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Experiences of trauma, depression, anxiety, and stress in western-Canadian HEMS personnel

Sebastian Harenberg,* Michelle C.E. McCarron,† R. Nicholas Carleton,‡
Thomas O'Malley,* & Terry Ross*

ABSTRACT

Mental health in first responders and other public safety personnel has received substantial research attention in the past decade. Emergency medical services (EMS) demonstrate a heightened prevalence of maladaptive mental health concerns compared to other first responders (e.g., police, fire fighters). Interestingly, there is an absence of research examining helicopter emergency medical services (HEMS) personnel, who respond to what are often life-threatening cases in challenging circumstances. Hence, the purpose of the present study was to assess the experiences of Posttraumatic Stress Disorder (PTSD) and associated mental health conditions (i.e., depression, anxiety, stress) in HEMS workers. HEMS workers from a single mid-western Canadian organization (n = 100) participated in the study. The participants completed the Posttraumatic Stress Disorder Checklist (PCL-5) and the Depression, Anxiety and Stress Scale (DASS-21) as part of an online survey. The results revealed that five per cent of HEMS personnel experienced heightened PTSD symptoms. Few participants exhibited signs of mild to severe depression, anxiety, and stress (< 17%). HEMS personnel experienced fewer mental health concerns than other first responder groups as reported in the literature; indeed, these figures are similar to levels observed within the general population. These findings may be explained by organizational or personality characteristics. Underreporting of mental health concerns may be an alternate explanation. Future qualitative and quantitative research is needed to explain and replicate the results of the present study.

Key Words Mental health; first responders; helicopter emergency medical services; PTSD

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INTRODUCTION

First responders and other public safety personnel (PSP) are among those at the highest risk for developing post-traumatic stress disorder (PTSD). In a recent nationwide survey of Canadian public safety personnel, Carleton, Afifi, Turner et al. (2017) found that nearly half (49.1%) of the 311 paramedics surveyed screened positive for and/or self-reported the presence of a mental health disorder (e.g., PTSD, major depression, anxiety disorders, alcohol abuse) with nearly one quarter (24.5%, n = 190) screening positive for PTSD. Similarly, Wilson, Guiliani, and Boichev (2016) reported lifetime PTSD prevalence rates of 26 per cent for Canadian paramedics. Persons diagnosed with PTSD suffer persistent symptoms such as intrusive and recurring thoughts about the traumatic experience, nightmares, hypersensitivity, and avoidance of stimuli associated with the trauma (American Psychiatric Association, 2013). Symptoms must be present for at least one month and impede functional abilities (e.g., vocationally, socially, emotionally).

Tasked with attending calls involving critical injuries, deaths, and/or violence, first responders, such as paramedics and helicopter emergency medical services (HEMS) personnel, are often confronted with disturbing experiences and imagery in the course of their work. First responders and other PSP may also experience negative effects through secondary exposure to trauma (i.e., hearing details of others' traumatic experiences), resulting in compassion fatigue, secondary PTSD, or vicarious trauma (Cieslak, Shoji, Douglas et al., 2014). There is a growing body of evidence for experiences of trauma and associated PTSD in Emergency Medical Services (EMS) workers; however, we are not aware of any reports relating to the experiences of HEMS personnel.

Typically, HEMS are dispatched to a scene when a case involves high risk of mortality and long distance transport. In addition to caring for the patient, HEMS personnel have to ensure flight safety, deal with longer transportation times from rural and remote locations, and manage increased noise levels that effectively reduce the crew's ability to communicate. The HEMS factors put additional stress on HEMS

Correspondence to: Sebastian Harenberg, Department of Exercise and Sport Sciences, Ithaca College, 953 Danby Rd, Ithaca, NY 14850, USA.
E-mail: sharenberg@ithaca.edu

personnel (Cowley & Durge, 2014). In addition, the images of patients' conditions and the emergency sites may induce additional traumatic stress (Beck, 2011). The present study was designed to assess the prevalence of PTSD and associated mental health conditions (i.e., depression, anxiety, stress) in HEMS workers.

METHODS

Participants

In total, 100 HEMS workers (M_{age} = 42.48, SD_{Age} = 7.94) from mid-western Canada participated. Ninety-eight percent of the participants (n = 98) identified their ethnicity as Caucasian. The participants worked in HEMS as nurses (n = 30), physicians (n = 20), pilots (n = 23), and paramedics (n = 27). On average, the participants worked 18.41 years (SD = 8.86) in their profession and 7.51 years (SD = 6.76) in HEMS.

Procedures and Measures

The current study was approved by the Regina Qu'Appelle Health Region Research Ethics Board (REB-15-101). HEMS personnel from a single organization were invited to complete an online survey about mental health concerns. The survey was hosted on FluidSurveys (http://fluidsurveys.com/) and distributed via organizational email addresses. The data were collected anonymously. Participants provided descriptive information (e.g., age, gender, job title, years in profession, years in HEMS), and completed scales measuring trauma, depression, anxiety, and stress.

Posttraumatic Stress

Participants completed the Posttraumatic Stress Disorder Checklist (PCL-5; Bievins, Weathers, Davis et al., 2015) to assess PTSD symptoms corresponding to criteria in the *Diagnostic and Statistical Manual of Mental Disorders-5* (DSM-5) (APA, 2013). Items are rated using a Likert-type scale ranging from 0 (not at all) to 4 (extremely). A total severity score (i.e., sum of all items) was used for this study, with a score ≥ 33 signifying presence of PTSD symptoms. Initial evidence suggests that the PCL-5 is a psychometrically sound measure with acceptable factorial validity and internal consistency (Bievins et al., 2015). Good internal consistency was also observed in the present study (α = .94).

Depression, Anxiety, Stress

Participants completed the 21-item version of the Depression Anxiety Stress Scales (DASS-21). Each subscale consists of seven items, which are measured on a 4-point Likert-type scale, ranging from 0 (never) to 3 (almost always). Subscale scores are summed and multiplied by two. Symptom severity ratings were based on recommendations by Lovibond and Lovibond (1995). Previous research has demonstrated acceptable factorial validity and internal consistency for the DASS-21 (Crawford & Henry, 2003), with good internal consistency observed in the present study (α = .81-.92).

Statistical Analyses

Chi-square tests with Fisher's correction were used to conduct comparative analyses of categorical data. For comparative analyses of continuous data, the Mann-Whitney U test with point biserial correlations was calculated when normality was violated. Independent *t*-tests with Cohen's *d* were used for normally distributed continuous data. For all analyses, a significance level of .05 was set.

RESULTS

Descriptive statistics are reported in Table 1. The self-reported levels of depression, anxiety, and stress were particularly low. Over 83 per cent of all participants reported normal levels on these variables. Only five (5%) participants reported a PCL score of 33 or higher (i.e., indicating severe PTSD symptoms). Participants flagged for symptoms consistent with PTSD also reported significantly higher depression ($r = .79$, $p < .01$), anxiety ($r = .93$, $p < .01$), and stress ($r = .74$, $p < .01$); however, there were no significant differences found for age, gender, or years working in the profession, although years working in HEMS approached significance ($p = .09$). The results of comparative analyses appear in Table 2. There were no significant differences found on any measured variables between team members (i.e., nurses, physicians, pilots, paramedics).

TABLE I Sample descriptives

Variable	Mean (SD)/Count (%)
Age	42.48 (7.94)
Gender	Male n=76 (76%) Female n=24 (24%)
Ethnicity	Caucasian n=98 (98%) South East Asian n=1 (1%) African American n=1 (1%)
Position	Nurse n=30 (30%) Physician n=20 (20%) Pilot n=23 (23%) Paramedic n=27 (27%)
Service in Profession	18.41 (8.86)
Service in HEMS	7.51 (6.76)
PCL - PTSD Symptoms	1.95 (.22) <33 n=95 (95%) >33 n=5 (5%)
DASS – Depression	3.03 (3.26) Normal (0-9) n=85 (85.9%) Mild (10-13) n=6 (6.1%) Moderate (14-20) n=1 (1%) Severe (21-27) n=2 (2%) Extremely Severe (28+) n=0
DASS – Anxiety	2.00 (1.99) Normal (0-7) n=89 (90.8%) Mild (8-9) n=1 (1%) Moderate (10-14) n=6 (6.1%) Severe (15-19) n=1 (1%) Extremely Severe (20+) n=1 (1%)
DASS – Stress	4.49 (3.80) Normal (0-14) n=81 (83.5%) Mild (15-18) n=8 (8.2%) Moderate (19-25) n=5 (5.2%) Severe (26-33) n=3 (3.1%) Extremely Severe (34+) n=0

TABLE II Comparison of groups by PTSD symptoms

	PCL < 33 (*n*=95)	PCL > 33 (*n*=5)	*p*
Age	42.37 (7.85)	44.60 (10.19)	*n.s.*
Gender	Male 71 (74.7%) Female 24 (25.3%)	Male 3 (60%) Female 2 (40%)	*n.s.*
Service in Profession	18.27 (8.91)	21.00 (8.34)	*n.s.*
Service in HEMS	7.24 (6.57)	12.50 (9.11)	.09
PCL - PTSD	6.89 (6.80)	41.00 (5.15)	<.01
DASS - Depression	2.73 (2.86)	8.60 (5.32)	<.01
DASS - Anxiety	1.73 (1.50)	7.00 (3.46)	<.01
DASS - Stress	4.15 (3.43)	11.00 (4.95)	<.01

DISCUSSION

The present study was designed to assess the prevalence of trauma, depression, anxiety, and stress in western Canadian HEMS workers. The reported prevalence of PTSD symptoms in the present study is comparable to reports in the general population (i.e., 3.5-6.8%; Kessler, Berglund, Demier et al., 2005) and substantially lower than previous research in paramedics (i.e., 24.5%; Carleton et al., 2017). Instead, participants self-reported levels of depression, anxiety, and stress symptoms (i.e., 83-89% in the "normal" range on the DASS-21) that were particularly low and consistent with reports from the general population (i.e., > 80-94% normal; Crawford & Henry, 2003) and some reports from Emergency Medical Service (EMS) personnel (i.e., > 93% normal; Bentley, Crawford, Wilkins et al., 2013). Taken together, the self-reported symptoms of PTSD, depression, anxiety, and stress were lower in this population than expected.

There are several possible explanations for the current results. EMS workers may experience heightened occupational stress due to performance pressure and a lack of time to debrief (Young & Cooper, 1995) relative to the present sample. Whereas HEMS workers may see more severe cases, the frequency of missions may be lower, with substantially more time to rest and debrief between missions. Secondly, HEMS personnel might arrive at the scene after some other first responders (e.g., police) and may receive some preliminary information that may prepare them for the upcoming mission. Third, the hiring of HEMS personnel is particularly selective. As such, the selected sample may exhibit personality characteristics that provide psychological resiliency. Lastly, the participating organization provides some psychological counselling services to members, which may have been effective in alleviating mental health symptoms.

There is also an important possibility involving potential underreporting of mental health symptoms. Several researchers have suggested that underreporting of symptoms may be common among first responders and other PSP (e.g., police, firefighters, paramedics; Martin, Marchand, Boyer et al., 2009; Perrin, DiGrande, Wheeler et al., 2007). Underreporting may occur if participants fear for their job security or that they will encounter social pressures if diagnosed a mental health disorder (e.g., PTSD; Martin et al., 2009). A few months before the current study was conducted, a paramedic in Western Canada lost a professional license following self-declaration of a diagnosis of PTSD on his renewal application (Warnica, 2015). The case received significant regional news coverage at the time. While the data for the present study were collected using an anonymous online survey tool, the well-publicized case may have affected the responses. Participants may have feared that descriptive information would reveal their identity or may not have trusted that the survey was truly anonymous. As such, participants may have underreported their mental health symptoms.

Several other limitations apply to the current study. First, an online survey design was chosen. Although this provided data suitable for initially estimating prevalence rates, a diagnostic interview approach would have been more definitive and may have provided context for the results. Second, the study used a cross-sectional assessment of mental health indicators, whereas self-reported symptoms are likely to fluctuate over time (Richter & Berger, 2006). As such, future studies should examine these variables in a longitudinal fashion. Finally, the study employed a convenience sampling approach, which may have created a response bias. Participants with heightened mental health symptoms may not have felt comfortable completing the survey (e.g., because of the fear of re-experiencing traumatic events).

CONCLUSIONS

The current study provides important additions to the literature on first responders and other PSP, as well as providing directions for future research. To our knowledge, the current results are the first information on mental health among HEMS workers. Generally, the results indicated low levels of mental health concerns relative to other first responder and PSP groups. Future research should attempt to replicate the current results using diagnostic interview and, assuming the mental health concerns remain low, researchers should assess what might be underlying the unexpectedly low symptom levels. Until such research efforts have been undertaken, the results of the current study should be interpreted with caution.

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CONFLICT OF INTEREST DISCLOSURES

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AUTHOR AFFILIATIONS

*Department of Exercise and Sport Sciences, Ithaca College, Ithaca, NY, USA; †Saskatchewan Health Authority, Regina, SK; ‡Department of Psychology, University of Regina, Regina, SK, Canada.

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First to serve and protect, then to lead: Exploring servant leadership as a foundation for Canadian policing

Les Sylven* and Carolyn Crippen†

ABSTRACT

Canadian police leadership is in the spotlight. In May 2017, three Canadian government studies concluded that the organizational culture inside Canada's national police force was dysfunctional and appeared to lack a culture of leadership. Similar criticisms were levelled against other Canadian police agencies, and the new Commissioner of the Royal Canadian Mounted Police was specifically mandated to address workplace bullying, harassment, and abuse of authority. In August 2018, the Canadian Association of Chiefs of Police 2018 Executive Global Studies program called on police leaders to demonstrate "courageous leadership'" to address the predatory and exclusionary behaviours found inside their agencies. In this concept paper, an alternative view of leadership is put forward as a framework to address these challenges. Servant leadership is a moral/ethical perspective that should intuitively resonate with police officers, particularly the next generation of police leaders. To explore the case for adopting this leadership approach in Canadian policing, its foundational concepts are presented. A description of the limited academic research on servant leadership in policing is described, and the article concludes with recommendations and questions to direct future research on exploring servant leadership in the context of Canadian policing.

Key Words Canadian police culture; workplace harassment; police leadership; servant leadership; millennials; inclusion.

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INTRODUCTION

Canada's Police Leadership Challenge

Police officers in Canada, like their counterparts in other countries, begin their careers by pledging an oath of service. From that day forward, they strive to serve and protect their community to the best of their abilities. A review of annual policing awards in one Canadian province reveals that many officers serve others courageously and with great success (British Columbia Ministry of Justice, 2017). Yet, there are recent reports that the commitment to serve police officers, themselves, is not as visible in the ethos of Canadian police leadership.

For example, during the month of May 2017, three Canadian government studies concluded that the organizational culture inside Canada's national police force was dysfunctional. Fraser (2017), McPhail (2017), and Ferguson (2017) reported that the Royal Canadian Mounted Police (RCMP) was plagued by workplace incidents of abuse of authority, harassment, and bullying. The authors argued that, even after decades of previous studies, recommendations, and initiatives designed to shift the culture inside this iconic police institution, the RCMP still appeared to lack a positive culture of leadership.

Fraser (2017) explored why several high-profile members of the RCMP sued their employers for harassment, concluding that they did so because "…they had no confidence in the internal systems of the RCMP to deal with their concerns" (para.1). McPhail (2017) investigated 264 workplace harassment allegations reported to the RCMP Civilian Review and Complaints Commission, finding that: "Abuse of authority remains a significant problem within the RCMP" (p.5). Ferguson (2017) investigated the RCMP's mental health support system and concluded that the RCMP "…fell short of meeting member's mental health needs" (para.4.19).

Although these reports focused on the RCMP, editorial and opinion articles have appeared to generalize these findings to other Canadian police agencies. One such article was published in *The Globe and Mail* newspaper titled, "It's not just the RCMP: Police culture is toxic" (Bikos, 2017). The author, citing her experience as a former police officer in Ontario and the findings from her PhD research, wrote: "The issues

Correspondence to: Les Sylven, 1903 Mt. Newton Cross Road, Saanichton, BC, Canada V8M 2A9.
E-mail: les.sylven@csaanich.ca

in these reports are not new to police administrations and government bodies, and are far from just an RCMP problem" (para 8).

These three reports were released at a time when a national search was underway to find a new RCMP Commissioner (Harris and Crawford, 2017). The search concluded on April 16, 2018, when Assistant Commissioner Brenda Lucki was appointed the 34th Commissioner of the RCMP, the first woman to be appointed to the position on a permanent basis (Tasker, 2018). On May 10, 2018, Public Safety Minister Ralph Goodale, in his mandate letter to Commissioner Lucki (Goodale, 2018), clearly defined the leadership challenge that lay before her:

> In support of culture change, you will need to prioritize that the RCMP is free from bullying, harassment, and sexual violence, including a comprehensive response to the underlying issues identified in recent reviews undertaken by the Civilian Review and Complaints Commission for the RCMP and Sheila Fraser.

The Canadian Association of Chiefs of Police (CACP) also issued a leadership challenge to its 2018 Global Studies program participants (CACP Global, 2018). This cohort of 21 rising police leaders from across the country was tasked with investigating equity, inclusion, and fundamental respect in policing. After determining that, "Policing in Canada is experiencing a crisis of credibility, both internally and in the public eye, arising from the existence of exclusionary environments within police organizations" (p.4), their domestic and international research led them to conclude that the concept of authentic inclusion is essential to changing Canadian police culture. Their recommended strategies for creating authentic inclusion included challenging assimilation in police cultures, widening pathways to talent, and engaging in courageous leadership to address predatory and exclusionary behaviours.

This purpose of this article is to explore one way that Canadian police leaders might begin their task of rebuilding a new policing culture through a courageous leadership approach. This new police culture must be one that repairs historical organizational wounds, addresses countless new operational pressures, and is accepted by the next generation of police officers who, some believe, require a very different style of leadership (Barbuto and Gottfredson, 2016).

As theory can inform practice, we propose that current police executives might begin their task by exploring emerging leadership theories and perspectives (Dinh, Lord, Gardner et al., 2014). More specifically, that they consider a leadership perspective where police senior executives, managers, and supervisors strive first to serve and protect the needs of their police officers, much like their police officers strive first to serve and protect the needs of people in their communities. One such model is "servant leadership" as envisioned by Robert K. Greenleaf (1977/2002). This moral/ethical leadership approach has the potential to be used as a new lens to examine police leadership—one that sees leadership as an act of service, rather than an act of power.

To explore the case for servant leadership in Canadian policing, a brief summary of its foundational principles is presented in this paper. This will be followed by an overview of some of the academic research on servant leadership. The results of a literature search for existing research on servant leadership and policing is presented, and the article concludes with several important recommendations and questions that can guide future research.

Foundational Principles of Servant Leadership

At its core, the premise of servant leadership is that a leader's focus is first and foremost on serving the highest-order needs of his or her followers. Robert Greenleaf articulated this premise in a series of essays that would later become the foundation of the modern-day servant leadership perspective. In *The Servant as Leader* (Greenleaf, 1970), he described finding his inspiration in the Hermann Hesse short novel, *The Journey to the East* (1956). In the story, the humble servant, Leo, who is accompanying and assisting the travelers on their long journey, is later revealed to be the head of the ancient order that the travelers were searching to locate.

Although Greenleaf (1977/2002) did not provide a concise definition of a servant leader in his essays, he did describe who a servant leader is: "The servant-leader is servant first—as Leo was portrayed. It begins with the natural feeling that one wants to serve, to serve first. Then conscious choice brings one to aspire to lead" (p.27).

Continuing his articulation of the foundation of his philosophy, Greenleaf described a test to determine if the servant leadership approach is in action:

> The best test, and difficult to administer, is this: Do those served grow as persons? Do they, while being served, become healthier, wiser, freer, more autonomous, more likely themselves to become servants? And, what is the effect on the least privileged in society? Will they benefit or at least not be further deprived? (p.27)

Shifting the focus of leadership away from meeting the needs of the leader and towards the needs of the followers is not a modern idea. The historical philosopher Lao Tzu (1991), in the ancient text *Tao Te Ching*, identified this paradox thousands of years ago when he wrote:

> When the Master governs, the people are hardly aware that he exists. Next best is a leader who is loved. Next, one who is feared. The worst is one who is despised … The Master doesn't talk, he acts. When his work is done, the people say, "Amazing: we did it, all by ourselves!" (verse 17)

In his book, *The Case for Servant Leadership*, Keith (2015) identified several other historical figures who could be viewed as exemplars of the servant leadership ethos including George Washington, Abraham Lincoln, and Mahatma Gandhi. Keith also points to modern examples of servant leadership in the public lives of Dr. Martin Luther King, Cesar Chavez, and Nelson Mandela.

Keith (2015) broadly summarized servant leadership in terms of two basic leadership models—the power model and the service model. He wrote:

> According to the power model, leadership is about how to accumulate and wield power, how to make people do

> things, how to attack and win. It is about clever strategies, applying pressure, and manipulating people to get what you want. (p.19)

In contrast, Keith explains that the service model of leadership has a different focus: "The whole point of the service model is to be of service—to identify and meet the needs of others. It is about paying attention to others and treating them right" (p.23). He wrote that even with the passing of Robert Greenleaf in 1990, leadership students, academics, and experts such as Ken Blanchard, Stephen Covey, Peter Drucker, and Peter Senge have continued to see servant leadership as a positive and viable philosophy for modern leadership. At the same time, academic researchers have struggled to accurately measure it, apply it, and validate its effectiveness in day-to-day organizational life (Van Dierendonck, 2011).

Current Academic Research on Servant Leadership

Much of the scholarly debate on servant leadership has focused on its main criticism: the lack of a precise definition from where research can begin. In his synthesis of servant leadership research, Van Dierendonck (2011) wrote "…despite its introduction four decades ago and empirical studies that started more than 10 years ago, there is still no consensus about a definition and theoretical framework of servant leadership" (p. 1231). In an effort to move towards a definition, Van Dierendonck integrated the major academic servant leadership models into six overarching characteristics that are repeatedly displayed by servant leaders, as experienced from the point of view of followers (p.1232-1234). These were: (a) empowerment and development of others; (b) humility; (c) authenticity; (d) interpersonal acceptance; (e) providing direction; and (f) stewardship.

Using these six characteristics, Van Dierendonck (2011) contrasted Servant Leadership with the key characteristics of seven other well-known leadership theories: Transformational Leadership; Authentic Leadership; Ethical Leadership; Level 5 Leadership; Empowering Leadership; Spiritual Leadership; and Self-Sacrificing Leadership (p. 1234-1239). Although each of these leadership theories shared some differences and similarities with servant leadership, Van Dierendonck (2011) wrote, "None of the theories described above incorporate all six key characteristics, which puts servant leadership in a unique position" (p.1238).

More recently in the academic literature, Baldomir and Hood (2016) presented servant leadership "...as an ideal leadership approach for introducing and implementing change within the context of organizations" (p. 27). Building on Lewin's (1958) three steps of organization change (unfreezing, changing, and re-freezing), they suggest that applying the attributes of servant leadership during these steps will ensure that followers have what they need to successfully navigate difficult changes. This is particularly true when leaders fully accept their role as stewards of their organizations.

Recent literature has also suggested that organizations that adopt an ethos of servant leadership will be highly sought out by the newest generation of employees—the Millennials. Although some leadership scholars refute the idea that different generations require different leadership approaches (Rudolph, Rauvola, & Zacher, 2018), Barbuto and Gottfredson (2016) write that the generation of employees born between 1982 and 1999, soon to be the largest generation in the workplace, have very different needs. In particular, the Millennials reportedly have higher expectations for finding meaning in work, want more frequent and candid feedback, and want managers who are very supportive. Barbuto and Gottfredson explain:

> If organizations want to compete for and retain top Millennial talent, organizations must make themselves attractive to Millennials. This will require that organizations develop a leadership base that is suited to lead Millennials. We suggest that servant leadership is likely the optimal leadership style for creating an organization rich in human capital development and for making an organization a preferred work-place for the Millennial generation. (p. 59)

As academic leadership scholars continue to debate the precise definition and framework of servant leadership, several researchers have studied how the philosophy might be applied within the context of police leadership.

Literature Search for Servant Leadership in Policing

Although academic literature on police leadership abounds (Pearson-Goff & Herrington, 2014), servant leadership in policing is sparsely researched. For example, using the on-line CACP "RF Connect" search engine, the University of Victoria "Summon" library database, and Google Scholar, queries of the combined terms "Servant Leadership" with "Policing" and "Law Enforcement" resulted in only nine articles that directly referenced servant leadership and policing within their titles or abstracts.

Of the nine, three were brief articles published in the *FBI Law Enforcement Bulletin*. These articles by Pangaro (2010), Gardner & Reece (2012), and Barath (2013), were editorial in nature, and advocated for investment in servant leadership as a model that might address the impending challenges facing law enforcement executives. An additional abstract by Matteson (2009) published in the *Australian Law Enforcement Executive Forum Journal* also appears to highlight the perceived value of servant leadership for policing, stressing the critical role that supportive organizational relationships play in effective police leadership.

Three other articles located in the literature were each written to meet academic requirements. Two were doctoral dissertations, Cortrite (2007) and Badger (2017), while a third originated from a university-based police leadership development program (Warren, 2012). As with the previously cited articles, each advocated for the adoption of the servant leadership ethos in policing.

Cortrite (2007) framed his dissertation within the context of ethical police leadership. Identifying that police in America "have been mired in a succession of corruption scandals for the last 30 years" (p.vi), he conducted an action research project in which he introduced police employees to the philosophy of servant leadership through a series of workshops. He reported that his 48 study participants overwhelmingly embraced the servant leadership philosophy and agreed that "…servant leadership was a good fit for law enforcement in general." He also reported observing positive ethical changes in the employee's behaviour after the workshops.

The second doctoral dissertation was written by Badger (2017) who conducted a case study analysis on a Central California federal law enforcement agency office. Using focused interviews, he uncovered perceptions related to leadership, stress, and resiliency. Badger concluded that a positive correlation existed between three perceived servant leader behaviours (creating collaborative environments, promoting subordinate autonomy, and ethical and moral decision-making) and subordinates increased self-perception of resilience.

The final academic article located in this literature search was written by Warren (2012), who authored a "white paper" for a law enforcement leadership development program. Throughout the paper, Warren (2012) cites the work of Greenleaf (1977/2002) and other well-known leadership authors to make a case to include servant leadership in law enforcement leadership practice. Like Greenleaf, Warren singles out effective listening as the key competency of police servant leaders. He writes, "Listening and communicating will establish trust, keep problems from escalating, and can improve organizations" (p.6).

The remaining two servant leadership policing articles were located in peer reviewed academic journals. Vito, Suresh, & Richards (2011) studied the ideal leadership style of police managers in the United States by administering the Leader Behavior Description Questionnaire–XII (Stogdill, 1963) to participants in the Administrative Officer Course at the Southern Police Institute during the 2007–2008 academic year. A total of 126 questionnaires were completed by police managers from 23 different US states. In the analysis of the survey data, the authors found statistically significant values that indicated, "These police leaders believe that the ideal police leader should express and follow the values of servant leadership" (p. 681).

The final journal article was an essay written by Williams (2017) and referred directly to servant leadership within the context of community policing. Although recently published, it appeared to have been written at least 10 years earlier. In the article, Williams identified where Greenleaf's philosophy of servant leadership may link with the concept of community policing, and where it has points of conflict and tension. For example, he identified the concept of decentralized leadership found in local community police stations as a point of linkage with Greenleaf's philosophy of a bottom-up, grass roots power structure.

According to Williams (2017), a place of conflict between servant leadership and community policing is found in the training that new police recruits receive at the police academy. He argued that the philosophy of community policing is not the dominant philosophy taught to recruits. He wrote, "Consequently, training reinforces the power differential between officers and citizens and buttresses an "us versus them" mentality" (p.70).

In conclusion, Williams described that part of the true test of servant leadership as devised by Greenleaf is its impact on the least privileged in society. He wrote, "Rooted in the spiritual world and embraced by the major religions, servant leadership represents a sacred vision of leadership that contrasts to the secular and carnal practice of community policing and public administration." He continued:

> "Consequently, we must continue to ponder whether public (secular) organizations should and can advance the sacred practice of servant leadership by considering their points of linkage and places of conflict and tension" (p.71).

Overall, this on-line literature review on servant leadership and policing revealed several key themes. First, there is clearly a need for additional empirical research on the subject of servant leadership and policing. Second, although the empirical research conducted by Cortrite (2007), Vito et al. (2011), and Badger (2017) contributed new evidence, they were localized studies, with each author calling for more research before validating or expanding their findings. Finally, none of the research located in this literature review focused on the Canadian policing context.

Remaining Questions on Servant Leadership and Policing

Intuitively, the philosophy of servant leadership should be a natural fit for policing. Even junior police officers have an understanding of the philosophy of service—if not through the oath they take to serve and protect, then in the mottos found on the badges they wear: "To Serve and Protect" (Toronto Police Service); "Servamus" (Vancouver Police Department); and "Honour Through Service" (Victoria Police Department). Carrying the act of service into the practice of police leadership, with leaders striving to first serve the highest-order needs of their officers, is a concept that should resonate with most police supervisors and managers.

Moving forward, Crippen's (2004) recommendations for advancing servant leadership in the field of education, modified for the profession of policing, are a helpful guide for Canadian police leaders beginning their task of rebuilding a new policing culture. These recommendations are:

1. Servant leadership requires further investigation to determine its viability as a viable model for Canadian policing.
2. If seen as a viable model, the servant leadership ethos should be introduced in police recruit training programs and included in all aspects of police leadership development to ensure the philosophy becomes an accepted part of the profession.
3. There is a need for research into Canadian police agencies to identify currently existing servant leadership practices and development programs.

With these recommendations in mind, the following questions for further research arise:

1. What theories of leadership currently underpin Canadian police leadership development programs?
2. Can the characteristics of servant leadership identified by Van Dierendonck (2011) be developed in existing or future police leaders?
3. If servant leadership characteristics can be developed, how would this be done?
4. What might an effective Canadian police servant leadership development program look like?

CONCLUSIONS

This concept paper has identified that changes in the culture of Canadian police leadership are urgently required. As a first step, identifying alternative, courageous leadership approaches is highly recommended. Although much more exploration and research is required, the philosophy of servant leadership appears to hold some promise as a new police leadership ethos that may contribute to more respect and authentic inclusion in Canadian police agencies.

CONFLICT OF INTEREST DISCLOSURES

The authors state there are no conflicts of interest.

AUTHOR AFFILIATIONS

*Central Saanich Police Service, Saanichton, Vancouver Island, BC; †Department of Educational Psychology and Leadership Studies, Faculty of Education, University of Victoria, Victoria, BC, Canada.

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ORIGINAL RESEARCH

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Survivability factors for Canadian cyclists hit by motor vehicles

Simon Demers*

ABSTRACT

Police-reported data from Transport Canada's National Collision Database (NCDB) are analyzed with a view to identify and quantify various factors that can impact the survivability of cyclists involved in a motor vehicle collision. A Least Absolute Shrinkage and Selection Operator (LASSO) regression and a multiple imputation (MI) process address the variable selection and missing data problems, respectively. The resulting probabilistic model suggests that collision survivability depends largely on the cyclist's age and helmet usage. Survivability improves with age up to age 21, peaks for cyclists aged 21 to 34, and falls after age 35. Controlling for age and other factors, a bicycle helmet reduces the risk that a cyclist fatality will occur by approximately 34% (OR: 0.66, 95% CI: 0.56-0.78). Survivability in general, and the apparent safety benefits of bicycle helmets in particular, do not appear to depend on the sex of the cyclist once the type of collision and other factors are controlled for. Head-on and rear-end collisions tend to be more deadly. Certain environmental and situational variables, like strong winds and traffic control devices, also appear to impact survivability. There might be opportunities to sensitize cyclists of various age groups about the risks they are exposed to while cycling, and prevent or better protect cyclists from head-on and rear-end collisions.

Key Words Bicycle; helmet; injury; fatality; motor vehicle; collision; National Collision Database; Transport Canada

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INTRODUCTION

Although there is already an extensive body of empirical research on cyclist safety and cyclist injuries, few studies have been able to analyze cyclist fatalities on a large scale. This reflects the fact that fatal cyclist incidents are relatively rare occurrences, which means extensive data collection procedures are typically required before there is enough data available to make reliable inferences. Pinpointing and quantifying fatality risk factors for cyclists remain elusive objectives, especially in the Canadian context (Gaudet, Romanow, Nettel-Aguirre et al., 2015).

The motivation for this research note is to fill a gap in the literature on cyclist safety by studying cyclist fatalities using 16 years of police-reported data on cyclist-involved motor vehicle incidents collected as part of Transport Canada's National Collision Database (NCDB).

We model the mortality risk for cyclists using a probabilistic (logit) regression model that controls for some situational variables and personal characteristics of the cyclists involved. The empirical strategy consists in comparing cyclists who died with those who did not die after being involved in a motor vehicle collision. The analysis is based on police-reported incident data, which follows in the footsteps of Kim, Kim, Ulfarsson et al. (2007) using North Carolina data, Wang, Lu and Lu (2015) using Kentucky data, and Bíl, Bílová and Müller (2010) using data from the Czech Republic.

With some exceptions (Rivara, Thompson, & Thompson, 1997; Curnow, 2003), previous epidemiological studies on bicycle injuries have generally concluded that bicycle helmets provide substantial, measurable protective benefits. More specifically, researchers have found empirical evidence suggesting that bicycle helmets contribute to reduce the risk of loss of consciousness, intracranial injuries, and significant traumatic brain injuries (Sethi, Heidenberg, Wall et al., 2015), head and brain injury (Thompson, Rivara, & Thompson, 1989; Thompson, Rivara, & Thompson, 1996), concussion or other injuries requiring hospital admission (Linn, Smith, & Sheps, 1998), major head injuries (Spaite, Murphy, Criss et al., 1991), as well as severe or incapacitating injuries (Moore, Schneider, Savolainen et al., 2011). Despite all this evidence, few studies until now have been able to quantify how helmet usage impacts the risk of a cyclist fatality at the incident- and person-level. The NCDB data offer a rare opportunity to fill that gap.

METHODS

Through the NCDB, Transport Canada has made available to the public detailed records of all police-reported motor vehicle collisions on public roads in Canada from the

Correspondence to: Simon Demers, Affiliation: Planning, Research & Audit Section, Vancouver Police Department, 3585 Graveley St., Vancouver, BC V5K 5J5, Canada.
E-mail: simon.demers@vpd.ca

1999-2014 period. Each province and territory provides the data to the Canadian government for national reporting and analysis purposes.

All the statistical analysis was conducted using the statistical package R and is based on the electronic dataset released in the public domain on September 24, 2016 (Record ID: 1eb9eba7-71d1-4b30-9fb1-30cbdab7e63a). The latest version of the dataset is available directly from the Open Government Portal (Transport Canada, 2016).

Out of 5,860,405 public NCDB records, there is a subset of 122,907 cyclist records where a motor vehicle hit a bicycle (or vice versa). These cyclist records are identifiable using the variables representing the class of road user (P_USER=4) or, interchangeably, the vehicle type (V_TYPE=17).

For each cyclist, the public dataset contains collision-level data elements (incident year and month, time of day, collision severity, collision configuration, roadway configuration, weather conditions, road surface, road alignment, traffic control), vehicle-level characteristics (vehicle type and model year), and person-level data for each person involved (sex, age, injury severity, safety devices used). Within the injury severity field (P_ISEV), a collision is considered fatal if the cyclist died on impact or within 30 days after the collision (except in Quebec, where the time limit is eight days). Deaths from natural causes are excluded. The NCDB Data Dictionary provides more details on how each variable is defined and coded (Transport Canada, 2016).

Data Preparation

For analysis purposes, we merge the group of injured cyclists (P_ISEV=2) with those who did not sustain any reportable injury (P_ISEV=1) according to the NCDB data. This allows us to create a binomial response variable (Y) which captures whether the cyclist died as a result of the motor vehicle collision (Y=1) or not (Y=0). This is the outcome variable we want to model in a probabilistic manner. Our dichotomous approach has the advantage of removing a lot of subjective judgment since the severity of injuries is only assessed on a fatal or non-fatal basis, which means we do not need to rely on police injury severity scales that otherwise tend to correlate poorly with official medical assessments (Agran, Castillo, & Winn, 1990).

In order to properly capture the fact that the mortality curve may not be a linear, smooth polynomial or even monotonic function of age, we divided the data between 13 distinct age groups. The largest group consists of cyclists aged 21–34 inclusively. The youngest group consists of cyclists under seven years old. The oldest group consists of cyclists aged 70 years or older. The other groups cover ages 7–11, 12–15, 16–20, 35–39, and every subsequent five-year range up to age 65–69. Age is often taken to be a relevant risk factor for cyclists, but the level of granularity varies greatly between studies. For context, Siman-Tov, Jaffe, Israel Trauma Group et al. (2012) only compared children against adults, and Thompson et al. (1989) limited their analysis to three age groups: younger than 15, 15–24 and 25 years or older. Thompson et al. (1996) relied on four age groups: younger than 6, 6–12, 13–19, and 20 years or older. More recently, Gaudet et al. (2015) used five age categories: younger than 10, 10–19, 20–44, 45–64, and 65 years or older. Several other research efforts have focused specifically on children (Linn et al., 1998; Agran et al., 1990) or adults only (Bíl et al., 2010), in which case empirical comparisons between age groups are impossible.

Probabilistic Model

The workhorse model we rely on for statistical analysis purposes is a logistic regression where the probability of a cyclist death following a motor vehicle collision, conditional on observed person-level and incident-level characteristics (captured by vector x), is modelled in accordance with Eq. (1):

$$\Pr(Y = 1|X = x) = \frac{\exp(\beta_0 + \beta^T x)}{1 + \exp(\beta_0 + \beta^T x)} \quad (1)$$

We first use a Least Absolute Shrinkage and Selection Operator (LASSO) regression to identify in a principled manner a subset of useful covariates and prune out those variables that have the least explanatory power. This approach encapsulates an inherent preference for sparsity and allows us to identify which factors have the strongest relationship with survivability, while minimizing superfluous interaction terms and redundant or statistically insignificant variables (Tibshirani, 1996). In other words, this serves as a regularization step that allows us to identify in the first instance which explanatory variables we should focus on for further analysis purposes.

For estimation purposes, we make available to the LASSO regression model a total of 135 regression terms: 122 individual factors plus 13 interaction terms that allow for the effect size of helmet usage to vary depending on the cyclist's sex and age group. The interaction terms allow us to test whether bicycle helmets tend to offer more life-saving benefits to cyclists in certain age groups and/or sex category.

As a second step, we build a standard logistic regression model (Model A) incorporating only the explanatory variables deemed to be important by the LASSO regression. This allows us to confirm that the preliminary findings from the regularization step are plausible and establishes a baseline model against which we will be able to compare our final results.

Missing Data

Unfortunately, several data records in the NCDB are incomplete or are not coded in an internally consistent manner. This includes, for example, the sex (20.4% missing) and age (26.0% missing) fields. The field intended to capture whether the cyclist was wearing a helmet at the time of the incident (P_SAFE) is especially problematic because it is impossible to conclusively confirm helmet usage in 76,731 cases, representing 62.4% of the entire NCDB sample.

In order to address the loss of statistical power and possible regression bias created by the missing data points (Fichman & Cummings, 2003), we rely on a multiple imputation (MI) process. This consists in filling in the missing values in a principled manner so that the analysis can proceed as if the dataset contained complete observations instead of automatically dropping all incomplete cases for which some data point is missing. The key is to properly reflect imputation uncertainty and this is accomplished by creating multiple synthetic datasets containing different imputed data points.

We accomplish the MI task and simulate five synthetic, but complete, datasets using the *Amelia* package in R

(Honaker, King, & Blackwell, 2011). The data are repeatedly simulated (imputed) based on the information available in the dataset. In each imputed dataset, the missing values are filled in using different imputed values that reflect approximately the uncertainty around the missing data.

Once MI has been used to fill in the missing values, all the usual statistical tools designed for complete cases can be used to conduct the analysis. In the pooled MI regression (Model B), the reported coefficient estimates simply reflect the average of the point estimates obtained from the five separate regressions based on each imputed dataset. The variance associated with each coefficient estimate in the pooled regression, for its part, reflects the average within imputation variance that captures model uncertainty plus a measure of between imputation variance that captures imputation uncertainty (Rubin, 1987; Marshall, Altman, Holder et al., 2009).

For reference, the flowchart in Figure 1 summarizes the analysis steps.

RESULTS

Out of the 122,907 individual cyclists involved in a police-reported motor vehicle collision on a public road in Canada between 1999 and 2004 inclusively, 895 died according to the NCDB. Table I shows the number of cyclist collisions and deaths in the NCDB by year.

This represents an average rate of approximately 73 cyclist fatalities per 10,000 collisions (95% CI: 68-78) or 1.7 cyclist fatalities per million person-years based on Statistics Canada's population numbers (Statistics Canada, 2018). This cyclist fatality rate is slightly lower than (but still comparable to) previously published estimates. Based on data from the Office of the Chief Coroner of Ontario, Wesson, Stephens, Lam et al. (2008) reported a mortality rate of 2.3 per million person-years across the 1991–2002 period, but observed a lower rate of 2.0 per million person-years specifically after the introduction of bicycle helmet legislation targeting children under 18 years old. In the United States, based on FARS data, Meehan, Lee, Fischer et al., (2013) found annualized fatality rates of 2.0 per million children and 2.5 per million children

TABLE I Police-reported cyclist collisions and deaths in the NCDB

Year	Collisions	Deaths
1999	8,674	69
2000	8,029	40
2001	8,221	59
2002	8,019	63
2003	8,062	45
2004	8,494	58
2005	8,390	52
2006	8,025	75
2007	7,746	67
2008	7,082	44
2009	7,144	44
2010	7,199	61
2011	7,078	56
2012	7,415	61
2013	7,109	62
2014	6,220	39
TOTAL	**122,907**	**895**

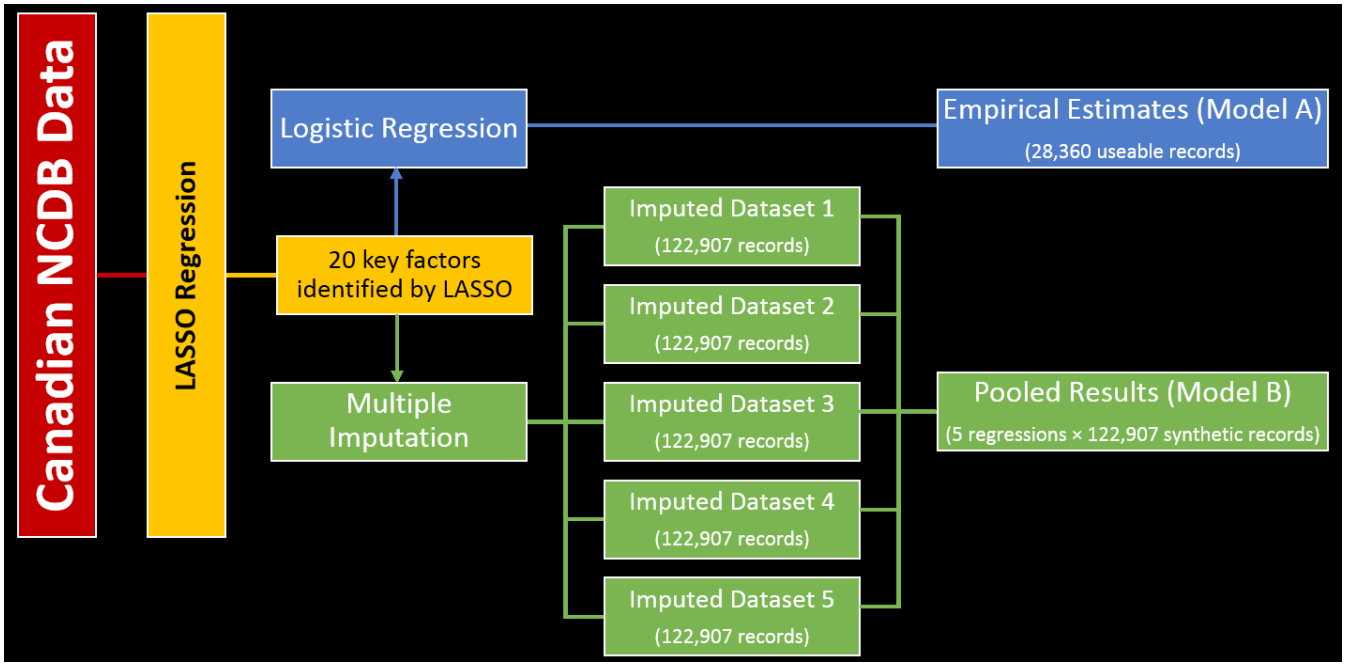

FIGURE 1 Analysis flowchart. The LASSO regression is used to identify which variables are included in the baseline logistic regression (Model A) and need to be manually imputed (Model B). The reported estimates from Model B reflect the pooled analysis results combining all five imputed datasets.

in states, respectively, with and without bicycle helmet safety laws. For the period between 1996 and 2005, Nicaj, Stayton, Mandel-Ricci et al. (2009) reported annualized rates of 1.8 to 2.3 per million residents for Chicago, Boston, Washington, Los Angeles, Philadelphia, and New York (in increasing order).

The main regression results from Model A and Model B are summarized side-by-side in Table II. For greater clarity, Model A is the regular logistic regression model that combines the relevant subset of factors identified by the sparse LASSO regression. Model B includes the same subset of explanatory variables as Model A, but is able to leverage the entire NCDB dataset instead of just the complete cases because it relies on the pooled MI data. Both models use only 20 explanatory variables (plus an intercept coefficient): a relevant subset of eight plausible predictors of survivability as identified by the LASSO model (including helmet usage) and dummy variables representing each age group (except the 21–34 baseline group).

Age is correlated strongly with cyclist survivability. This finding is consistent with earlier studies, including, most recently, Gaudet et al. (2015) and Behnood and Mannering (2017). As anticipated, however, the relationship is not linear or monotonic. This is illustrated by Figure 2.

Cyclists younger than 21 years old are roughly 45–55 per cent more likely to die subsequent to a cyclist collision relative to those in the baseline 21–34 age group. This is consistent with previous empirical evidence that suggested children may be more vulnerable than adults to serious injury in general (Rivara et al., 1997) and head injury in particular (Thompson et al., 1989), especially in a cycling setting. Always relative to the 21–34 age group, the mortality risk becomes 80 per cent higher by age 35–39 (OR: 1.80, 95% CI: 1.34-2.43), doubles for cyclists aged 40–54, triples for cyclists aged 55–59 (OR: 3.05, 95% CI: 2.22-4.19), more than quadruples for cyclists aged 60–69, and continues to worsen for cyclists who are 70 years or older (OR: 8.53, 95% CI: 6.35-11.46).

The mortality risk for a cyclist involved in a head-on collision increases three-fold (OR: 3.12, 95% CI: 2.37-4.12). Rear-end collisions (OR: 4.87, 95% CI: 4.03-5.88) and collisions where the cyclist was run off the right shoulder (OR: 5.94,

TABLE II Regression results: the corresponding odds ratio (OR) is reported to the right of each estimated regression coefficient; all the reported coefficients except two are statistically significant at least at the 95% confidence level; confidence intervals are provided for Model B (95% CI), reflecting the fact that it is intended to be the final empirical model

	Model A (Reduced)		Model B (Pooled MI Data)		
Factor	**Estimate**	**OR**	**Estimate**	**OR**	**[95% CI]**
Helmet	-0.53[a]	0.59	-0.41[a]	0.66	[0.56-0.78]
Ran off right shoulder	2.61[a]	13.60	1.78[a]	5.94	[3.07-11.50]
Rear-end collision	1.58[a]	4.85	1.58[a]	4.87	[4.03-5.88]
Head-on collision	1.52[a]	4.57	1.14[a]	3.12	[2.37-4.12]
Passing or climbing lane	5.25[a]	191	1.88[b]	6.54	[1.01-42.23]
Strong wind	2.25[a]	9.50	1.63[a]	5.11	[2.02-12.93]
Stop sign	-0.55[a]	0.58	-0.53[a]	0.59	[0.46-0.76]
No traffic control	0.30[b]	1.36	0.42[a]	1.53	[1.31-1.79]
Age 6 and younger	1.73[a]	5.63	0.45[b]	1.56	[1.04-2.35]
Age 7 to 11	0.66[b]	1.94	N.S.	N.S.	[0.90-1.74]
Age 12 to 15	0.45[c]	1.57	0.38[a]	1.46	[1.10-1.95]
Age 16 to 20	0.57[b]	1.76	0.37[a]	1.45	[1.11-1.90]
Age 21 to 34	Baseline	1.00	Baseline	1.00	Baseline
Age 35 to 39	0.93[a]	2.54	0.59[a]	1.80	[1.34-2.43]
Age 40 to 44	0.68[a]	1.98	0.65[a]	1.92	[1.44-2.58]
Age 45 to 49	0.64[b]	1.90	0.68[a]	1.98	[1.44-2.73]
Age 50 to 54	0.82[a]	2.27	0.71[a]	2.03	[1.47-2.80]
Age 55 to 59	1.59[a]	4.90	1.11[a]	3.05	[2.22-4.19]
Age 60 to 64	2.01[a]	7.49	1.43[a]	4.20	[3.03-5.82]
Age 65 to 69	1.83[a]	6.24	1.63[a]	5.08	[3.54-7.29]
Age 70 and older	2.38[a]	10.85	2.14[a]	8.53	[6.35-11.46]
No. of observations	**28,360**		**122,907**		

[a] Statistically significant at the 99% confidence level.
[b] Statistically significant at the 95% confidence level.
[c] Statistically significant at the 90% confidence level.
N.S. = not statistically significant (or different from the baseline).

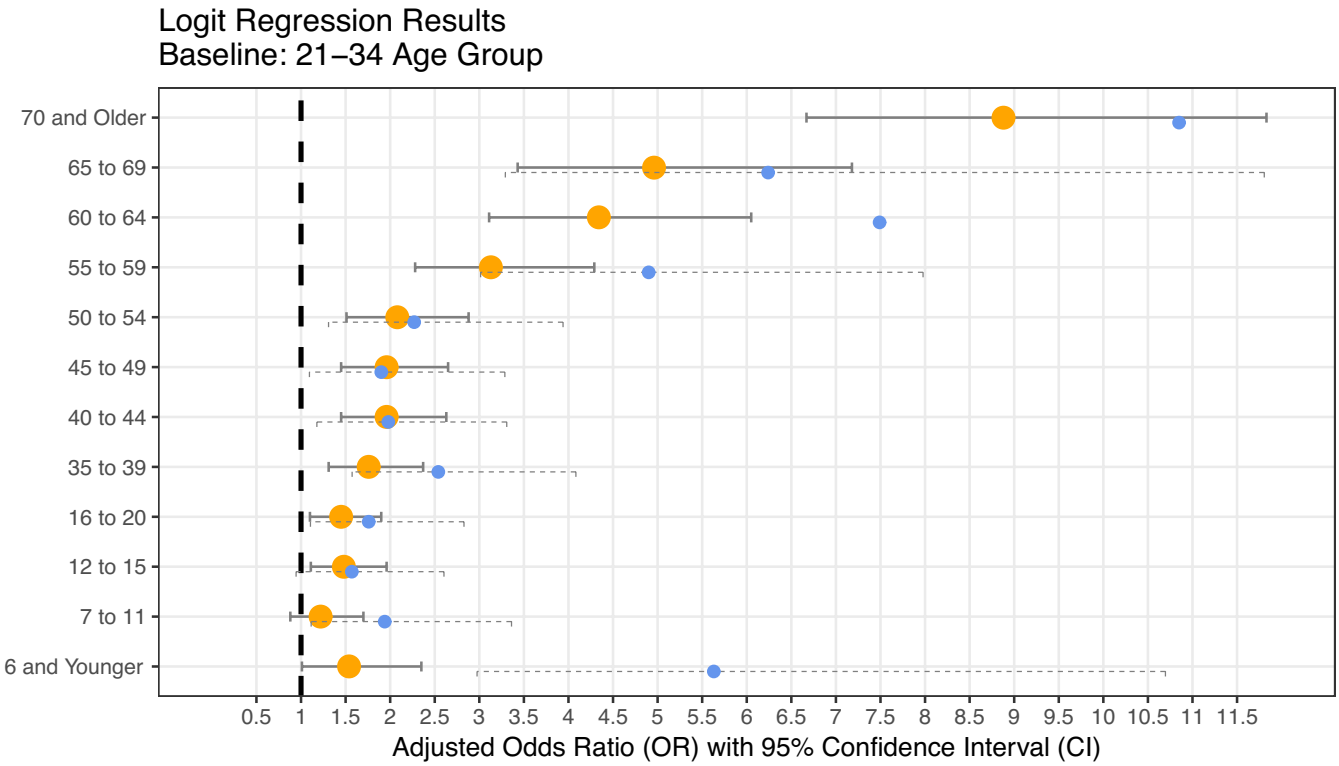

FIGURE 2 Adjusted odds ratios and 95% confidence intervals by age group. For comparison purposes, the pooled analysis results from Model B (top lines) are presented side-by-side with Model A estimates (bottom dashed lines). Model B tends to deliver estimates that are simultaneously more conservative (ORs usually closer to 1) and more precise (with shorter confidence intervals) relative to Model A. The confidence intervals produced by Model A for two age groups (60–64 and 70 years and older) are not shown because they extend beyond the maximum range of the horizontal axis.

95% CI: 3.07-11.50) are, respectively, five and six times more deadly than other types of cyclist collisions. Cyclist collisions that occur in strong wind conditions are also five times more deadly (OR: 5.11, 95% CI: 2.02-12.93). We hypothesize, without being able to offer any supporting evidence, that this might be because the cyclists or motorists involved in these types of collisions may not have as much opportunity to mitigate the force of the impact (e.g., by applying the brakes, swerving, or bracing themselves just before the accident).

The absence of traffic control device increases the mortality risk for cyclists involved in a collision by 53 per cent (OR: 1.53, 95% CI: 1.31-1.79). It might be because these cases tend to involve faster speeds, or tend to occur in more isolated areas where the ambulance response times are longer or in rural areas where emergency care is less specialized. By comparison, cyclist collisions that occur at or near an intersection controlled by a stop sign tend to be 41 per cent less deadly (OR: 0.59, 95% CI: 0.46-0.76).

Everything else being the same, wearing a helmet improves survivability for cyclists involved in a traffic collision, but there is no measurable difference between sex or age groups in terms of life-saving benefits, which is consistent with earlier findings by Thompson et al., (1996). Helmet use reduces the risk that a cyclist fatality will occur by approximately 34 per cent (OR: 0.66, 95% CI: 0.56-0.78). This level of efficacy for bicycle helmets falls within the statistical range obtained by Attewell, Glase and McFadden (2001) based on a meta-analysis of earlier studies on bicycle helmets published between 1987 and 1998 (95% CI: 0.10-0.71), and Olivier and Creighton (2016) from another meta-analysis of quantitative studies (95% CI: 0.14-0.88). Separately, Joseph, Azim, Haider et al. (2017) reported a mortality OR of 0.56 (95% CI: 0.34-0.78) based on an analysis of National Trauma Data Bank (NTDB) data compiled by the American College of Surgeons.

DISCUSSION

Despite the fact that adult males appear to be consistently overrepresented in cyclist fatalities (even taking into account the number of collisions), as shown by several previous epidemiological studies and the raw Canadian NCDB data itself, male cyclists who are involved in a motor vehicle collision are NOT more likely to die than female cyclists, everything else being equal. This apparent contradiction can be reconciled by recognizing that male cyclists involved in motor vehicle collisions tend to be older than their female counterparts (average age of 30.8 vs. 28.8), are less likely to wear a helmet (51.2% vs. 58.1%), are more likely to be rear-ended (5.1% vs. 3.7%) or be involved in a head-on collision (2.1% vs. 1.6%), and are more likely to be involved in collisions where there is no traffic control device (50.1% vs. 47.1%) as opposed to an intersection controlled by a stop sign (20.8% vs. 23.4%). Those are all detrimental risk factors for male cyclists, as shown by Table II.

One obvious weakness with the NCDB data is that we cannot differentiate cases that involved a head impact or a

head injury from those that did not involve a head impact or a head injury. Of course, if cyclists tend to die from injuries other than head injuries or head trauma, then bicycle helmets would essentially make no difference on the mortality risk. Based on a detailed review of case files from the Coroner's Office, Gaudet et al. (2015) found that 72 per cent of the cyclists who died in a motor vehicle collision in Alberta between 1998 and 2011 suffered head injuries. A similar review in New York City found that 77 per cent of the bicycle fatalities that occurred there between 1996 and 2005 involved a head injury (Nicaj et al., 2009).

Unlike Nicaj et al. (2009), Gaudet et al. (2015) and others, we are also unable to consider alcohol or drug use as possible risk factors because these factors are not available in the public NCDB dataset. We also do not know the speeds involved in each case or the type of motor vehicle that collided with each cyclist. These shortcomings would need to be addressed in follow-up studies or through supplemental data.

CONCLUSIONS

The police-reported data in Transport Canada's NCDB offer researchers a rare opportunity to analyze cyclist fatalities and, more specifically, the relative mortality risk associated with various environmental and situational factors.

Our analysis delivers new findings and reaffirms several existing ones, especially around the life-saving benefits of bicycle helmets. Among others, the NCDB data suggest that wearing a helmet can reduce the risk that a cyclist fatality will occur by approximately 34 per cent (OR: 0.66, 95% CI: 0.56-0.78). This means there might be opportunities to remind cyclists about the life-saving benefits of bicycle helmets and reinforce helmet usage through enforcement.

Head-on and rear-end collisions tend to be especially more deadly. Certain environmental and situational variables like strong winds and traffic control devices also appear to influence survivability, independently from the type of collision or the characteristics of the cyclist. These findings suggest that there might be opportunities to better protect cyclists involved in certain types of collisions or look for ways to prevent these collisions in the first place.

Since collision survivability appears to improve for younger cyclists up to age 21, peaks between age 21 and 34, and then decreases after age 35, there might be opportunities to sensitize cyclists in different age groups about the risks they are exposed to. These results also show that it is useful to control for the size of each age group when analyzing aggregate, population-level trends around cyclist fatality rates.

CONFLICT OF INTEREST DISCLOSURES

A version of this paper was submitted to and accepted by the 2018 Conference of the Canadian Association of Road Safety Professionals (CARSP). It will be presented at the Conference in Victoria, BC in June 2018, and is expected to eventually appear in the Conference Proceedings. These Conference Proceedings will be accessible only to CARSP members, through the secure CARSP website. The author states that there are no conflicts of interest.

AUTHOR AFFILIATIONS

*Planning, Research & Audit Section, Vancouver Police Department, Vancouver, BC, Canada.

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COMMENTARY

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Taking back the power: The link between poverty and Canada's sex industry

Sandra Hodzic,* Robert Chrismas†

Despite the investment in sophisticated and well-funded counter-exploitation strategies in Canada, women and children continue to be trafficked and sexually exploited each day. Research has provided significant findings, demonstrating close correlations between poverty, homelessness, and deprivation of opportunities for education and employment, and lacking resilience to being targeted and oppressed in the sex industry (Chrismas, 2017).

Cullen-DuPont (2009) has described how traffickers identify people who are desperate to escape poverty by luring them with lies, such as the promise of legitimate work. In some cases, parents sell their children in hopes of a better life. Tragically, however, the hope of legitimate work often turns into torture and servitude to the sex industry.

Chrismas (2017) has characterized the sex industry in Canada as amounting to 21st century slavery, in which children and young women are, at first, lured and then captured in a fully entrenched culture of torture. Human trafficking is the recruitment, transportation, transfer, harbouring or purchase of persons for the sole purpose of exploitation (Glowbal Act, 2018). It happens to men and women, but the base majority of exploited people in Manitoba are women, often introduced to the sex trade industry at an early age. This paper provides context around the impacts that poverty and homelessness have on those who are trafficked, along with recommendations for those looking to get out.

CONTEXT

Human trafficking involves the illegal transport of people from one place to another to advance forced labour for sexual or commercial gain. The United Nations Office on Drugs and Crime (UNODC) Global Report on Trafficking in Persons 2014 states that human trafficking is universally on the rise (UNODC, 2014; see also Nelson, 2014; Canadian Women's Foundation [CWF], 2014). In Manitoba, there is a growing sense of urgency and need for strategies to combat sexual exploitation and trafficking. Issues around missing and murdered Indigenous women and children (Welch, 2014) continue to shape the public narrative, and government and non-government agencies are increasingly pressed to find more effective ways to respond. These issues have been a rising priority for most police agencies across Canada, as-well-as for leaders in the broad spectrum of partnering agencies (Friesen, 2014; CBC, 2014). Tina Fontaine's murder, among others, has served as a tragic reminder that there is much work to be done to prevent the oppression of vulnerable citizens (Paperney, 2009).

Most sex industry survivors are oppressed, not only from the trauma of being exploited, abused, beaten, and neglected, but also most often from being lost in a sea of fragmented social services and programs that are difficult to navigate. Some elements of our system work well together, while others work in isolation, and some work against each other due to opposing philosophies and competition over limited resources (Chrismas, 2017). Now, more than ever, provincial governments are facing persisting challenges to do more with less money, and fewer resources, due to shrinking federal transfers and a changing demographic, which has placed pressure on the social services sector. Resources that are available are scarce, and social service agencies often struggle to become noticed and ensure their programming is seen as a central priority in order to continue receiving funding supports. This often means that prevention programs are not funded, or not at the same rate as other programs, due to competing demands and political priorities. While most governments strive to strengthen our social safety net, the finite and scarce nature of public resources tackles some problems, but not all. This means that governments, alone, cannot resolve all social ills. Strengthening our social fabric is everyone's responsibility, and individuals in the private and not-for-profit sectors need to be a part of the solution to this set of interconnected social issues that drive marginalized people to a path of destruction. Conventional wisdom in public service is that no one agency can move the needle on most social problems; rather, multiple systems must be coordinated in order to make headway on almost any significant social problem, including human trafficking.

The maze that drives and holds many vulnerable individuals in the sex industry includes unlimited combinations of factors including family dysfunction, educational difficulties, poverty, chemical and substance abuse, involvement with child protective services, friends or family who are involved in trading sex, running away from home, homelessness, school delinquency, and sexual activity. Among these, research suggests that homelessness is an influential factor in individuals entering the sex industry, and it is a fundamental challenge that impoverished people face.

Correspondence to: Robert Chrismas
E-mail: robertwchrismas@hotmail.com

Raising healthy families is a pre-cursor to stable employment and a necessity for good mental health, something that victims in the sex trade lack. There is overwhelming evidence of the positive correlation between stable housing and home ownership and overall improved quality of life (Partnership for Strong Communities, 2018). Stable home environments, including home ownership, lead to increased community involvement and more economic participation, which gentrifies neighbourhoods, attracts skilled labour, and improves overall job creation (Nelles, 2016). This leads to higher post-secondary graduation rates, better health, increased future earnings' potential, and a better life, which also allows people to be more resilient and less vulnerable to sexual exploitation.

Homeless individuals often come from low-income backgrounds and lack social capital, which Burton refers to in his study of financial and material needs (Burton, 1997). Statistics Canada reported in 2015 that one in five children in Canada's major cities lived in low-income households in 2015 (Press, 2017). Generally speaking, the incidence of low income has been increasing for most subpopulations in Manitoba, as well as at the national level. The percentage of Manitobans living in poverty increased by 21 per cent from 2008 to 2015 compared to an increase of eight per cent for Canada as a whole. Among Indigenous peoples living off-reserve more specifically, poverty rates increased by 54 per cent between 2008 and 2015 (Government of Manitoba, 2018b).

Homelessness drives many people into survival sex, especially in places with harsh winter climates that are so cold one could easily die or lose limbs if safe refuge is denied. Chrismas (2017) documented strong evidence that traffickers specifically target those who are vulnerable due to homelessness and impoverishment, by offering them a means to survive and have a roof over their heads. Affordable housing is a crucial factor in assessing poverty and measuring vulnerability. Some individuals' challenges have been mitigated through government support programs, such as Manitoba Government subsidies that provide over 35,000 affordable housing units to people in need (Government of Manitoba, 2018b). Many of these individuals are unable to access government supports when they need them, because they are either unaware of available programs, or they are busy just trying to stay alive.

While we all know of individuals from disadvantaged environments who later became successful, the fate for most people is to live and die as members of the same socioeconomic classes into which they were born. MacLeod (1995) found that "social reproduction processes" tend to keep people locked in their place in the social-economic order. Following residents of one urban neighbourhood longitudinally, over several decades from childhood on, Macleod found that social structures create a destiny that is difficult to escape. The same dynamics seem to be at play with respect to sex industry survivors. Impoverishment and the related lack of opportunities are clearly linked to people resorting to survival sex. In Canada, and in particular in the Prairies, having a warm refuge from dangerously cold climates is a condition of survival and many resort to trading sex for shelter during the cold winter months. Housing in this context becomes not just a matter of stability, but an urgent matter of life and death.

Previous research has revealed that women who are sexually exploited tend to experience alarming levels of direct physical violence and abuse. Farley (2003), for example, found that most women and youth who are sexually exploited are trapped in violent exploitative relationships where they live in fear, which eventually takes a toll on their mental and physical well-being. A study of 854 survivors in nine countries revealed that violence is the common experience for people in the sex industry (Farley, 2003). Women and youth reported being routinely subjected to various forms of oppression and violence including sexual harassment, verbal abuse, stalking, rape, battering, and torture (Farley, 2003). The lack of housing exacerbates these problems should they try to escape. Chrismas found that even when housing exists, lack of security is a layered problem for survivors as traffickers are relentless in harassing them; housing that is safe and secure is an additional problem for them.

There is a growing awareness of the oppression that Indigenous women and children have suffered historically, and continue to endure in the present day. A substantial body of research has confirmed that Indigenous communities in Canada are still suffering the impacts of colonization (Ham, 2014; Younging, 2009). First Nations women and girls are four times more likely than mainstream Canadians to live in crowded conditions and/or in homes that are in states of ill repair (Mandel, 2016). The continuing marginalization of Indigenous people has also been long-established in the literature that documents higher crime rates, lower employment rates, and overall poor educational outcomes in relation to other Canadians (Hallett, Thornton & Stewart, 2006).

Indigenous people are migrating in increasing numbers from impoverished reserves into poor neighbourhoods in Canada's urban centers (Norris, Beavon, Guimond et al., 2000; Norris, Kerr & Nault, 1995). Street gangs often provide the identity and structure that children need and are not finding at home (Comack et al., 2009; Totten, 2009). The need for a sense of belonging and access to life's basic necessities of food, clothing, a bed to sleep in, and social interaction are often an acceptable tradeoff for children who succumb to being sexually exploited. Intervention and exit strategies for sexually exploited Indigenous girls must consider these deep-rooted transgenerational impacts and culturally appropriate interventions.

Sociologist Patricia Hill Collins wrote about the overlapping forms of oppression that many women face in society (Collins, 2009). Multiple oppressive forces affect many young women, making them vulnerable to exploitation. Women involved in the sex industry also continually face judgments in society (Amahazion, 2014; Lozano, 2010; Doezema, 1998), often denied protection and security in their work and lives that others take for granted (Kempadoo & Doezema, 1998). The five vulnerability factors most often mentioned in the Canadian Women's Foundation (2014) research were: (1) being female, (2) being poor, (3) having a history of violence or neglect, (4) a history of child sexual abuse, and (5) a low level of education.

Sociologists have coined the term intersectionality to explain multiple disadvantages and challenges that oppressed people face (Grace, 2014; Hankivsky, 2011; McCall, 2005). Grace (2014) highlights that intersectionality researchers "consider complex interactions between structures of

power and oppression and interconnected aspects of individual and group identity and social location" (p. 1). Children and women in the sex industry face multiple compounded challenges, thus explaining the difficulty they have in escaping it.

An intersectional perspective is applicable to the issue of sexual exploitation. Ferguson (2005) wrote:

> "In the intersections is where we fashion languages against coherence. Intersections are necessarily messy, chaotic, and heterodox. Why necessarily so? Because intersections are not about identity; they are about social dynamics" (p. 66).

The theory of intersectionality explains how and why people are vulnerable and exploited, both in the grooming and introduction to the sex industry and in the socialization, manipulation, power imbalances, and outright physical force that keeps them there. This creates a need to explore interventions and strategies around sexual exploitation while considering gender, economic disparity, and the social psychology of manipulation. The intervention and eradication of sexual exploitation requires a collective approach that considers a set of multi-faceted variables which contribute to the root of the issue. These variables include transgenerational traumas related to colonization, early childhood sexual abuse, poverty, and their related effect on lost educational and job opportunities for victims of sexual exploitation.

CONCLUSION

This research contributes to our understanding of poverty as a significant component in the industry of sex and human trafficking. While impoverishment does not clearly lead to involvement in the sex industry, we find that many sex industry survivors are/were more vulnerable due to being impoverished. Basic needs, such as having a secure place to live, often literally mean survival in Northern climates, such as in Winnipeg where cold winter conditions could badly injure or kill an improperly dressed person within minutes. Inadequate housing, or no housing at all, often compounded by extreme substance abuse and other intersectional challenges, results in women and girls falling back into the only outlet that is available for them to survive—performing sex acts for money.

The fundamental ideas of reducing poverty and providing opportunities for young people to have a different way of earning a living and having safe housing seems to be at the root of any solution to the problem. Poverty and the lack of affordable social housing affects people of all ethnic groups when they are challenged by it. Reduced disparity and poverty, and improved housing prospects, could improve resistance to victimization in the sex industry; therefore, governments, and the broad spectrum of service agencies, should focus on helping sex industry survivors.

Social service agencies could do more to identify children at risk, and educate them and their caregivers about the hazards of being targeted and groomed into the sex industry. This includes, in particular, youth from the North coming to larger urban centres to continue their education. We need to provide more safe refuge for women and girls involved in the sex industry. Manitoba does have shelters for victims of domestic violence, but insufficient shelters for women trying to escape the sex industry.

Existing systems and services need to be friendlier and accessible to survivors to "meet them where they are at" (Chrismas, 2017), rather than making them bend to the need of service providers. Examples of this are medical, government, and non-for-profit services that are open only during the day when they are needed at night. Systems and services also need to be more flexible in meeting survivor's needs; for example, not "aging out" victims the day they turn 18, or telling a survivor to wait three weeks for entry into addictions programming.

Improved resilience to victimization seems to be key in supporting women and girls to avoid the sex industry and for survivors to escape it. This is done, in part, through poverty reduction and improved educational and employment opportunities. Chrismas (2017) found that a great deal of opportunity exists for creating better opportunities to people in Manitoba and Canada. The most effective interventions lie in prevention. Poverty reduction, including access to affordable housing, is an important goal that we can collectively work toward, and help survivors take back the power.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare they have no conflicts of interest.

AUTHOR AFFILIATIONS

*Political Sciences Department, University of Winnipeg, Winnipeg, MB; †Arthur V. Mauro Center for Peace and Justice, University of Manitoba, Winnipeg, MB, Canada.

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COMMENTARY

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Profiling the life course of resource-based boomtowns: A key step in crime prevention

Rick Ruddell* and Heather A. Ray†

The rapid population growth and industrialization associated with a natural resource-based boom poses a number of challenges for the residents of a small community, including significant reductions in their quality of life, well-being, and public safety. The majority of Canadian communities undergoing such growth are associated with the extraction of oil and gas or other mining operations, although booms do also occur in single-industry towns (Broadway, 2007). Since 2000 dozens of boomtowns have emerged throughout Canada, from Kitimat, British Columbia to St. John's, Newfoundland. With the exception of Fort McMurray, Alberta, however, very few of these places receive much attention as they are often small towns in rural and remote places that are both out of sight and out of mind. The challenges created by rapid population growth, however, are of critical importance to the residents, as well as the workers in the health, education, social service, and justice systems who must respond to escalating demands for services with inadequate resources (Jayasundara, Danis, Legerski et al., 2018).

The resource-based booms occurring across North America after hydraulic fracturing (fracking) became commonplace after 2005 produced scores of academic papers highlighting the disruptions occurring in boomtowns. Many of these studies examined circumstances in the Bakken region in eastern North Dakota and western Montana, a region that straddles the Manitoba and Saskatchewan borders. Foremost of these challenges was an inability of local governments to meet the demands of their growing populations. Not only did the size of small and rural communities increase, but the composition of the newcomer population—predominantly made up of young, high-salaried males with little stake in the community—leads to increased involvement in antisocial behaviour and crime (Dahle & Archbold, 2015). Police officers reported many of these newcomers had prior criminal records (Archbold, Dahle, & Jordan, 2014), and researchers found that the proportion of registered sex offenders living in resource-based boom communities was higher than in neighbouring jurisdictions (Berger & Beckman, 2010; Jayasundara, Heitkamp, Mayzer et al., 2016a).

Writing about boomtowns, Thomas, Smith, and Ortiz (2016) observed that since the problems associated with a boom can be predicted, they can be prevented. In this paper we propose that a key first step in developing crime prevention strategies in communities experiencing resource-based booms is to consider the life course of these places, and how the evolution of a boom affects community services and public safety. In what follows we briefly define boomtown effects, describe the life course of resource-based boom communities, and discuss the importance of using our knowledge to increase public safety and the quality of life for boomtown residents.

BOOMTOWN EFFECTS

The outcomes of the rapid population growth and changes associated with resource-based booms have attracted the interest of Canadians since the 1896 Klondike gold rush (Berton, 1972). From the 1900s until today, hundreds of boomtowns emerged throughout rural Canada and although their location, as well as the duration and intensity of each respective boom, may have differed, there are a number of social ills that occur after a boom, which are called boomtown effects. These factors were described by the Government of New Brunswick (2012, p. 5) as:

> … impact[ing] community health. These can include increased rates of crime, drug and alcohol abuse, sexually-transmitted infections (STIs), and domestic violence; inadequate supply and equality of housing; increased cost of living; increased community dissatisfaction; increased mental health and social services caseloads; increased hospital admissions; insufficient infrastructure; and insufficient capacity in public services, including policing, local government, social services, and health care.

Although all of these factors reduce the safety and quality of life for boomtown residents, we focus upon the responses of the justice systems to the increase in antisocial behaviour and crime. Media accounts have portrayed Canadian and US boomtowns as a new "wild west," (Daily Mail, 2013; Ferguson, 2007), and journalists report these towns are plagued with "murder and mayhem" (Nienaber, 2014). A review of the actual crime statistics in these places, however, shows that, while overall levels of crime increase in boom communities, most of these offences are fairly minor and associated with drug offences (Grossman, Humphreys, Khalil et al., 2016; Heitkamp, 2016), common assaults, driving under the influence, and

Correspondence to: Rick Ruddell
E-mail: rick.ruddell@uregina.ca

mischief (Montana Board of Crime Control, 2016; O'Connor, 2017). Those crime increases are fairly consistent in studies carried out in Australia (Carrington, Hogg, & McIntosh, 2011), Canada (Ruddell, 2011), and the US (Ruddell, 2017).

With respect to serious and violent crimes, a review of the extant research shows an increase in these offences in US jurisdictions after booms occur (James & Smith, 2017; Liao, Berzofsky, Heller at al., 2015). There is, however, some variation in the distribution of violent offences and there are significantly higher rates of these crimes in some towns or counties (O'Connor, 2017; Ruddell, Jayasundara, Mayzer at al., 2014). Moreover, rates of violent crime tend to decrease over time. With respect to Fort McMurray, for example, Statistics Canada (2018) data shows that the violent crime rate in Fort McMurray was twice the Alberta rate in 1998, but by 2017 Fort McMurray's violent crime rate had decreased by 42 per cent.

The literature supports that some boomtown populations may be more vulnerable to victimization. A growing number of researchers report that violence toward women increases after the start of a boom (James & Smith, 2017; Jayasundara et al., 2016a; Komarek, 2018). Survivors of family violence may be reluctant to report their victimization to the police if they come from marginalized populations, such as Indigenous women or newcomers who are socially isolated (e.g., unemployed women with few friends or kinship networks). A study of women in rural British Columbia communities that had economies based on resource extraction found that many of them lived in precarious living arrangements, and "were just one argument with their spouse from being on the streets" (Amnesty International Canada, 2016, p. 45). This vulnerability increased in the North Dakota oilfields due to a lack of domestic violence services and shortcomings in the local justice systems that made it difficult to prosecute domestic violence offenders (Ruddell, Britto, & Schafer, 2018)

The occurrence of dangerous driving is also shown to rise in boomtowns. Fatalities and serious injuries increase as few rural roads were designed for the increased volume of traffic caused by the boom, and local governments could not afford to repair the damages to the roadways caused by large trucks (Raimi & Newell, 2016). Driving-related offences in boomtowns are also associated with increases in fatal collisions and in Fort McMurray, between 2008 and 2015, 6.4% of drivers in fatal vehicle crashes had been drinking, were impaired by alcohol or drugs, were fatigued/fell asleep, or reported other medical-related causes, and 13 per cent were travelling at an unsafe speed (Alberta Transportation, 2017). These statistics are indicative of a culture where the end of a worker's shift is synonymous with the desire to abuse alcohol and drugs—what the workers call "blowing off steam" (Amnesty International Canada, 2016).

In addition to the rise in collisions, traffic congestion is also described as reducing a community's quality of life (Anderson & Theodori, 2009). Britto's (2016) examination of surveys of Fort McMurray residents found that speeding, aggressive driving, and driving under the influence offences were their biggest concerns, with enforcement of these crimes being the top priorities identified for law enforcement to address. In terms of the prevalence of these offences, a review of impaired and dangerous driving offences reveals that these crimes in Fort McMurray in 2017 were about one-fifth higher than the provincial rates (Statistics Canada, 2018).

The increases in antisocial behaviour, crime, and the need for expanded traffic enforcement in these rapid-growth communities place significant burdens on police officer workloads (Archbold et al., 2014, Montana All Threat Intelligence Center and North Dakota State & Local Intelligence Center, 2012). Officer workloads in Fort McMurray, for example, grew to three times the national average, and it took more than a decade until they decreased to the provincial average (Ruddell, 2011). Local courts are also impacted by the boom and the dockets in oil-impacted counties increased to the point where some cases were backlogged for years (North Dakota Court System, 2015; Perry, 2007). Local probation agencies were also overwhelmed (Guldborg, 2016) and many counties impacted by the boom were forced to expand their jail populations (Ruddell, 2017).

Altogether, we find that levels of antisocial behaviour, disorder, and crimes in boomtown increase, and this places significant demands on the operations of the police, courts, and corrections. It has long been recognized, however, that all social problems occurring in rapid growth communities are in fact interrelated (Gilmore, 1976). This can result in "overwhelmed public services, degradation of quality-of-life factors" and challenges in community planning and development (Bangsud & Hodur, 2014, p. 43). Jayasundara, Heitkamp and Ruddell (2016b) found the volume of clients seeking help from health, educational, and social service agencies increased after the oil boom occurred in the Bakken, and the cases that workers confronted were more often more serious and complex than ones they had normally encountered. These demands can seem relentless to human service workers, and a respondent in the research by Flanagan, Heitkamp, Nedegaard et al., (2014, p. 100) "described oil booms as a human tornado."

LIFE COURSE PERSPECTIVE

Local government officials can mitigate boomtown effects by basing their responses to rapid community change on a full understanding of the dynamics occurring in these places. One way to analyze these conditions is to draw upon the life course perspective, which has long been used in the study of human development, and more recently been applied to organizational performance (Aldrich & Ruef, 2006). The life course perspective is based on understanding the influences of time and history of a boom community, and we argue this approach provides a way of understanding the birth, evolution, and demise of a boom; all booms ultimately bust.

The life course approach presented in this section is modeled on King's (2009) studies of police organizations. The profile was developed following an extensive review of the extant literature and applying a framework analysis to identify the themes reported below. These boomtown effects focus primarily on issues related to crime and the operations of the justice system, and are presented in the following list.

LIFE COURSE OF A RESOURCE-BASED BOOM COMMUNITY

- Rising commodity values increase resource exploration and extraction in rural and/or remote communities.

- The population increases rapidly with the majority of newcomers being young males with little stake in the community. There is an out-migration of established community residents, such as senior citizens. Existing sex ratios are disrupted and men often outnumber women.
- There are an increased number of public order offences (e.g., alcohol-related crimes, drug offences, driving under the influence, and prostitution).
- Incidents of domestic violence increase, as do rates of property crime and non-lethal violence, although the magnitude of the increase varies with location.
- Traffic congestion and the number of serious and fatal collisions increases.
- The population exceeds the community's ability to meet the demand for basic services such as housing. Man camps, with hundreds or thousands of residents, emerge in the areas surrounding the boom's epicenter.
- Demands for health, educational, social, and protective services such as police, fire, and emergency medical services, increase exponentially.
- Quality of life and community well-being decreases with a rise in traffic collisions, pollution, noise, and industrial accidents. Visible signs of disorder, such as litter and graffiti increase.
- Local residents express frustration toward the newcomers and tensions between these groups rises.
- Tension between different factions of long-term community residents can also increase due to conflicts about the desirability and impacts of growth and development.
- The police struggle to manage the demands created by the growing populations and associated crime rates. Organized crime offenders and gang members supply residents with drugs and are involved in the sex-trade, including sex trafficking. The threshold for arrests increases as officers prioritize responses to serious offences.
- The population composition changes as the construction phase of development ends and the production phase requires fewer employees. Workers with families replace young single males in the population.
- Local government services eventually match demands in a sustained boom.
- As the turnover of short-term workers decreases, the population stabilizes, including the ratio of men to women.
- Crime and disorder plateaus and then drops.
- Resident quality of life and overall community well-being improves.
- The economic boom withers and then busts. All resource-based booms eventually bust.
- Some communities experience cycles of booms and busts as commodity prices and extraction costs fluctuate.

Having profiled the life course of a resource-based boom community, there are a number of limitations regarding the profile portrayed above that should be considered. Jacquet and Kay (2014), for example, point out there is no single type of boomtown and Keough (2015, p. 1189) observes "there is no single contemporary model" for growth. Moreover, not all boomtowns will follow the model presented above, and it is impossible to predict the time span for each of these stages. Boomtown populations increase rapidly; Keough (2015, p. 1180) notes that the work camp population of Fort McMurray grew 68 per cent between 2010 and 2012. With respect to the municipal population, Fort McMurray experienced a 120 per cent increase between 2001 and 2016 (Alberta Transportation, 2017).

Whether a boom progresses as presented in this framework is also related to a number of geographical, political, economic, historical, and demographic factors. For example, the expansion of diamond mining in a geographically remote and sparsely populated northern Indigenous community with little economic development will have a different impact compared to a boom based on oil and gas extraction in a rural community 100 kilometres from an urban centre. With respect to geography, fracking can occur across an entire region, and the population increase may be diffused across a number of communities rather than overwhelming a single city, such as the communities of Williston, North Dakota or Fort McMurray (Jayasundara et al., 2016a). Moreover, historical factors, such as whether a community has previously experienced a boom—and whether local government leaders had learned from these lessons of the past—may also play a role in how they manage the boomtown effects. Leaders who have learned from the mistakes of others may also be more successful in mitigating the boomtown effects.

DISCUSSION

Freudenburg (1981) observes that residents of rural communities anticipating booms are often enthusiastic about the potential for economic growth and reduced unemployment. After experiencing the realities of the boom, however, they quickly become disillusioned with changes affecting their former way of life. Conflict about the desirability of the boom often emerges according to one's status as a "have" (e.g., those benefiting directly from the boom, such as landowners receiving resource royalties) and the "have nots" who have not shared in the benefits of the boom (Jaquet, 2014). Although some long-term residents decide to leave, most do stay and adapt to their new communities and living situations. Other communities may undergo a series of booms, busts, and periods of recovery (Putz, Finken, & Goreham, 2011), and some Alberta and North Dakota boomtowns experienced at least three of these cycles since the 1950s.

One of the most important steps municipal and county (or regional municipalities) government officials can take is to acknowledge that all booms will end, and that their role is to "protect the public and natural resources, nurture a healthy local business environment, and provide independent oversight of the impacts of…development within their jurisdiction" (Kelsey, Partridge, & White, 2016, p. 209). Forward-looking politicians and government officials planning for the bust will have ideally channelled surplus revenues into the creation of their municipality's or county's physical infrastructure or human resource development to create long-term advantages for their communities (Kelsey, Partridge, & White, 2016). That is a tall order, as the evidence shows that the long-term economic, social, and environmental outcomes of a boom are often grim, and many communities are worse off after the boom turns into a bust (Jacobsen & Parker, 2016).

CONCLUSIONS

This commentary started with the contention by Thomas et al. (2016) that, if a social problem can be predicted, it can be prevented. In this paper we describe the life course of resource-based booms and our intent in developing this framework is to provide local government officials a starting point from which to base responses to the rapid population growth and industrialization affecting their communities. Government officials anticipating a boom in their communities or surrounding locales are at some advantage if they can learn from the experiences of others.

CONFLICT OF INTEREST DISCLOSURES

The authors declare there are no conflicts of interest.

AUTHOR AFFILIATIONS

*Justice Studies, University of Regina, Regina, SK; †Department of Health & Physical Education, Mount Royal University, Calgary, AB, Canada.

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Government under pressure: investing in better outcomes through social impact bonds

Sandra Hodzic*

ABSTRACT

With shrinking resources and declining federal transfers, provincial governments across Canada are forced to provide increased levels of supports to vulnerable individuals with decreasing resources (Janssen & Estevez, 2013). Governments continue to face obstacles in meeting the needs of vulnerable populations such as children, single parents, and those who are homeless, to name a few. Manitoba, for instance, faces demographic challenges related to an influx of newcomers who are seeking refuge, resettlement, and housing supports, an aging baby boomer population that will need end-of-life supports, as well as a growing number of children in government care. Instead of funding programs based on their activities and outcomes, this paper presents outcomes-based financing, such as the social impact bond, that reward service providers who are able to demonstrate proof of outcomes and can show how the intervention improved the lives of the individuals it was meant to serve. Under a social impact bond, government engages non-traditional partners in the private and non-for-profit sectors, and the community as a whole becomes part of the solution to challenging social problems.

Key Words Outcomes-based financing; social impact bond; community; vulnerable individuals; outputs; activities; child welfare.

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INTRODUCTION

In an arena where multiple players are competing for scarce resources, it becomes increasingly important to demonstrate that social program supports lead to an effective outcome to ensure their continuation. Traditional methods of funding social services, such as activities and outputs-based programs, have not always demanded evidence of how the program improved the life of the recipient(s) receiving the intervention. This lack of focus on outcomes has discouraged some service providers from pursuing long-term goals that have become a recent trend and a condition of securing future funding (Bugg-Levine, 2017; Klem, 2017).

Many governments and service providers have failed to distinguish outputs versus outcome when assessing program effect. The former has been the central driver of funding decisions, but the problem is that it focuses on results that are achieved shortly after program implementation (e.g., creation of ten extra hospital beds) without demonstrating effect. Continuing with the health care analogy, outcomes focus on the underlying issue(s) which lead to hospitalization in the first place, and they strive to transition the patient and keep her out of the hospital in the future. Another reason government has tended to fund programs based on activities and outputs is due to a lack of data and Information Technology infrastructure needed to evaluate and track client outcomes, which has made it more difficult to establish cause and effect.

This growing trend with demonstrating outcomes has led some jurisdictions to redefine the way they offer social services by introducing pay-for-performance tools that prompt program payment once there is evidence that an intervention has been successful at reaching a specific outcome. The most frequent example of a pay-for-performance model is the social impact bond (SIB), which represents a major renewal to the way government has delivered social services in the past. Under SIBs, a service provider borrows money to operate the program and the service provider repays that money back to the lender only if the program is able to successfully meet its targets (MaRS, 2017).

Pay-for-performance structures like SIBs offer service providers more latitude and flexibility to design and deliver interventions without government interference, which was uncommon under traditional service delivery contracts (Bugg-Levine, 2017). They also provide an additional option of funding difficult social problems based on measurable evidence of success. SIBs rely on community experts, Indigenous partners, and other sector professionals to become part of the solution, while government facilitates and empowers them to help define a positive solution. SIBs have gained global popularity in the last decade and most can now be

Correspondence to: Sandra Hodzic, Department of Families, Government of Manitoba, 450 Broadway, Winnipeg, MB R3C 0V8, Canada.
E-mail: Sandra.hodzic@gov.mb.ca

found in the United States, United Kingdom, and other parts of Europe, Australia and, more recently, in Canada (Social Finance UK). They are most often delivered in areas that require a creative solution to a complex social problem such as rehabilitation and youth employment, homelessness, juvenile delinquency, child welfare, and recidivism. The proliferation of SIBs, and impact investing more generally, is most popular with Generation X and Y investors because they tend to share a common vision of social responsibility (Fidelity Charitable, 2018).

SIBs generally begin when government issues a contract with clear deliverables and measurable outcomes that may be used as a basis for assessing program success. SIBs consist of a group of partners including, but not limited to, government, private/business investors, an intermediary, third-party service provider, an evaluator, and the target population, and each partner has a unique and specific function. The role of the service provider is to deliver a specific social service, such as reducing the number of children in state care, by following specific metrics and measures of success that are established at the beginning of the program. Many SIBs also have an intermediary; a third party who serves as a liaison between government and service provider to assist with various program components. The intermediary commonly supports investor engagement and identifies investors who are interested in contributing to a specific cause.

MacDonald (2013) has used the *Dragon Den's* analogy to explain the multi-stakeholder relationship under SIBs more clearly. MacDonald says that social programs are "pitched" to a private investor and its attractiveness is based on the rate of return and opportunity for future capital. However, this is not the only driver of investor engagement. Many investors who contribute to a SIB are often socially driven individuals and philanthropists who are inspired to invest in a given social cause due to a sense of personal responsibility. In some cases, investors also have an opportunity to collect a return on their investment, depending on the service provider's ability to meet specific program targets. However, in other cases, their investor contributions are purely philanthropic and all proceeds are re-invested back into the project, as has been the case with the Mah family in Saskatchewan's Sweet Dreams SIB (Loxley, 2017).

Program outcomes are validated by an independent evaluator who determines the degree of success and the scope of investor return. Returns on investment typically range from five to ten per cent, depending on program scope and geography. If the evaluation proves successful, government pays investors their principal amount, plus a return. Under this scenario, investors may lose some or all of their money, depending on the degree of success. This has been one of the more attractive elements of SIBs because investors are essentially de-risking the service provider and government from investing in unsuccessful initiatives that do not produce positive outcomes.

SIBs give investors a chance to define, or be a part of, solving a social problem and contributing to outcomes by investing in, rather than funding, social programs through taxes. MacDonald (2013) explains that governments can, and often do, save money from SIB investments because the improved social outcomes offset future expenditures that government would have incurred in the absence of a SIB.

Recent research suggests that paying for outcomes is superior to paying for activities because it creates a demand that begins to reshape institutions, behaviours, relationships, and culture (Erickson, 2017). SIBs are one tool that governments can leverage to meet critical demand and help improve social outcomes to deliver meaningful results based on shared priorities. These priorities may include any number of things such as reducing the rates of recidivism, improving health care outcomes among pre-hypertensive individuals, or, as in Manitoba's case, reducing the number of children in government care.

Using SIBs to Fund Child Welfare in Manitoba

Manitoba has faced, and continues to face, a high number of children in government care compared to other Canadian jurisdictions. As a potential response to this ongoing trend, Manitoba had formally engaged community partners in the private and non-for-profit sectors to assist with resolving this pressing challenge by selecting its first SIB in child welfare. The goal of this program is to assist at-risk mothers with keeping their children at home (including faster reunification) and to prevent them from entering into care. Manitoba hopes to issue a public SIB announcement, jointly with its service provider, in the fall of 2018.

Other SIBs in Child Welfare

Social Finance UK's global database for impact bond's shows that there are more than a dozen social impact bonds globally in the area of child welfare. While the performance for the majority of these programs remains inconclusive, evidence shows that at least three child welfare SIBs, to date, have demonstrated effective outcomes (Social Finance UK website). The Uniting Care Burnside SIB and the Benevolent Society are both Australia-based SIBs. The goal is to reunite children in out-of-home care with their families and prevent children from entering into out-of-home care. Evidence from the Uniting Care Burnside SIB has shown that 63 per cent of children in government care were safely reunified with their families at the end of year five and most of those children would otherwise have been in government care in the absence of this intervention (Social Ventures Australia, 2018). The third child welfare SIB, Partnering for Family Success, is based in Ohio, United States, and its goal is to reduce the number of days that children spend in care by supporting their families, many of whom struggle with homelessness and addictions that often leads to family breakdown and child apprehension. A final report regarding the outcomes of this program is currently underway, but a preliminary evaluation shows generally positive results. Clients who received the treatment were significantly less likely to access emergency shelters, and there were no cases of child maltreatment in the control group compared to 6 per cent in the treatment group (Bai, Collins, Crampton et al., 2017).

In all of these examples, treatment families have shown less involvement with the child welfare system and more focus on the families' overall well-being. This well-being spans beyond immediate gains and highlights the importance of long term benefits associated with family restoration. The rhetoric is redefined to include outcomes and tangible life improvements stemming from family reunification, as opposed to immediate gains that fail to target the

underlying issue, which often leads to the intervention in the first place.

CONCLUSIONS

In order to be effective, the SIB will need explicit support from leadership across all three sectors: public, private and non-for-profit. This, in turn, will create critical momentum around the social services economy through a renewed focus on outcomes. Investing and paying for outcomes (e.g., number of children that were safely reunified with their families and who stayed with their families for a year post-program) as opposed to outputs (e.g., number of children apprehended from their homes) reorients the funder/grantee relationship around long-term results instead of short-term rewards. This leads to a positive and lasting change in the life of the program recipient, and it strengthens the accountability between the funder and the funded.

In order to meet our current and future demand, governments need to redefine their relationship with service providers. This means ensuring that service providers are able to demonstrate positive outcomes that governments will use as the basis for making challenging policy decisions. This is especially important at a time when governments are challenged to provide increased supports with declining resources and reduced federal transfers, as well as shifting demographic and geopolitical uncertainties (Eisen, Murrell, & Fantauzzo, 2014). These pressures are forcing many to rethink the way funding decisions have been made. This means placing more accountability on service delivery organizations to provide proof of outcomes as a condition of receiving continued funding supports. SIBs are one tool that offers this advantage.

The successful implementation of this outcomes-based model requires an ideological shift in the way government operates within the public sphere. In addition to a change in policy, SIBs may inspire a host of questions related to ethical, financial, economic, environmental, and social considerations that may lead to a shift in the way social services have been delivered in order to meet current and future demand. One question remains: Are we willing to welcome the change?

CONFLICT OF INTEREST DISCLOSURES

The author declares that there are no conflicts of interest.

AUTHOR AFFILIATIONS

*Department of Families, Government of Manitoba, Winnipeg, MB.

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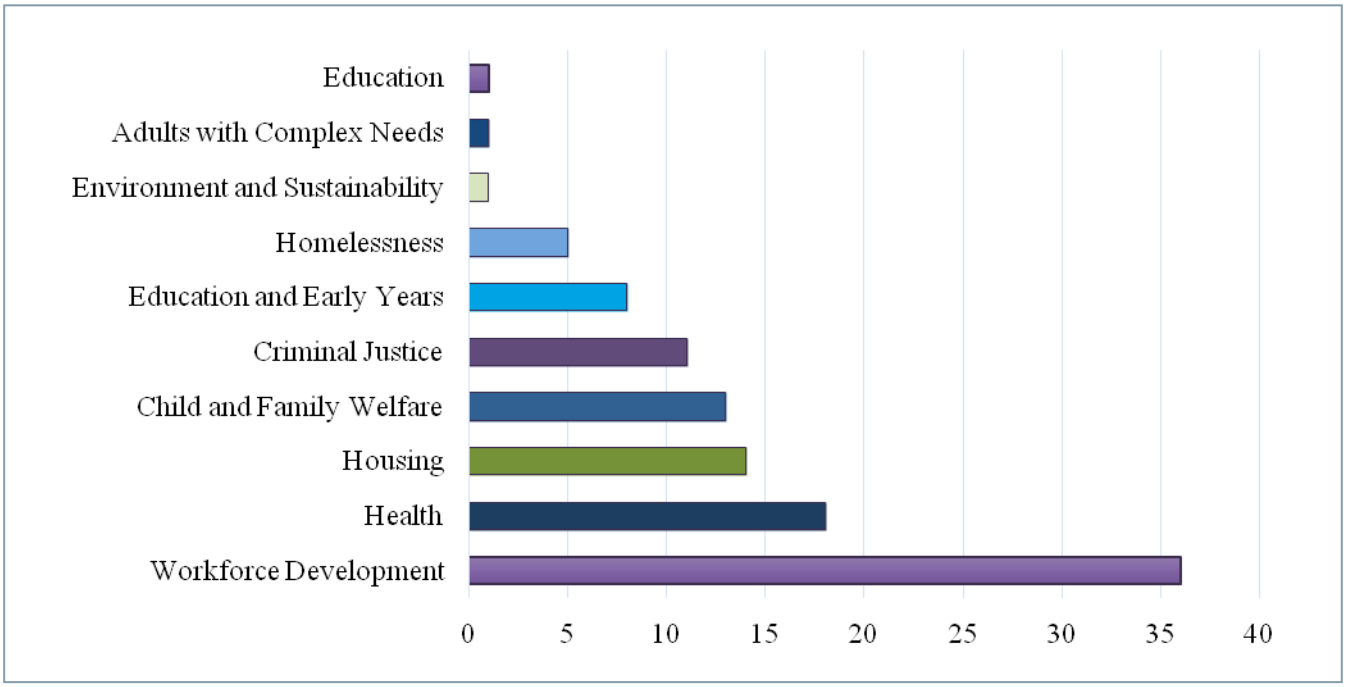
APPENDICES

Appendix A: Global Overview of Social Impact Bonds



Source: Social Finance United Kingdom, 2018.

ORIGINAL RESEARCH

Journal of
COMMUNITY SAFETY & WELL-BEING

A Hub intervention in Surrey, Canada: learning from people at risk

Stefanie N. Rezansoff,* Akm Moniruzzaman,* Wei Xiao Yang,* and Julian M. Somers*

ABSTRACT

Co-occurring health and public safety concerns involving mental illness, substance use, and homelessness are increasingly prevalent challenges for policymakers in cities worldwide. The Hub model is a roundtable process where the combined resources of diverse agencies are used to mitigate urgent risk of crime, victimization, illness and death, by establishing immediate connections with appropriate services and supports. Initiated in Scotland, the model has been replicated in more than 60 communities across Canada since 2012. In November 2105, the Surrey Mobilization and Resiliency Table (SMART) became the first Hub in British Columbia. Little peer-reviewed research has examined the impact of Hub interventions from a client perspective. We conducted semi-structured interviews with 16 SMART clients and analyzed their responses thematically. We also examined demographic- and intervention-related characteristics reported in the SMART database. Participants described positive experiences with SMART service providers, and commented that the intervention was effective at meeting relatively circumscribed needs. However, most clients reported complex and mutually exacerbating health and social conditions, and expressed the need for ongoing structured support (e.g., Assertive Community Treatment (ACT)). Our results emphasize the beneficial role played by SMART's coordinated, real-time approach. They also indicate demand for social policies that include substantial and enduring forms of support to prevent crises and promote community safety.

Key Words Hub; concurrent disorders; public safety; homelessness; problem-oriented policing; Assertive Community Treatment.

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INTRODUCTION

In Canada, crime rates have declined consistently for more than two decades (Statistics Canada, 2017), while law enforcement costs have increased (Di Matteo, 2014; Leuprecht, 2014). Police, courts, and departments of corrections are increasingly required to respond to complex, co-occurring, and mutually exacerbating health and public safety issues involving mental illness, substance use, and homelessness (Fazel & Danesh, 2002; Somers, Moniruzzaman, Rezansoff et al., 2014). In response, a number of Canadian communities have implemented an initiative known as the Hub model or Situation Table,[1] where the combined resources of multisectoral agencies (e.g., policing, mental health, addictions, housing, education and corrections) are used to identify and respond in a timely manner to situations of 'acutely elevated risk'[2] of harm to individual and/or public health and safety. The first application of the Hub model in the province of British Columbia is the Surrey Mobilization and Resiliency Table (SMART), implemented in November 2015.

Situation Tables (STs) respond to clients with diverse risk factors, and interaction with the justice system is not necessary for referral. Rather than serving as stand-alone programs, they function as forums where agency representatives convene for time-limited discussions of high-risk situations. Finally, ST interventions are limited to crisis resolution, and do not include sustained support such as case management or Assertive Community Treatment.

Little is known about client perspectives and experiences of ST interventions, an omission that has been identified as requiring attention (Nilson, 2016). The current study aimed to address this gap by conducting semi-structured interviews with SMART clients, focusing on their needs, their experiences with SMART, and the factors that enable or impede lasting positive change.

1 Referring to the formalized process of information sharing between table discussants from social, health, and housing agencies, community stakeholders, and police during regularly scheduled meetings. The terms Hub and Situation Table are used interchangeably in extant literature and the current manuscript.

2 Defined by four criteria (from McFee & Taylor, 2014, p.10): a) significant community interest at stake; b) clear probability of harm; c) severe intensity of harm predicted; and d) multidisciplinary nature to elevated risk factors.

Correspondence to: Stefanie N. Rezansoff, Faculty of Health Sciences, Simon Fraser University, 8888 University Dr., Burnaby, BC V5A 1S6, Canada.
E-mail: sra20@sfu.ca

METHODS

The SMART Database

SMART maintains a de-identified client database modelled on Canada's flagship Hub (Nilson, 2014). Recorded data include client socio-demographic characteristics, categories of risk, agency involvement, services mobilized, intervention outcomes, and length of client engagement with SMART. These data were tabulated and analyzed to provide supplementary context for the interview findings.

Interviews

Interview eligibility was based on current or former SMART client status, regardless of the extent of client engagement with services. Recruitment was facilitated by SMART service providers affiliated with police, income assistance, housing, health care, corrections, education, and civic government in Surrey. Recruitment was conducted purposively to identify clients whose needs were representative of those in the overall population served by SMART, and continued to the point of theoretical saturation whereby the responses of participants were overlapping and reiterative. No inferential tests were planned, and statistical power was not calculated. Table members drew on their knowledge of clients' whereabouts to facilitate contact with the research team. Participation was voluntary and did not affect service provision.

Consenting participants met with a trained postdoctoral interviewer who explained study objectives and obtained written permission for interviews to be recorded and transcribed. A semi-structured interview was conducted targeting: a) immediate needs; b) experience with SMART; and c) barriers/contributors to changes initiated by SMART. Interviews took place in agency offices, custody centres, and street settings, and lasted from 15 to 30 minutes. A cash honorarium of $25.00 CDN was provided.

Interviews were transcribed and anonymized. Transcripts were reviewed independently by two researchers, and recurring themes for each domain were identified using systematic text condensation (Malterud, 2012). A coding frame was developed to facilitate the coding of interview transcripts using NVivo (Version 11.0). Final identification of themes was based on consensus between four authors. Pseudonyms were used in reporting. This study was reviewed and approved by the Research Ethics Board at Simon Fraser University.

RESULTS

Client Characteristics

Demographic and intervention-related client characteristics (n = 161) extending from November 2015 (SMART inception) August 2017 are presented in Table 1.

The majority of cases were single clients (93%) between the ages of 25 and 49 (77%). Although gender was evenly divided across the population, individuals under the age of 25 were more likely to be female (65%). Cases originated most frequently from police, probation, and housing outreach services, and were resolved within a mean period of 2–3 weeks. Half of all case closings were attributed to client engagement with appropriate services and supports. A minority (14%) of individuals and one family refused services. Nine (individual) client cases (6%) were re-opened at least once.

TABLE I Socio-demographic and intervention-related characteristics of SMART clients (n=161[a])

	Individual (youth) n=51[b]	Individual (adult) n=96	Family n=12
Age			
<25 years	51 (100.0)	0 (0.0)	
25–49 years	0 (0.0)	74 (77.1)	
≥50 years	0 (0.0)	22 (22.9)	N/A
Gender			
Female	33 (64.7)	39 (40.6)	
Male	18 (35.3)	57 (59.4)	N/A
Originating Agency			
Education – school district	8 (15.7)	0 (0.0)	4 (33.3)
Local health authority	2 (3.9)	7 (7.3)	1 (8.3)
Housing & outreach	10 (19.6)	29 (30.2)	3 (25.0)
Income assistance	1 (2.0)	4 (4.2)	0 (0.0)
Community services	1 (2.0)	1 (1.0)	0 (0.0)
Police	22 (43.1)	36 (37.5)	2 (16.7)
Probation – Adult	5 (9.8)	17 (17.7)	0 (0.0)
Social services	2 (3.9)	2 (2.1)	2 (16.7)
Duration of Intervention[c]			
Mean (SD)	17.8 (13.0)	16.3 (11.9)	21.0 (7.3)
Median (min, max)	14 (0, 49)	14 (0, 56)	21 (7, 28)
# of repeating clients	3 (5.9)	6 (6.2)	0 (0.0)

[a] Nine individuals were repeat clients. Information was missing for two clients.
[b] Individuals were categorized into two age groups: < 25 years (youth), and ≥ 25 years (adult).
[c] For repeat clients, duration of first episode was considered.

Categories of risk for the client population as assessed by SMART are presented in Table 2. The most prevalent category of risk was a high level of unmet basic need (e.g., housing, activities of daily living; 51%), followed by exposure to negative environment (e.g., physical or emotional abuse; 16%), and substance use (alcohol or other drugs; 14%). Crime (gang involvement or other criminal behaviour) and mental/physical health (disability, diagnosed disorder) were noted as risk factors in 10 per cent and 8 per cent of cases, respectively.

Interview Sample

Of 28 individuals who were approached for an interview, 16 provided informed consent (10 elected not to participate, 2 were deemed by the investigators to be unable to consent). Self-reported characteristics of the interview sample were similar to those of the larger client population, and are presented in Table 3. The majority of participants were white (n = 9) and male (n = 10), with a mean age of 36 years. Six participants claimed Indigenous ethnicity. More than half were homeless and reported diagnosed mental disorder, current substance use, and chronic physical illness/injury. Five individuals had children under the age of 18, and one participant was pregnant.

Interview Findings

Results are organized under the following domains: client needs: experience with the SMART intervention; and barriers/contributors to positive change. Subheadings refer to

TABLE II Assessed categories of risk among SMART clients (n=161[a])

	Individual (youth) n=51	Individual (adult) n=96	Family n=12
Primary risk category			
Basic needs	26 (51)	47 (49)	8 (66.7)
Crime & public safety	3 (5.9)	11 (11.5)	2 (16.7)
Alcohol/drugs	9 (17.6)	13 (13.5)	1 (8.3)
Mental health	5 (9.8)	4 (4.2)	0 (0)
Negative environment	8 (15.7)	17 (17.7)	1 (8.3)
Physical health	0 (0)	4 (4.2)	0 (0)

[a] Nine individuals were repeat clients. Information was missing for two clients.

TABLE III Self-reported socio-demographic, health, and related characteristics of SMART interviewees (n =16)

Variable	n (%)
Age	36 years; (SD=14)
Gender (M)	10 (63)
Ethnicity	
– Indigenous	6 (38)
– White	9 (56)
– Other	1 (6)
Dx physical illness	8 (50)
Dx mental disorder	10 (63)
Current substance use	12 (75)
Currently homeless	10 (63)
Dependent children	1 (6)
Children in foster care	4 (25)
Currently pregnant	1 (6)

dominant themes identified through the analysis of transcripts, prominently involving: shelter/housing, substance use, coordination across sectors, and longer-term support.

Client Needs

Self-described needs emphasized: housing, personal safety, and substance dependence. Housing affordability and accessibility were prominent challenges. To illustrate, Mary—a single Indigenous woman recently released from hospital following the birth of her son—had attempted to secure an apartment:

> "I need affordable housing first of all. Rent is too high, landlords are restricting, and they're somewhat prejudiced too … about your background or what you do for a living."

In many cases clients described interdependent needs (e.g., housing linked to drug treatment). For example, Josh and his partner had been placed in a shelter, but were subsequently evicted for drug use:

> "It was a good place for us, but it just didn't work … we fucked up and got the boot. A recovery house, or something like that, would have been better."

Josh explained how renting an apartment was financially impossible for them, despite their combined resources:

> "It's hard. It's really hard. Even with both our incomes it's hard to find a place. Both our whole cheques would go to them [landlord], and we'd get like, what, thirty bucks or something to eat for the month, right?"

Threats to personal safety often involved interactions between drug use and sleeping rough. Fifty-year old Suzanne described the following attack:

> "It was one of the young guys on the strip that deals and stuff, and he was high and drunk … he ripped open the zipper to the tent, grabbed the propane tank [next to me] and started swinging, you know? Broke my nose, fractured my orbital bone and all kinds of stuff … It's dangerous out there. And you have to look after yourself… Especially for ladies and the older guys."

Jenny was five months pregnant at the time of the interview, and described her circumstances sleeping in a tent on the street:

> "I'm so tired … I can't sleep during the day. We have to collapse our tents by 9 o'clock in the morning … If you sleep inside the tent during the day you suffocate in the sun. It's really hot – you're basically, like, in a greenhouse … No, I don't want to be there … I hate it down there, I do … I hate it. There's lots of rats. They like, chew through your tents and everything. So gross."

Participants spoke urgently and desperately of their need to curtail substance use, and their frustrated attempts to access treatment either initially or after a prior episode:

> "Ever since 2006 I've been using crystal meth and it's just such a shit show. I've lost lots, right? I tried Suboxone … I had another puff and I was right back into it. Like, I've never used intravenous, and I never will. Knock on wood or whatever, right? But you know, I feel that it's only getting closer and closer, and I don't want to go there… Yeah man. I gotta get the fuck outta here man."

Experience with the SMART Intervention

Participants described benefits derived from their SMART encounters. These included advocacy with landlords to secure housing. Rob, a 46-year-old Indigenous man related:

> "Housing I could never get by myself. I just, you know, just…maybe I'm a visible minority or something, I don't know. Like even if I clean myself up it seems like, I don't get through, eh? It's hard if you don't have references too, right? You know. So yeah…it was helpful."

Some participants had relatively discrete needs. Paul described how he and his five-year-old son were helped by gaining access to income assistance:

> "I didn't need anything else – just help getting back on my feet and making a home for my son. We were living

in a motel, and the Ministry was going to take him away, but once I had some money I was able to find us a place on my own. Now I can start looking for work and we can get on with things."

Other participants described benefits related to advice and encouragement provided by SMART. Eighteen-year-old James explained how he was frequently arrested for fighting, behaviour that he attributed to poor medication adherence:

"They talked me into taking my meds again, and I'm fighting way less… And they showed me the clinic for my Narcan kit. I'm there once a week now."

Barriers and Contributors to Change

Participants consistently valued the attention that they received from SMART, and described this as an important contributor to change. The qualities of persistence and caring often stood out:

"It felt really good to get help from Dan [police officer]. I'm grateful. He was ok to talk to and he kept everything confidential … He stuck with me. I can still talk to him … They tried to help me right away, and I pushed them away, but they just came trying to help me again."

Participants singled out police representatives of SMART, describing their approach as fundamentally different from their previous experiences with law enforcement:

"It was cool. I never met a cop that would go that far, you know what I mean? Like, he seemed to take it a bit personal. And it was cool because, like, I don't know – he took a shine to me too – I swear … even came off-shift to see me in the hospital, right? Like, it was just cool – they took it a bit further than the street, right? Took it home with them almost. It was like, it was a really cool feeling … it was motivating."

Respondents emphasized that their experience with SMART made them more willing to engage with service providers and more motivated to make the most of opportunities that are presented to them:

"The tunnel seems a lot less … long. You know what I mean? The light's like, right there! Just now I gotta make the next step, right? I was there for a minute and I liked it, and I need to go back, man."

Barriers to change primarily involved missing or incomplete services (e.g., abstinence-based housing without conjoint drug treatment). Forty-eight-year-old Bert praised SMART for helping him access an emergency shelter, but expressed remorse that his heroin dependence undermined that opportunity:

"She was really good … she got me into [the shelter] but it didn't work out due to the fact uh...with the curfew and stuff. I just kind of screwed that up, cause like I said … I was using quite a bit at that time. But she did a lot to help me – I'll tell you that. She could have done a lot more for me if I hadn't been so…like, you know. I was doing a lot of drugs then, right? It's kind of embarrassing but, I probably should have stuck more with her, you know what I mean? And I didn't and I regret that."

Similarly, Danielle—an elderly diabetic—explained that SMART helped her find an apartment, but that she felt compelled to return to the street:

"They put me in a place – a sort of transit never-never-land. Sometimes you just can't…that was a huge problem for me with my cellulitis, right? … I was supposed to go to the Dr's office for IV treatment, 3 hours a day. But I couldn't get there – I couldn't walk to Skytrain because um, my legs were…right? And so the ambulance guys – the EMTs that are on the strip now – they insisted on taking me, like every 3 days."

Despite describing benefits arising from their contact with SMART, the vast majority reported that it was insufficient to meet ongoing challenges. Tony, a 50-year-old homeless woman with chronic health issues and heroin dependence had a very clear idea of her long-term support needs:

"I need an ACT team. I need a proper worker to sit down and remain … to constantly communicate with me and – what I need is not that hard! [Crying] I need a contact number, a contact person, you know? I need supportive housing and I need to get on the methadone program – really bad."

DISCUSSION

Our findings indicate that participants derived meaningful support from SMART, and that consistent needs for support transcended variations in their personal circumstances. Overall, participants' self-reported priorities involved homelessness, substance use, personal safety, and unmet basic needs. Nearly all clients reported needs spanning multiple domains of service (e.g., housing, health care, as well as income support). Notably, participant self-reported substance use (75%) was much higher than the level of substance use recorded in the SMART database (14%), a discrepancy that may arise from the fact that SMART does not conduct clinical assessments.

Housing emerged as the paramount need among SMART clients. Typically, housing was linked to additional needs, such as transit or addiction treatment. Clients reported losing housing due to non-compliance with regulations (e.g., curfews, abstinence requirements). Few participants emphasized needs related to mental or physical health. It is unclear whether participants were unaware of their health status (e.g., infection positivity, mental illness symptoms, etc.), regarded their physical and mental health as lower priorities, or lacked positive and therapeutic experiences with relevant health professionals. People claiming Indigenous ethnicity comprised 38 per cent of the sample, underscoring the need for culturally appropriate services.

Participants reported two primary sources of benefit from their encounters with SMART. In some cases the

provision of specific resources enabled other positive changes to take place. This occurred when clients had relatively circumscribed needs. However, the majority stated that essential services and supports were unavailable (e.g., substance use treatment, affordable housing).

The second type of benefit involved clients' experiences with SMART representatives. Clients described SMART as having provided them with attention and opportunities that they would not otherwise have received. Clients articulated feeling hopeful following their encounters with SMART, and appreciative of the care and concern shown by table members. Participants reported valuing their relationships with team members even after their cases were closed, but missing the level of support they received as active clients. Expressions of gratitude were prevalent among interviewees who remained homeless and at risk.

Our findings support the role of brief interventions like SMART in the identification of high-risk cases, diversion from acute risk, and rapport building with extremely marginalized people. Nonetheless, the de-escalation of imminent risk of harm is not a solution to the longstanding and complex social problems described by former SMART clients. To promote enduring reductions in risk Situation Tables (ST) require access to long-term resources specific to the needs of their community. In the case of SMART these needs emphasize appropriate housing.

The current study provides preliminary evidence concerning clients' experiences with ST interventions, augmented with descriptive data collected by SMART. Although Table members attested to the representativeness of our sample, we are unable to confirm this independently. We are also unable to validate the self-reports of participants. A further potential limitation of this research concerns the generalizability of our findings to other communities due to differences in client needs and available resources.

Several research questions addressing the ST model require investigation, including mechanisms to pair acute interventions with continuing evidence-based supports (e.g., Assertive Community Treatment). The study of long-term outcomes for clients of ST interventions is also required, including research on the patterns and costs of service use preceding clients' involvement with STs, the conditions required to achieve diversion from acute risk, and the resources needed for long-term recovery.

CONCLUSIONS

This study set out to learn from people who are at risk, and found that the SMART intervention attenuated acute crises, established rapport, and inspired hope among highly marginalized people. SMART effectively triaged cases based on acuteness of risk, but was limited by the insufficient availability of evidence-based models of housing and support. A robust body of evidence details the types of services that are effective, and develops the business case for their implementation. Scaling up these services to meet demand is now a matter to be resolved by elected officials and the public servants who support them.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that there are no conflicts of interest.

AUTHOR AFFILIATIONS

**Faculty of Health Sciences, Simon Fraser University, Burnaby, BC, Canada.*

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ORIGINAL RESEARCH

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Assessing the impact of economic and demographic change on property crime rates in Western Canada

Stuart Wilson*

ABSTRACT

Western provinces have experienced tremendous change over the last few decades, with oil booms and busts, with large international and interprovincial movement of workers and families, and with rising and declining property crime rates. What are the links between these economic, demographic, and crime rate changes? I investigate these links for Western Canada over the period from 1968 to 2015. Empirical results suggest that increases in household incomes and alcohol sales per capita, and decreases in unemployment rates, all signs of improved economic prosperity, coincided with decreases in rates of property crime. Increases in migration turnover (both inward and outward migration) put upward pressure on rates of property crime. In addition, changes in police reporting methods and categorization have had dramatic effects on official rates of property crime: the change from UCR1 to UCR2 reporting methodology caused rates of property crime to rise by between 18 per cent and 30 per cent in 1998, and changes in police reporting methods in 2003 caused property crime rates to rise again, by between 5 per cent and 16 per cent in 2003, for the western provinces. The recent rise in rates of property crime in the west is closely linked to the economic slowdown following the drop in oil and resource prices, and should migration turnover rates remain high as people move seeking better opportunities, property crime rates will remain high. Policymakers and criminal justice professionals may be advised and reminded of the effect of these economic and demographic changes, as well as the effect of reporting changes, on official rates property crime.

Key Words Crime rate trends; economic growth; demographic change; police reporting.

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INTRODUCTION

Crime rates trended downwards from 2003 to 2013 in western Canada, coinciding with an international resource boom. In particular, Saskatchewan experienced sharp increases in resource development, household income, and large in-migration movements, from both other provinces and nations, during a period termed the "Saskaboom". Rapid economic and demographic change can have various effects on crime. Newcomers may have different behaviours and propensities to commit certain types of crimes. Improved employment outcomes of young males may reduce criminal activity. Inequalities in employment, incomes, and housing may lead to increased crime. Over the past few years with the decline in oil prices and revenues, some western Canadian provinces have experienced poor economic growth and increasing unemployment rates. What influence have demographic and economic changes had on crime rate patterns in the western Canadian provinces?

The economic factors that have been found to influence crime include changes in unemployment, in incomes, in inflation, in inequality, and in alcohol consumption (Cook & Zarkin, 1985; Raphael & Winter-Ebmer, 2001; Savoie, 2008; Pernanen, Cousineau, Brochu et al., 2002; Bunge, Johnson, & Balde, 2005, Andresen, 2013 among others). Research investigating the demographic factors that influence crime have tended to concentrate on the youth and migrant populations (Butcher & Piehl, 1998; Bunge et al., 2005; Kitchen, 2007; Stevens, Odynak, Brazil et al, 2011; Plecas, Evans, & Dandurand, n.d.). For more extensive reviews of the influences on crime, readers are encouraged to refer to Levitt (2004), Albertson & Fox (2012), Farrell, Tilley & Tseloni (2014), Tonry (2014), and Wilson, Sagynbekov, Pardy et al. (2015).

Tonry (2014) wrote that overall, there may be a role for economic and demographic forces in explaining property crime rate patterns over time, but little support for their influence on violent crime rate patterns. Recent work by Wilson (2017) supported this assessment by showing that economic

Correspondence to: Stuart Wilson, Department of Economics, University of Regina, 3737 Wascana Parkway, Regina, SK S4S 0A2, Canada.
E-mail: Stuart.Wilson@uregina.ca

and demographic change could help explain only minor changes in rates of violent crime, but may help explain up to 40 per cent of the changes in rates of property crime in western Canadian provinces over the last five decades. This article further focuses on assessing the economic and demographic influences on property crime in western Canada.

METHODS

Police-reported crime data are available for Canadian provinces starting in 1962. The rates of property crime from 1962 to 2015 are depicted in Figure 1. Bunge et al. (2005) conducted time-series analyses on the influences on crime over 1962 to 2003 for Canada as a whole. This study serves as an extension of their work, with a larger time period, and with a larger dataset by pooling together data for the five provinces west of Quebec in a panel analysis.[1] This study also serves as an extension of Wilson (2017) in three ways: (i) some explanatory variables, including inflation, were dropped due to statistical insignificance; (ii) the model allows for a singular focused effect of migration turnover on property crime, motivated by results which suggested that increases in interprovincial and international migrant movement, both inward and outward, had similarly positive impacts on property crime, and; (iii) the analysis incorporates data from the more recent period characterized by low resource prices.

The relationship between rates of property crime and the economic and demographic variables for the panel of five provinces (British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario) is investigated using a linear panel model. The set of provincial economic and demographic variables used in the analysis are described in Table 1. These variables are real household disposable income per capita, the unemployment rate, per capita alcohol sales, the youth share of the population, and the migration turnover rate (the sum of both in- and out-migration, as a proportion of the total population). Provincial data for unemployment rates are only available starting in 1967. These variables all exhibit the property of nonstationarity, and therefore require transformation using logarithmic first differences to allow for estimation to overcome the problems of stochastic trends and spurious regressions; as such, this study may not be directly compared to that of Andresen (2013), which presented results from a panel study with variables in their undifferenced logarithmic forms.[2] In addition, a set dummy variables was used to account for additional province-specific trends and shifts in rates of property crime. The effective time period of the study is from 1968 to 2015.

RESULTS

The results from the panel regressions for the growth in the rates of property crime over the study period are presented in Table 2. The first regression model includes contemporaneous and lagged independent variables, and a common constant term but with no other dummy variables. The estimates from that model are presented in Column 2, are identified as Model 1, and indicate how much variation may be accounted for solely by variation in the independent variables. The estimated fit of this first model is relatively low, with an overall R^2 of 0.18, indicating that the explanatory variables

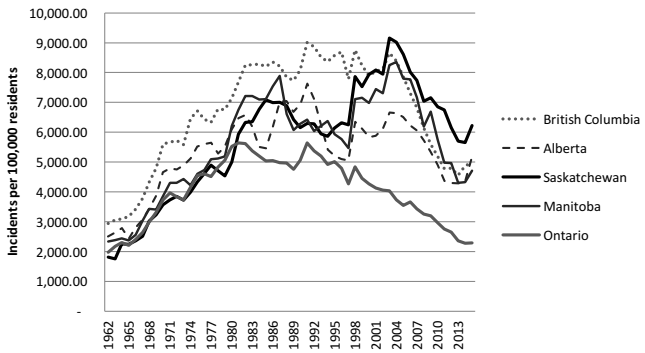

FIGURE 1 Rates of property crime, four western provinces and Ontario, 1962–2015.

used in this regression may account for a small portion of the variation in the growth of the rates of property crime over the sample. Only one variable, the unemployment rate, was statistically significant in the regression. The second regression model includes province-specific constant terms, and province-specific one-period and trend shift dummies which allow for trend changes that occurred around 1990, for an upward shift in 1998 with the movement to UCR2 reporting, and also for changes around 2003 (see notes to Table 2). The estimates from this model are identified in Column 3 as Model 2. This second regression performed much better in terms of the R^2 statistic. The inclusion of these province-specific dummy variables allows the model to measure the impact of economic and demographic changes on property crime rates with better precision, and all of the economic and demographic variables have statistically significant effects on property crime rates, either contemporaneously, with lagged effects, or both. This model indicates how important it is to include these province- and time-specific effects to better identify the relationship between economic and demographic change, and changes in rates of property crime.

Influence of Economic and Demographic Change on Rates of Property Crime

The estimates provided in Table 2 for Model 2, of the impact of economic and demographic changes on rates of property crime, will first be explained using a few illustrative examples. The coefficient estimates of -0.1214 and -0.2232 for Δy_t and Δy_{t-1} suggest that for every one percentage point increase in the growth rate of real disposable household income per capita, the growth rate of the rate of property crime decreased by 0.12 percentage points, and the growth rate of the rate of property crime decreased by 0.22 percentage points in the following period, all else equal. The coefficient estimates of 1.1038 and 0.1322 for $\Delta youth\text{-}share_t$ and $\Delta youth\text{-}share_{t-1}$ suggest

1 Panel dataset estimation provides several advantages over individual time series estimation, including "more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency" (Baltagi, 2005, p. 5).

2 Nonstationary series, including the undifferenced series in this analysis, exhibit stochastic trends which may lead such series to appear to be related over the long run when they aren't, resulting in a spurious regression. For more information on issues regarding nonstationarity and spurious regressions, please refer to Stock and Watson (2003, pp. 460–462).

TABLE I Data description

Variable	Symbol for Logarithmic Form	Description	Sources
Property Crime Rate	pcr	Provincial rate of property crime, incidents per 100,000 residents as of July 1.[a]	CANSIM Tables 252-0001 (1962-1997); 252-0051 (1998-2015); 051-0026 (1962-1970),- 0001 (1971-2015)
Per Capita Income	y	Real provincial household disposable income per capita.	CANSIM Tables 384-5000 (1962-2013); 384-0040 and 051-0051 (2014-2015)[b]
Unemployment Rate	ur	The provincial unemployment rate.	CANSIM I CHASS I CHASS Labels D45076,45097,45118, 45139, 45160 (1967-1975) CANSIM Table 282-0002 (1976-2015)
Per Capita Alcohol Sales	alcohol_sales	Real value of provincial alcohol sales per capita, by March 31 fiscal year end[c]	CANSIM Tables 183-0006; 183-0023 (2014-2015 - see Note 3); 051-0026 (1962-1970), 051-0001 (1971-2015)
Youth Population Share	youth_share	The provincial ratio of the population aged 15 to 24 as of July 1 that year divided by the population as of July 1 of that year.	CANSIM Tables 051-0026 (1962-1970), 051-0001 (1971-2015)
Migration Turnover Rate	mig_turnover	Migration Turnover Rate: The provincial ratio of the number of international immigrants plus emigrants plus interprovincial in-migrants plus interprovincial out-migrants that year divided by the population as of July 1.	CANSIM Tables 051-0017 and 051-0037 (1962-2015); 051-0026 (1962-1970), -0001 (1971-2015)

[a] Police-reported crime data are available starting in 1962, using the Uniform Crime Reporting Survey UCR1 definitions and crime categories. These data are made available by Statistics Canada from 1962 to 2003. Statistics Canada currently releases police-reported crime data under UCR2 coding. Changes from the UCR1 coding include more detailed offense categories, expanding from the three-digit coding in UCR1 to the four-digit coding in UCR2. Many offenses which were previously categorized in the "Other Criminal Code violations" category were re-categorized under UCR2 as violent or property crimes. The UCR2 data go back to 1998 and are considered as the official crime statistics. Statistics Canada has also released more comprehensive data using UCR1 methodology for the period from 1977 to 1997, with series similar to those released after 1997. For the purpose of this article, the UCR1 data was used from 1962 to 1997, and the UCR2 data was used from 1998 to 2014. The change in methodology at 1998, with a substantial jump in many police-reported crime rates in 1998 compared to 1997, is important to note and to treat appropriately in the econometric analysis.

[b] The two different data sources resulted in series discontinuities in 2014. Since the data for the 2014-15 period included earlier data, the series in first differences was spliced starting in 2014 rather than the series in levels.

[c] Data is for fiscal years ending on March 31 of the given year. Since the data contain nine months of data from the previous year, regressions were conducted using the lead (t+1) which would contain nine months of data from that calendar year along with data from three additional months from the following year, but did not yield statistically significant coefficients for these leads.

that for every one percentage point decrease in the growth rate of the share of youth aged 15 to 24 years to the total population, the growth rate of the rate of property crime decreased by 1.10 percentage points, and the growth rate of the rate of property crime decreased by 0.13 percentage points in the following period, all else equal. While the other specific estimates themselves are of importance, it is appropriate and convenient to continue the analysis focusing on the direction of the influences of these variables on rates of property crime for the purpose of simplicity and ease of presentation.

As noted in one of the illustrative examples above, the empirical results indicate that there were negative contemporaneous and lagged relationships between changes in disposable income and changes in rates of property crime. In addition, there was a strong positive contemporaneous link between unemployment rates and property crime rates; however, that impact was partially muted with a counteracting negative effect of lagged unemployment rates. These results strongly suggest that improvements in the economy coincided with declines in rates of property crime, and that increases in property crime rates occurred during poor economic conditions, supporting a motivational effect of the economy on crime. Rates of property crime were also found to be negatively linked with contemporaneous and lagged changes in per capita alcohol sales. This result runs counter to the hypothesis that alcohol consumption and crime are positively linked, given a high proportion of crime is committed by individuals dependent and under the influence of alcohol and drugs (Pernanen et al., 2002). However, alcohol sales were positively correlated with disposable income, and are more likely a sign of increasing wealth and responsible alcohol consumption, so that these results reinforce the inference that increasing prosperity leads to declines in the rate of property crime.

Demographic change also had an influence on rates of property crime. Changes in the proportion of youth in the population and in the rate of migration turnover (both of inward and outward migration) were positively linked to changes in property crime. These results reinforce the age–crime link with adolescents committing a high proportion of crime in society (Gannon, Mihorean, Beattie et al., 2005; Brennan, 2012), and over the past decade while property crime rates have been falling, the proportion of youth in the population has also been in decline. While much international work has focused on the impact of immigrant populations on crime rates, in the Canadian context there is only suggestive

TABLE II Panel estimates of the growth in the rate of property crime[a]

Regressors/Statistics	Δpcr 1968–2015 Model 1[b]	Δpcr 1968–2015 Model 2[b]
Δy_t	0.0050 (0.1620)	-0.1214 (0.0967)
Δy_{t-1}	-0.0979 (0.1546)	-0.2232 (0.0988)**
Δur_t	0.1303 (0.0450)***	0.1103 (0.0264)***
Δur_{t-1}	-0.0396 (0.0458)	-0.0589 (0.0266)**
$\Delta alcohol\_sales_t$	-0.1512 (0.1450)	-0.1882 (0.0881)**
$\Delta alcohol\_sales_{t-1}$	-0.1288 (0.1413)	-0.1965 (0.0847)**
$\Delta youth\_share_t$	0.8700 (0.7869)	1.1038 (0.4644)**
$\Delta youth\_share_{t-1}$	0.4810 (0.7809)	0.1322 (0.457)
$\Delta mig\_turnover_t$	0.0387 (0.1019)	0.0798 (0.0561)
$\Delta mig\_turnover_{t-1}$	0.1388 (0.1020)	0.1275 (0.0554)**
$\hat{\rho}$ (ON; MB; SK; AB; BC)	0.26; 0.12; 0.11; 0.38; 0.24	0.10; -0.02; 0.13; 0.43; 0.16
Province-specific deterministic dummies[c]	No (only a common constant term)	Yes (25)
R^2	0.1843	0.6246
Test for significance of second lags (t-2 variables)	χ^2 (6) =7.93 (p-value= 0.1602)	χ^2 (6) = 7.20 (p-value = 0.2063)

[a] The xtpcse command in STATA was used to produce these results, and allows for panel-corrected standard errors for the estimates, for heteroskedasticity, for first order autocorrelation, and for correlation of errors across panels at a given point in time; the generalized least squares method in STATA (xtgls) was also used and yielded similar results to those presented herein, but does not produce a convenient and universally understood R^2 statistic.

[b] Panel-corrected standard errors in parentheses; **, and *** denote coefficient is statistically significantly different from zero at the 95% and 99% confidence levels (two-tailed tests), respectively.

[c] Province-specific deterministic dummies include: province-specific constants, one-period dummies for 1988 (Saskatchewan, Manitoba), for 1991 (Alberta, British Columbia, Ontario), for 1998 and for 2003 (for all five provinces); period dummies for 1988–2015 (Saskatchewan, Manitoba), and for 1991–2015 (Alberta, British Columbia, Ontario).

evidence that, over time, an increasing share of immigrants may decrease rates of property crime (Zhang, 2014). Results presented herein indicate that the migration turnover rate, which measures the sum of inward and outward migration movements, had an impact on the rate of property crime, so that increasing migration turnover over the past decade put upward pressure on rates of property crime. This raises the question as to whether increasing migration turnover presents criminals with increased opportunities for property crime as people and their goods move in and out of the community, or whether the migrants themselves commit these acts.

Trend Changes and Jumps in Rates of Property Crime

Significant changes in the pattern of property crime rates occurred around 1990, 1998, and 2003. The quantitative impact of these changes is highlighted in Table 3. Up to the late 1980s, rates of property crime in the five provinces grew by between four per cent (Ontario) and seven per cent (Saskatchewan) per year (the result of the combined impact of the common constant identified in the second row of Table 3 and the additional province-specific constant term in the third row). The growth trend in the rates of property crime in all five provinces fell significantly around 1990, by between seven and eight percentage points from previous rates of growth (as indicated by the period- and province-specific additions to the growth trend indicated in row four). This was a major turning point in the evolution of property crime, and coincided with the drop in the rate of total criminal code violations in Canada which occurred after the peak in 1991. The figures in the next row of Table 3 indicate the extent of special one-period changes (jumps) in the growth rates of property crime which occurred at the beginning of the trend decline. These identify a significant one-period drop in the rate of property crime for Manitoba in 1988 from a peak in 1987, and significant increases in the rates of property crime for Ontario, Alberta, and British Columbia to peaks in 1991, prior to the model-predicted trend decline in the rates.

Of particular interest are the one-period jumps in 1998 and 2003. The predicted rates of property crime for the five provinces jumped by approximately 20 per cent in 1998. This substantial change is attributed to the change in reporting methodology, from UCR1 to UCR2 in 1998. Many offense categories expanded in detail, and some offenses were re-categorized from the "Other Criminal Code" category to either of the property crime or violent crime categories under UCR2 coding. Significant one-period, model-predicted jumps in property crime rates above the trend decline also occurred in 2003 in Manitoba (16%), Saskatchewan (16%), Alberta (9%), and in British Columbia (11%), as indicated in the last row of Table 3, and in Figure 1. This increase in rates of property crime in 2003 has been attributed to changes in reporting procedures "which make it easier for the public to report minor crimes to the police" (Wallace, 2004:4). As an example, the major increase of minor thefts in Winnipeg in 2003, and of auto thefts in particular, was tied to the introduction of a telephone reporting system by the Winnipeg Police Service (Wallace, 2004:11). These types of reporting changes were

TABLE III Province-specific deterministic dummies[a]

	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Common constant (initial growth rate trend)			0.0436 (0.0091)***		
Additional constant term (addition to the initial growth trend)	N/A	0.0208 (0.0131)	0.0255 (0.0133)*	0.0129 (0.0178)	0.0109 (0.0093)
Period-specific addition to growth trend	1991-2015 -0.0808 (0.0117)***	1988-2015 -0.0836 (0.0160)***	1988-2015 -0.0746 (0.0151)***	1991-2015 -0.0697 (0.0245)***	1991-2015 -0.0787 (0.0146)***
One-period additional growth (1988 or 1991)	1991 0.1212 (0.0370)***	1988 -0.1316 (0.0538)**	1988 0.0016 (0.0446)	1991 0.1068 (0.0473)**	1991 0.1225 (0.0418)***
One-period additional growth in 1998	1998 0.2066 (0.0370)***	1998 0.2969 (0.0537)***	1998 0.2175 (0.0428)***	1998 0.2350 (0.0461)***	1998 0.1740 (0.0461)***
One-period additional growth in 2003	2003 0.0521 (0.0353)	2003 0.1559 (0.0534)***	2003 0.1573 (0.0423)***	2003 0.0850 (0.0465)*	2003 0.1086 (0.0412)***

[a] Panel-corrected standard errors in parentheses; *, **, and *** denote coefficient is statistically significantly different from zero at the 90%, 95%, and 99% confidence levels (two-tailed tests), respectively.

also experienced elsewhere. Tonry (2014) indicated that many countries have changed how they report crime incidents, by moving from an "output" system in which crime is officially reported after police screening, to "input" systems, where crime is officially reported with less police screening and investigation. In 2002/03, the police-reported crime rate in England and Wales rose by 10 per cent as a result of the shift from an output to input system (Simmons & Dodd, 2003).

DISCUSSION

The empirical results suggest that rates of property crime will decline with improvements in economic conditions and increasing prosperity, with reductions in the share of youth in the total population, and with reductions in migration turnover, in the short term. Rates of property crime have risen in Manitoba, Saskatchewan, Alberta, and British Columbia over the past two years, and this corresponds to the drop in oil prices and pause in the commodity boom, and a rise in unemployment. If economic conditions continue to weaken and if the unemployment rate continues to rise, then the property crime rate is expected to continue to rise. If the degree of migration turnover remains high as people move to seek opportunities, it is expected that rates of property crime will remain high relative to the rates in the early part of the last decade. Policies that can strengthen the economy, in both resource and non-resource sectors, and that provide businesses with a favourable climate to create jobs and decrease unemployment, are especially welcome in difficult times, given policymakers have limited influence over international resource price changes. Policymakers and justice officials also have limited influence over migrants' decisions to relocate, but they may be better prepared and able to formulate and target additional crime prevention measures knowing that population movements and economic slowdowns tend to increase crime rates. The results presented herein also indicate how crucial it is to incorporate relevant province- and time-specific effects into the analysis to show that changes in the economic and demographic variables are important, yet incomplete, predictors for changes in rates of property crime.

The one-period growth rate changes which occurred in 1998 and in 2003 were substantial, leading to large upward shifts in the rates of property crime in 1998, and again in 2003, as shown in Figure 1. These large and lasting increases in rates of property crime have been attributed to changes in crime categorization in the UCR2 coding, and to recording practices as police have moved from output to input systems of recording. Policymakers and justice professionals may be advised and reminded of how changes in recording practices and methods may have substantial effects on police-reported crime rates, and to exercise caution when examining trends over time. Comparisons of crime rates, between those in the 1990s and those in the 2010s as an example, are not advisable without taking into account these changes in reporting methodology.

The shift from growing to falling rates of property crime occurred in the late 1980s in Saskatchewan and Manitoba, and in the early 1990s in British Columbia, Alberta, and Ontario. This long-run trend shift has also been experienced in most developed countries, and has yet to be conclusively explained. Levitt (2004) examined the recent crime decline in the US, and provided evidence to discredit some prominent explanations and to conclude that the increased number of police, the increase in incarceration, the diminished crack cocaine problem, and the legalization of abortion and reduction in unwanted births and child poverty were the prominent causes of the US decline in crime since the early 1990s. These explanations are not particularly useful, however, for other nations experiencing similar transitions in crime rate trends, but dissimilar changes in policing and/or incarceration, and differing drug and abortion environments. Mishra & Lalumiere (2009) added to the literature by suggesting that a decrease in risky behaviour among youth contributed to the crime drop in the US and Canada, while van Dijk, Tseloni & Farrell (2012) pointed also to the influence of situational crime prevention initiatives as a possible factor to the decline in crime. Farrell et al. (2014) tested the major hypotheses proposed to explain the recent drop in crime in industrialized nations, including those of Levitt (2004), and concluded that the timing and patterns of the drop in

crime in various countries could be best tied to the timing and patterns of security improvements, and these security improvements may have contributed to declines in many crime types through spillover effects. Research continues to better understand this important recent Canadian and international long-run trend decline in crime.

CONCLUSIONS

This article provides an empirical assessment of the changes in rates of property crime over the period from 1968 to 2015, to uncover the impact of economic and demographic change on rates of property crime in British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario. The results suggest that increasing incomes and alcohol sales per capita, and decreasing unemployment rates, all indicative of improved economic conditions, coincided with declines in rates of property crime. The results also suggest that a declining share of youth to the total population coincided with decreases in rates of property crime, while increasing migration turnover (both inwards and outwards migration) put upward pressure on rates of property crime. Both of these demographic changes are typically experienced during times of improved employment opportunities with counteracting effects on property crime.

These findings help to explain how resource and economic booms in the west helped bring down rates of property crime, as well as to inform policymakers how the more recent resource and economic slowdown has put upward pressure on rates of property crime. In addition, the results presented herein indicate the strong role changes in reporting practices and methodology have had on official police-reported crime statistics, of which policymakers and analysts must be aware before characterizing crime rates in different periods, and in considering policy changes. Lastly, while this article helps to identify the quantitative nature of the change from growing to declining rates of property crime that occurred in the late 1980s and early 1990s, the causes have not yet been fully identified. More research is needed to explore long-run trends in rates of property crime, including the exploration of a role for the timing and patterns of security improvements in Canada, as well as for differences in the patterns of—and influences over—the sub-categories of property crime.

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AUTHOR AFFILIATIONS

*Department of Economics, University of Regina, Regina, SK, Canada.

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ORIGINAL RESEARCH

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Historical recidivism rates of Alberta's not criminally responsible population

Kayla Richer,* Jeremy Cheng,† Andrew M. Haag*‡§

ABSTRACT

In Canada, public safety is a paramount concern for the provincial Review Boards that oversee individuals found to be Not Criminally Responsible on Account of Mental Disorder (NCR). There is limited research on recidivism rates for NCR populations to assist public policy and institutional practices. In response to this gap, the authors examined the recidivism characteristics of the population of NCR individuals who have passed under the Review Board of Alberta, Canada. The maximum follow-up period was 35 years and included 528 cases between October 1941 and December 2015. Results indicated that the overall general recidivism rate of NCR individuals was 19.7% (convictions). Of this percentage, 4.6% received a major violent conviction, 12.6% received a violent conviction, and 0.75% received a sexual conviction. The presence of a mood or psychotic disorder resulted in a slightly lower likelihood for recidivism, whereas longer criminal histories led to a greater likelihood of recidivism. The findings are discussed for their implications on forensic practice.

Key Words The Alberta NCR project; not criminally responsible; recidivism; forensic mental health; mental disorder; violence; NCR.

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INTRODUCTION

In Canada, persons who are found to have a mental illness at the time of their criminal offense that (1) rendered them unable to appreciate the nature of their criminal act or (2) rendered them incapable of knowing that there criminal offence was wrong are said to be Not Criminally Responsible on Account of a Mental Disorder (NCR). Under section 672.54 of the Canadian Criminal Code, there are three dispositions available to a court or Review Board for persons found to be NCR: (1) a full warrant or detention in hospital, (2) a conditional discharge, or (3) absolute discharge. A full warrant refers to the detention of an individual with no or limited community access. In the event of a conditional discharge, the person found to be NCR would be supervised in the community with restrictions imposed on their liberty. In the case of an absolute discharge, the NCR person would no longer be under the jurisdiction of a provincial review board and would return to being a member of the community.

In order to better understand the context of Review Board decision making, it is thought that one should understand the demographics of those who have been found to be NCR (Haag, Cheng, & Wirove, 2016), in addition to the public policy/legal statutes. Sequentially, it is equally as important to consider an additional characteristic of this population: recidivism.

The literature provides either outdated or incomplete provincial data on Canadian NCR recidivism rates (Charette, Crocker, Seto et al., 2015; Luettgen, Chrapko, & Reddon, 1998). For instance, Luettgen et al. (1998) researched the increase in community-based treatment of individuals found NCR and their rates of recidivism. The researchers noted that the principle of least restrictive care has historically encouraged the integration of NCR individuals into society. Luettgen et al. (1998) summarized the NCR recidivism rates from previous studies, which have ranged "from 5.4% in Ontario to 65.8% in Maryland" (p. 89). The wide range in the rates of recidivism was explained due to the fact that "it is difficult to generalize between studies and populations" (p. 90).

Conducted at Alberta Hospital Edmonton, Luettgen et al. (1998) studied 109 NCR patients, all of whom had received treatment for 30 days or more in the hospital's Forensic Service. Follow-up data on these patients were gathered from the Alberta Hospital Edmonton's databases, along with several other sources. Of the cohort, 69.7% were re-integrated into the community, where half lived in group homes and the other half resided in their own homes. Results indicated that eight integrated patients had reoffended in the community, and of these eight, only two had committed violent crimes when they reoffended. These results contradicted the misconception that NCR individuals are prone to recidivism (Crocker, Nicholls, Seto et al., 2015a) and should not be granted the right to be integrated back into society.

More recently, Charette et al. (2015) studied recidivism in their analysis of NCR individuals within British

Correspondence to: Dr. Andrew Haag, Department of Psychology, Biological Sciences Building, University of Alberta, Edmonton, AB T6G 2E9, Canada.
E-mail: haag1@ualberta.ca

Columbia, Ontario, and Quebec. In their study examining those found NCR between the year 2000 and 2005, they discovered a relatively low recidivism rate of 23.5% during the five-year follow-up period. The researchers realized that individuals who had severe, violent index offences were much less likely to reoffend (6% after three-year follow-up) as compared to those who had committed less severe index offences (15.3% after three-year follow-up). In addition, past criminal convictions, NCR findings, and psychiatric diagnosis were good predictors of future offending. Lastly, Charette et al. (2015) described the significance of review boards in that recidivism rates were lower in those individuals who were involved with review boards. The researchers stressed that recidivism among persons found NCR was a rarity, particularly when compared to offenders who do not have a mental disorder.

A meta-analysis by Bonta, Law, and Hanson (1998) found that a variety of factors were associated with general and violent recidivism including criminal history, psychiatric diagnosis, and severity of the index offense. In addition, those found NCR were less likely to reoffend than those without this verdict. Coinciding with the findings by Charette et al. (2015), Bonta et al. (1998) found that those with mental illnesses who committed serious offenses (i.e., homicide, sexual offenses) were less likely to reoffend than those who committed less serious offenses (i.e., property damage, possession).

As with other areas in the criminal justice system, there will always be a need for systematic, quality data to be collected on the issue of criminal recidivism. Certainly, the subpopulation of those found NCR is no exception to this. Ideally such data should be collected at the population level to avoid problems with collecting representative samples (Szklo, 1998). The advantage of population level data is that greater accuracy can be achieved with "demographic, epidemiological, and clinical characteristics of the prevalent target population" (Ethgen & Standaert, 2012, p. 171). To date, the best Canadian NCR studies have considered rates of recidivism of cohorts as opposed to population (e.g., Crocker et al., 2015a)—an approach with advantages to finding appropriate samples. It is acknowledged that for many reasons, population-level research may not always be feasible.

Although there are data on Canadian NCR recidivism rates, several provinces and territories are understudied, including Alberta. The current study sought to build upon the Alberta NCR Project (Haag et al., 2016) and report the recidivism rates for the population of NCR individuals in Alberta's history. It was a secondary aim to determine the impact of psychiatric diagnosis, severity of crime, and criminal history on recidivism for the Alberta NCR population. Data were collected from Canadian Police Information Centre (CPIC) criminal records and archived patient charts. CPIC records were coded for convictions post-NCR verdict, and archived patient charts were coded for the time of earliest unsupervised privilege. Given the past research on Canadian NCR groups, it was expected that recidivism rates would be relatively low, especially when compared to general offender populations. Furthermore, predictors of recidivism for NCR accused should also be similar to those that apply to general offenders.

METHODS

Design

This study is an expansion of the Alberta NCR Project, a retrospective longitudinal program of research on NCR individuals throughout Alberta's history. The current research also used a retrospective longitudinal design to track recidivism data on the population of NCR individuals who have been placed under the jurisdiction of the Alberta Review Board (ARB). The minimum follow-up period was 1 year, with a maximum of 35 years.

Procedure

Recidivism data were processed by the authors and counted only convictions post-NCR verdict. Although there is debate on the merits of charges versus convictions for recidivism estimates, some research suggests that there are no significant differences on the use of either operation on final results (Harris, Rice, Quinsey et al., 2015). Thus, the authors opted for a conservative outlook on recidivism rates via convictions. Recidivism follow-up periods began at the time of the earliest unsupervised privilege or, if a conviction occurred prior to the first unsupervised privilege, post-NCR verdict. Typically, unsupervised privileges would be the first opportunity for recidivism after hospitalization (full warrant) for those found to be NCR. Recidivism data were subject to two units of analysis, crude and adjusted. Crude analysis included all cases prior to inclusion criteria and did not account for death and deportation. Adjusted analysis included the cases left after inclusion and exclusion criteria. Smaller samples sizes, as follow-up periods advanced, were a result of cases being removed due to exclusion criteria.

Inclusion Criteria

Inclusion criteria involved cases that reoffended in the follow-up period, and those who went Absent Without Official Leave (AWOL). In the event of death, cases counted up until the last completed follow-up period. In the event of deportation, cases counted only towards the follow-up period completed in Canada.

Exclusion Criteria

Exclusion criteria involved cases that became NCR after recidivism data were collected, died prior to any supervised release, never been given an unsupervised release and never reoffended, and persons transferred out of province prior to unsupervised privilege being granted (there was no way to determine when out of province unsupervised privileges started). In the event of a known death or deportation after release, cases were included until the known date of the event and then no longer included.

Sources of Data

Data were sourced from CPIC records and patient files. CPIC records were collected from the Royal Canadian Mounted Police in December of 2015 and coded for the date and type of conviction across four categories: sexual, major violent, violent, and general. Sexual offenses involved any crime of a sexual nature (i.e., sexual assault, sexual harassment, sexual indecency). Major violent offenses included assault causing bodily harm, aggravated assault, assault with a weapon,

homicide, and attempted homicide. Violent offenses included sexual violence and robbery. General offenses included a conviction for any crime. Data were checked at least twice by two independent coders, with group consultation available for discrepancy behind criminal record interpretations. As for NCR patient files, the authors reviewed and coded for the earliest date of unsupervised privilege and the type of privilege allocated (e.g., unsupervised grounds, unsupervised city passes).

Participants

A total of 528 cases were included in this study between October 1941 and December 2015. The gender composition was 84 per cent male and 16 per cent female with an average age of 35.3 years at the time of NCR verdict. Table 1 displays the psychiatric diagnoses at the time of NCR verdict. Table 2 shows the distribution of index offense types at the time of NCR verdict. Cumulative percentages for the tables exceeded 100 per cent due to multiple index offenses or diagnoses in some cases. For a further breakdown of sociodemographic, mental health, and criminological profiles see Haag et al. (2016).

Analytic Strategy

Descriptive data on recidivism rates were analyzed with frequency statistics. Multiple regression was conducted to examine predictors of recidivism. Predictors entered in the regression included diagnosis (i.e., mood disorder, psychotic disorder, and substance use disorder), and criminological traits (i.e., criminal history, index offense severity). The data for this project were compiled, processed, and reported using the Statistical Package for the Social Sciences (SPSS) (IBM Corp, 2010).

TABLE I Psychiatric diagnoses for Alberta's NCR population

	n (%)
Psychotic Disorder	385 (74.2)
Mood Disorder	154 (29.7)
Substance Abuse Disorder	192 (37)

TABLE II Distribution of index offences for Alberta's NCR population

Type of Offence	n (%)
Direct Violence (excluding sexual offences, homicide, and attempted homicide)	256 (46.9)
Homicide	101 (18.5)
Weapons	91 (16.6)
Attempted Homicide	58 (10.6)
Arson	36 (6.6)
Sexual Offences	34 (6.2)
Robbery	32 (5.9)
Criminal Harassment	17 (3.1)
Offences directly related to intoxicants	4 (.7)
Drug possession/trafficking	2 (.4)
Counsel To Commit Murder	1 (.2)
Conspiracy To Commit Murder	1 (.2)
All Other Offences	179 (32.7)

Ethics

Ethics approval for this research was acquired from both Alberta Health Services and the Research Ethics Office at the University of Alberta.

RESULTS

For crude recidivism analysis, 14 cases were removed after exclusion criteria, leaving a remainder of 528 cases. For adjusted recidivism, there were 528 cases after two years, 485 cases after five years, and 477 cases after ten years and beyond. Table 3 displays the crude and adjusted recidivism rates across major violent, violent, and general recidivism. It should be noted that sexual recidivism was not included due to exceedingly low rates of sexual recidivism. Figure 1 illustrates the survival curve for crude and adjusted recidivism rates except for sexual recidivism. There were four cases of sexual recidivism out of 528 potential. There was one sexual recidivist within four years, one additional case within seven years, and two additional cases within 14 years. In the history of Alberta, 19.7% (N = 87; adjusted rates) of those found NCR reoffended after 35 years of follow-up. Across recidivism categories after 30 years, adjusted recidivism

TABLE III Recidivism rates by offense type

	Crude Recidivism (%)	Adjusted Recidivism (%)
Major Violent Recidivism		
2 Year Rate	0.8	0.8
5 Year Rate	1.7	1.9
10 Year Rate	2.8	3.1
15 Year Rate	3.8	4.2
20 Year Rate	4	4.4
25 Year Rate	4	4.4
30 Year Rate	4.2	4.6
Violent Recidivism		
5 Year Rate	1.9	1.9
10 Year Rate	4.7	5.2
15 Year Rate	8	8.8
20 Year Rate	10.4	11.5
25 Year Rate	11	12.2
30 Year Rate	11	12.2
35 Year Rate	11.4	12.6
General Recidivism		
5 Year Rate	4.5	4.5
10 Year Rate	9.3	10.1
15 Year Rate	13.8	15.3
20 Year Rate	17	18.9
25 Year Rate	17.4	19.3
30 Year Rate	17.6	19.5

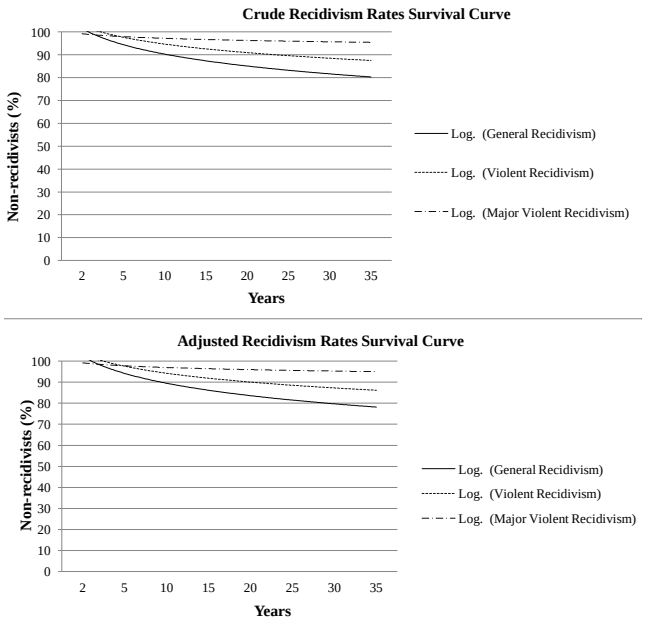

FIGURE 1 Survival curve for crude and adjusted recidivism rates by type of recidivism (excluded sexual recidivism).

rates from lowest to highest were sexual violence (N = 4; 0.75%), major violent recidivism (N = 22; 4.6%), and violent recidivism (N = 59; 12.2%). General and violent recidivism risk stabilized after 20 years, whereas major recidivism stabilized after 10 years. It was notable that there have only been four female NCR recidivists throughout Alberta's history; only one of whom committed an act of major violent recidivism.

Analyzing recidivism rates by disposition, when recidivism occurred, 32.2% of the time (N = 28) was during a full warrant, 11.5% (N = 10) during a conditional discharge, and 56.3% (N = 49) after an absolute discharge.

For mental health and criminological analyses, nine cases were removed due to missing data for a total of 519 cases. Cohen's (1988) guidelines suggest $f^2 \geq 0.02$, $f^2 \geq 0.15$, and $f^2 \geq 0.35$ represent small, medium, and large effect sizes, respectively. There was a significant negative, but small, main effect of mood disorder whereby its presence resulted in a .076 per cent decrease in recidivism, $t(513) = -2.066$, $p = .039$, $f^2 = .091$. There was also a significant negative main effect of psychotic disorder whereby its presence related to a .141 per cent decrease in recidivism, $t(513) = -3.676$, $p < .001$, $f^2 = .165$. There was not a significant relationship between a comorbid substance abuse disorder and recidivism, $t(513) = -.963$, $p = .336$. The presence of a mood or psychotic disorder resulted in a lower likelihood of recidivism, with a psychotic disorder having a larger effect than a mood disorder.

The results indicated that there was a significant positive main effect for the number of previous sentences where, for every one additional conviction, there was a .015 per cent increase in recidivism rates, $t(513) = 4.174$, $p < .001$, $f^2 = .189$. Severity of index offense did not have a significant relationship with recidivism, $t(513) = .281$, $p = .779$. Overall, longer criminal histories led to a greater likelihood of recidivism, whereas the severity of the index offense did not.

DISCUSSION

The primary aim of this study was to report the recidivism rates for the NCR population throughout Alberta's history. In the study period, 19.7% of NCR individuals reoffended, with 12.6% of those reoffenses being violent. Lower recidivism rates were found for more severe crimes, namely sexual violence (0.75%) and major violent recidivism (4.6%). Furthermore, recidivism risk for severe crimes stabilized faster than less severe crimes (10 and 20 years, respectively). The findings of this study converge with previous research showing similarly low rates of general and violent recidivism among Canadian NCR samples (22%; Charette et al., 2015) and international NCR samples (Marais & Subramaney, 2015; Wang, Zhang, Jiang et al., 2007; Bonta et al., 1998). Furthermore, the results show that those NCR persons under the Alberta Review Board have lower general recidivism rates compared to other offender groups within Canada and internationally, as established by other research (Hanson & Morton-Bourgon, 2005; Rice & Harris, 1992; O'Donnell, Baumer, & Hughes, 2008; Langan & Levin, 2002; Baumer, Wright, Kristinsdottir et al., 2002). Given that Review Boards are typically responsible for the granting of dispositions/privileges which subsequently provide the legal framework for the supervision of the NCR population, it appears that these tribunals have successfully upheld public safety based on reconviction rates found in the current study.

The current results suggest the ARB has been successful in providing a framework for risk management when granting conditional discharge. These current results, however, diverge slightly from other studies with Canadian NCR groups/samples that reported patterns of recidivism rates from lowest to highest in relation from full warrant to absolute discharge (Charette et al., 2015). Although, the current study found that most reoffenses occurred after an absolute discharge, there were higher rates during a full warrant than a conditional discharge. There are several ways to explain this phenomenon. Given that the majority of recidivism occurs within five years post-release (Durose, Cooper, & Snyder, 2014; James, 2015; Porporino, & Motiuk, 1995), it is unsurprising that most reoffenses occurred after an absolute discharge. Individuals found to be NCR in Alberta spend an average of 5.7 years under the Review Board (Haag et al., 2016), the majority of it under a full warrant. Given the length of time of a full warrant and that the first unsupervised release almost always occurs in the context of a full warrant, it is not surprising that there is recidivism for some NCR accused prior to being granted a conditional discharge. Moreover, it should be noted that it is not uncommon for those found NCR in Alberta to be living in the community on an approved accommodation while still on a full warrant. Furthermore, one should consider that there are risk management plans developed for NCR individuals from the moment they become NCR in Alberta. By the time that an NCR accused is being considered for a conditional discharge, the treatment team and the ARB would likely have confidence that the idiosyncratic risk management plan has been adequate to manage risk and it is reasonable to progress the NCR accused to a less supervised state. In other words, a person who is on conditional discharge should have demonstrated that they are a manageable risk over time prior to being granted a conditional discharge.

While on conditional discharge, there is still mandatory supervision and support for the NCR accused until they reach an absolute discharge. After an absolute discharge, any support received would be voluntary. Given the presence of supervision and managed risk, one would expect relatively low rates of recidivism while on conditional discharge. When one considers other empirical literature, in one study, general psychiatric populations were found to commit the majority of recidivism (44%) during inpatient status at open psychiatric hospitals (Rice & Harris, 1992), but otherwise have low recidivism rates post-release. In sum, the patterns of recidivism based on disposition type in the current study are consistent with past research.

It was a secondary aim of this research to determine the impact of mental health and criminological traits on recidivism rates for the Alberta NCR population. There was an inverse relationship between a severe mental disorder and recidivism in this study, a finding supported by other research on mentally disordered and general offenders (Bonta et al., 1998; Doyle, Logan, Ludlow et al., 2012; Douglas, Guy, & Hart, 2009; Hall, Miraglia, Lee et al., 2012; Lund, Hofvander, Forsman et al., 2013; Ostermann & Matejkowski, 2014; Nilsson, Wallinius, Gustavson et al., 2011; O'Driscoll, Larney, Indig et al., 2012). Although mental health care is an important aspect of general medical treatment, it should not be viewed in the context of risk as a poor contributor to recidivism. Contrary to other studies, we found that comorbid substance abuse did not hold a relationship with recidivism (Bonta et al., 1998; Charette et al., 2015). One reason for this finding may be that the low base rates of recidivism in our study, general (19.7%) and violent (12.6%), rendered a lack of power to detect an effect. Indeed, many studies support that comorbid substance abuse disorder is an additive risk factor for recidivism amongst mentally disordered and general offenders (i.e., Grann, Danesh, & Fazel, 2008; Harris et al., 2015; Howard, McCarthy, Huband et al., 2013; Lund et al., 2012; Nilsson et al., 2011). Furthermore, given that intoxication at the time of a criminal act should greatly decrease the likelihood of being found NCR in the first place (R v Bouchard-Lebrun, 2011; Criminal Code, 1985), there are fewer NCRs with substance use disorders relative to general offender populations.

As for criminological traits, the finding that criminal history was a good predictor of recidivism coincides with other research on mentally disordered offenders and offenders alike (Bonta, Blais, & Wilson, 2014; Bonta et al., 1998; Charette et al., 2015; Doyle, Carter, Shaw et al., 2012; Howard et al., 2013; Lund et al., 2013; Nilsson et al., 2011). Moreover, the lack of a relationship between severity of index offense and recidivism means that those who committed more serious offenses did not reoffend at a different rate than those who committed less serious offenses. Indeed, some studies highlight the finding that recidivism chances were greater for those with less serious index offenses than those with more serious index offenses (Bonta et al., 1998; Charette et al., 2015). In the context of risk, these findings reinforce the importance of historical factors for NCR populations to recidivate.

Strengths, Limitations, and Future Directions

The strength of this study is that it is a longitudinal design that tracked the entire Alberta NCR population throughout its history. As such, the results of this study may be generalized within Alberta and to other similar populations. A limitation was that recidivism data were available only from official CPIC records and, furthermore, coded for convictions. This suggests that our recidivism estimates were conservative, as crimes may go unreported or result in rehospitalization instead of criminal charges or convictions (Harris et al., 2015). As such, the overall limitation of our recidivism data points to the need to search for more diverse measures of outcome aside from criminal records (Charette et al., 2015). Such measures may be rehospitalization or institutional violence during time under the Review Boards for NCR populations.

This study was a part of the Alberta NCR Project, which seeks to understand those made NCR across Alberta's entire history. Other projects will involve the validation of risk assessment tools on the Alberta NCR population, predictors of desistance from recidivism, and the impact of 2014 changes to NCR legislation on Review Board decision-making.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that there are no conflicts of interest.

AUTHOR AFFILIATIONS

*Department of Psychology, University of Alberta, Edmonton, AB; †Department of Psychology, University of Saskatchewan, Saskatoon, SK; ‡Alberta Health Services, Edmonton, AB; §Department of Psychiatry, University of Alberta, Edmonton, AB, Canada.

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