault episodes;

3. Use this information to evaluate the effectiveness of these strategies.

Phase 1 - feasibility and establishment phase: 2009

The study's feasibility will be assessed using information collected in interviews and focus groups. Mechanisms to compile evaluation data will be trialed and set in place.

Statement Defining (Limiting Definition Of) Violence Of Interest

Introduction: we are focusing on episodes of person to person violence in the entertainment precinct late at night, related to use of alcohol. We are not focusing on things which may be a confounding influence, including:

- Homelessness/itinerant people
- Personal Robbery
- Domestic and Family Violence; or
- Sexual Assault (do you think this SA an issue?).

Start with map of study area and say this is the geographical area of concern for the research. Ask: do you think these boundaries are correct?

Are there any particular places of concern within these boundaries? Why do you think so? This is all confidential so feel free to bag anyone you want. (probe the reason - to include environmental design of spaces where assaults occur)

Interview Questions: feasibility and establishment phase

The following questions will be asked of key agency/community stakeholders:

What are the main alcohol-related assault issues for your organisation?

What kind of projects are there in this community to address this issue?

What partnerships do you have with other service agencies to address the issues?

How often do you communicate with them about this sort of violence?

Have there been any results of these exchange?

What is the organisational role of your contact?

How do you measure the level of violence?

Using this information, would it be possible to develop targeted strategies?

What further opportunities and strengths are there to address these issues?

What challenges and barriers are there to address these issues?

What data do you routinely collect on alcohol related assaults at the moment?

Is it possible to separate out identifying data from incident/demographic information for each event?

What additional data can be routinely collected at no or minimal cost?

What data can be shared with other agencies?

Is it possible to provide a copy of relevant policies and processes to the JCU project on a confidential basis? (During the intervention design phase it is probable you will be asked for permission to share these with specific, nominated agencies. They will not be shared in any other circumstances)

Can you estimate the annual costs to your service of assault episodes?

Can you measure alcohol availability and levels of patron intoxication?

How can the JCU project further respond to these issues?

Is your service available for follow-up by JCU every quarter so we can tell you how the project is going?

- What are the main alcohol-related assault issues for your organization?

- What partnerships do you have with other service agencies to address these issues?

- Is collaboration possible for sharing information with other services about the nature and occurrence of assault episodes?

- Using this information, would it be possible to develop targeted strategies?

- What kind of projects are there in this community to address these issues?

- What further opportunities/ strengths are there to address these issues?

- What challenges/barriers are there to address these issues?

- How can the JCU *Alcohol, Assault and Licensed Premises In Inner City Areas Project* further respond to these issues?

- Who else should JCU project staff work/talk with?

For further information contact: Cairns Campus

Boris Pointing Ph: 07 4042 1635 boris.pointing@jcu.edu.au

Alan Clough Ph: 07 40421604 alan.clough@jcu.edu.au

Appendix 3: List of ICD10 Injury Codes

Injury S Codes			
Primary ICD Code Cluster	**Primary ICD Code Diagnosis**	**Name of Diagnosis**	**Used in the Software Project attached to EDIS**
Face & Head (S.00 – S.09)	S00.04	Scalp Superficial Foreign Body	
	S00.1	Black Eye	Yes
	S00.11	Scalp Abrasion	
	S00.21	Eyelid Abrasion	Yes
	S00.8	Contusions - Face And Head	
	S00.81	Face Abrasion (Excluding. EYE)	Yes
	S00.84	Face Superficial Foreign Body (Excl Eye, Nose, Ear)	
	S00.9	Minor Head Injury	Yes
	S01.0	Lacerated Scalp	
	S01.1	Eyelid Laceration	Yes
	S01.3	Lacerated External Ear	Yes
	S01.5	Lacerated Mouth, Lips Or Oral Cavity	Yes
	S01.88	Lacerated Face	
	S02.0	# Skull, Vault, Without Intracranial Injury	Yes
	S02.1	# Skull, Base, Without Intercranial Injury	Yes
	S02.2	# Nasal Bones	Yes
	S02.3	# Orbital Floor Blowout	Yes
	S02.4	# Malar Or Maxillary Bones	Yes
	S02.5	# Tooth / Teeth	Yes
	S02.6	# Mandible	Yes
	S02.9	# Facial Bones	Yes
	S03.0	Dislocated Jaw	Yes
	S03.2	Tooth / Teeth Dislocation	
	S03.4	Jaw Sprain / Strain	
	S05.0	Corneal/ Conjunctival Abrasion	
	S05.1	Hyphemia - Traumatic	
	S05.4	Penetrating Eye Injury	
	S06.00	Concussion - No Loss Of Consciousness	Yes

	S06.01	Loss Of Consciousness (Concussion - ?)	Yes
	S06.02	Concussion - No Loss Of Consciousness (Duration)	Yes)
	S06.5	Subdural Haemorrhage - Traumatic	Yes
	S06.8	Intracranial Haemorrhage - Traumatic	Yes
	S07.0	Head Crush Injury	
Neck & Throat (S.10 – S.19)	S10.84	Neck Superficial Foreign Body	
	S11.8	Lacerated Neck	
	S12.9	# Cervical Spine	
	S13.1	Cervical Subluxation	
	S13.4	Neck Sprain / Strain (Trauma Related)	
	S17.0	Larynx Crush Injury	
	S17.8	Throat Crush Injury	
	S17.9	Neck Crush Injury	
Chest, Torso & Upper Back (S.20 – S.29)	S20.2	Contusion To Chest Wall	
	S20.4	Contusion To Upper Back	
	S20.81	Trunk Abrasion	
	S21.9	Lacerated Thorax Chest Or Upper Back	
	S22.0	# Thoracic Spine	
	S22.3	# Ribs	
	S23.1	Thoracic Subluxation	
	S23.3	Thoracic Sprain / Strain	
	S23.4	Rib & Sternum Sprain / Strain	
	S27.0	Pneumothorax - Traumatic	
	S27.3	Traumatic Injury To Lung	
	S30.1	Abdominal Wall Contusion	
	S31.1	Lacerated Abdomen Or Lower Back	
	S31.2	Lacerated Penis	
	S31.3	Lacerated Scrotum And Testis	
	S31.4	Lacerated Female Genitals	
	S32.00	# Lumbar Spine	

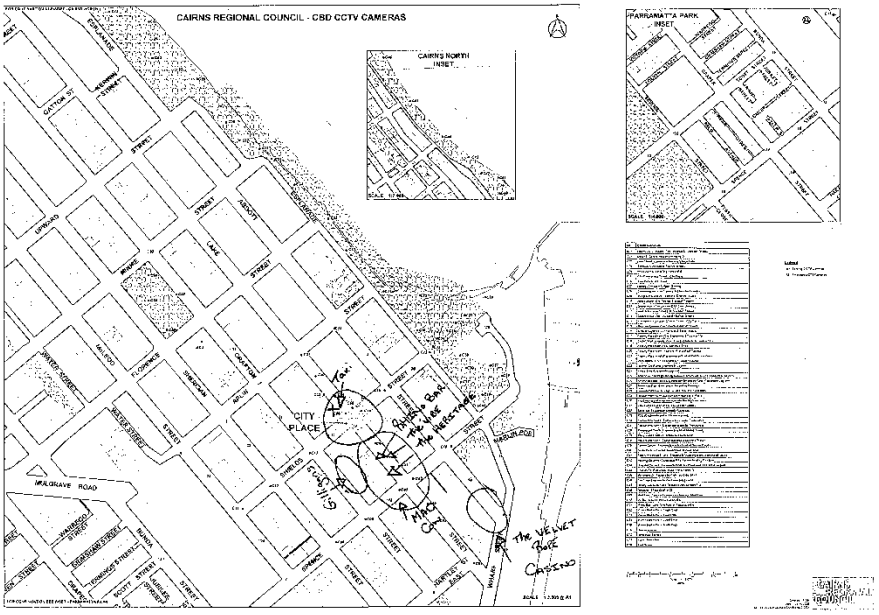
Abdomen & Genitals (S.30 – S.34)	S32.4	# Acetabulum	
	S32.5	# Pelvic Pubis	
	S32.83	# Pelvis	
	S33.1	Lumbar Subluxation	
	S33.2	Coccyx Subluxation	
	S33.7	Back & Lumbar (Sprain / Strain) Pain	
Internal Trauma (S.35 – S.37)	S36.00	Trauma To Spleen	
	S36.10	Trauma To Liver	
	S36.88	Trauma To Internal Organ/S - Unspecified	
	S37.00	Trauma To Kidney/S	
Lower Abdomen Crush (S38)	S38.0	External Genitalia Crush Injury	
	S38.1	Back Crush Injury	
Upper Arm (S40 – S49)	S40.81	Shoulder & Upper Arm Abrasion	
	S41.0 & S41.1	Lacerated Shoulder/Upper Arm	
	S42.00	# Clavicle	
	S42.1	# Scapula	
	S42.20	# Humerus - Upper End	
	S42.3	# Humerus - Shaft Or Other Part	
	S42.40	# Humerus - Lower End	
	S43.1	Acromioclavicular Joint Dislocation	
	S43.2	Sternoclavicular Joint Dislocation	
	S43.3	Shoulder Dislocation	
	S43.4	Shoulder Sprain / Strain	
	S43.5	Acromioclavicular Joint Sprain / Strain	
	S43.7	Upper Arm Sprain / Strain	

	S46.0	Rotator Cuff Sprain / Strain	
	S47	Shoulder Region/Upper Arm/Scapula Crush Injury	
Lower Arm (S50 – S59)	S50.81	Elbow & Forearm Abrasion	
	S50.84	Elbow & Forearm Superficial Foreign Body	
	S51.0	Lacerated Elbow	
	S51.9	Lacerated Forearm	
	S52.2	# Ulna	Yes
	S52.4	# Radius And Ulna	Yes
	S52.5	# Radius - Lower End	Yes
	S52.8 S53.10	# Radius - Other Part Elbow Dislocation	Yes Yes
	S53.40	Elbow & Forearm Sprain / Strain	
Wrists & Hands (S60 – S69)	S60.81	Wrist Hand Or Finger Abrasion	Yes
	S60.84	Wrist Hand Or Finger Superficial Foreign Body	
	S61.9	Lacerated Finger, Hand Or Wrist	
	S62.0	# Scaphoid (Inc Navicular Scaphoid)	Yes
	S62.2	# Metacarpal Bones	Yes
	S62.5	# Thumb	Yes
	S62.6	# Finger	Yes
	S63.0	Wrist Dislocation	Yes
	S63.10	Finger Dislocation	Yes
	S63.50	Wrist Sprain / Strain	Yes
	S63.60	Finger Sprain/Strain	Yes
	S63.61	Gamekeeper's Thumb	
	S63.7	Hand Sprain / Strain	
	S67.0	Finger Crush Injury	
	S67.8	Wrist & Hand (Excl Finger Only) Crush Injury	
	S68.9	Traumatic Amputation Of Hand &/ Finger(S)	
	S70.81	Hip & Thigh Abrasion	

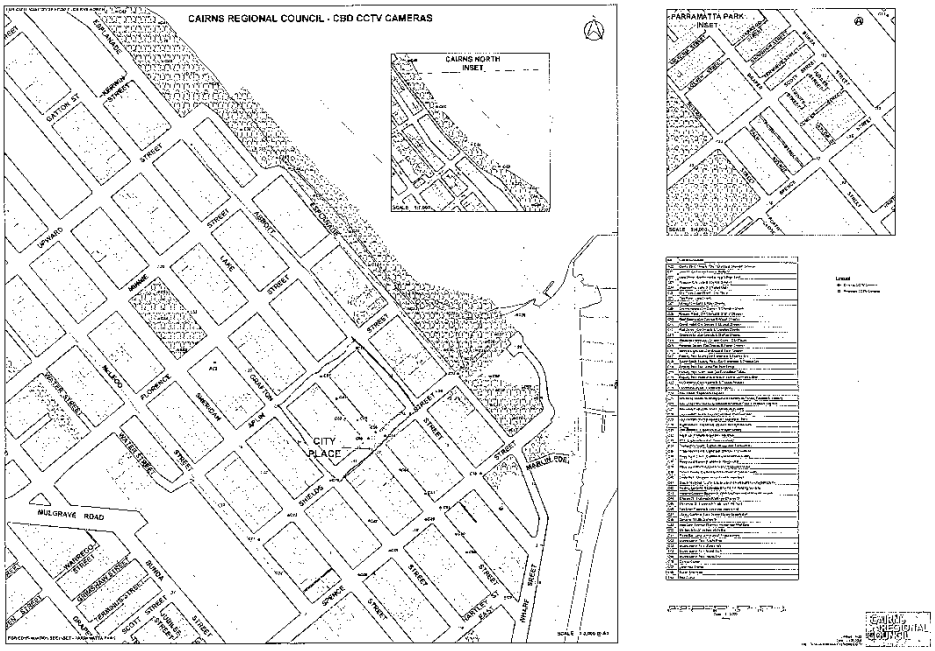
Upper Leg (S70 - S80)	S71.1	Lacerated Thigh	
	S72.00	# Femur - Neck Other	
	S72.3	# Femur - Shaft Or Other Part	
	S72.40	# Femur - Lower Part	
	S73.00	Hip Dislocation Or Sprain / Strain, And Groin Sprain / Strain	
	S73.10	Hip Sprain / Strain, Groin Sprain / Strain Or Buttock Sprain / Strain	
	S76.4	Thigh Sprain / Strain	
Lower Leg (S80-S89)	S80.81	Abrasion Of Lower Leg Incl. Knee	
	S80.84	Knee - Leg Or Ankle Superficial Foreign Body	
	S81.0	Lacerated Knee	
	S81.9	Lacerated Leg	
	S82.0	# Patella	
	S82.18	# Tibia - Upper End	
	S82.28	# Tibia - Shaft	
	S82.3	# Tibia	
	S82.4	# Fibula	
	S82.5 – S.82.81	# Tibia (Medial Malleolus, Lateral Malleolus & Bimalleolar)	
	S82.88	# Tibia - Other Part	
	S83.0	Patella Dislocation	
	S83.10	Knee Dislocation	
	S83.2	Meniscus Injury	
	S83.6	Knee Sprain / Strain	
	S86.0	Achilles Tendon Sprain / Strain	
	S86.8	Gastrocnemius Tear	
Feet, Ankles & Toes (S90 – S99)	S90.81	Ankle Foot Or Toe Abrasion	
	S90.84	Foot Or Toe Superficial Foreign Body	
	S90.9	Contusions – Foot & Ankle	
	S91.7	Lacerated Toe, Ankle Or Foot	
	S92.0	# Calcaneus	
	S92.2	# Tarsal Or Metatarsal Bones	
	S92.4	# Great Toe	

	S92.5	# Toe Other	
	S92.9	# Foot - Other	
	S93.0	Ankle Dislocation	
	S93.10	Toe Dislocation	
	S93.40	Ankle Sprain / Strain	
	S93.5	Toe Sprain / Strain	
	S93.6	Foot Sprain / Strain	
	S97.0	Ankle Crush Injury	
	S97.1	Toe Crush Injury	
	S97.8	Foot (Excl Toes) Crush Injury	

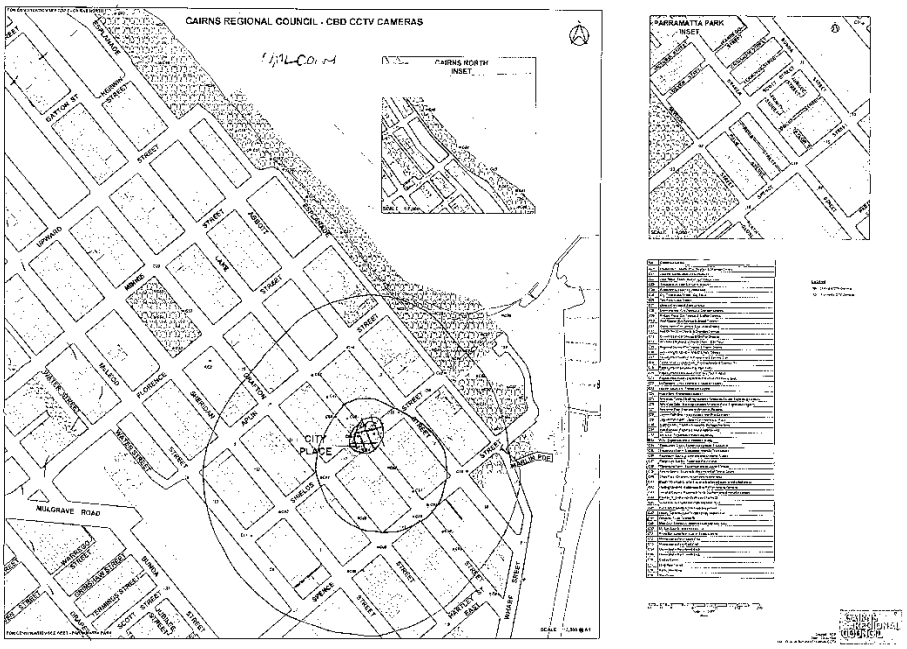
Appendix 4: Examples of hand drawn cognitive maps



As identified by a police officer.



As identified by an ED nurse.



As identified by a Council officer.