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Police Practice and Research

An International Journal

ISSN: 1561-4263 (Print) 1477-271X (Online) Journal homepage: <http://www.tandfonline.com/loi/gppr20>

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To cite this article: Victoria A. Sytsma & Eric L. Piza (2017): The influence of job assignment on community engagement: bicycle patrol and community-oriented policing, Police Practice and Research, DOI: [10.1080/15614263.2017.1364998](https://doi.org/10.1080/15614263.2017.1364998)

To link to this article: <http://dx.doi.org/10.1080/15614263.2017.1364998>

Published online: 24 Aug 2017.

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The influence of job assignment on community engagement: bicycle patrol and community-oriented policing

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ABSTRACT

The purpose of this study is to compare a specialized community-oriented policing (COP) unit to a reactive unit on officer perceptions of public contact and officer perceptions of job performance. We also compare bicycle patrol officers to motor vehicle patrol officers within these units. Using a static group comparison design, questionnaires were distributed to officers within the Toronto Police Service ($n = 178$). Bicycle patrol is associated with more contacts with the public and higher rates of proactive policing when compared to motor vehicle patrol and bicycle officers are more likely to rate higher on several measures of crime control. Officers with a COP mandate engage with the public for a wider variety of reasons compared to those with a reactive mandate, and are more likely to rate higher on perceptions of performing job duties in a procedurally just manner. This study demonstrates the value of a specialized COP unit that includes bicycle patrol in achieving tenets of COP. It contributes to the literature on COP and the use of bicycle patrol in law enforcement by presenting the perspective of the police officer.

ARTICLE HISTORY

Received 24 November 2016
Accepted 14 July 2017

KEYWORDS

Community-oriented policing; non-motor vehicle patrol; community engagement; multi-level modeling; structural equation modeling

Highlights

- Bicycle patrol associated with contacts with public and proactive policing.
- Bicycle patrol associated with several measures of crime control.
- COP officers engage with public for wide variety of reasons.
- COP associated with perceptions of performing in procedurally just manner.
- COP unit that includes bicycle patrol has value in achieving tenets of COP.

Introduction

The introduction of motor vehicles represented the first and arguably most significant technological innovation in policing. Motor vehicles were expected to deliver numerous advantages to policing, such as rapidly responding to incidents, patrolling large beats to create a sense of 'omnipresence,' allowing supervisors to more readily conduct field checks of their officers, and keeping pace with criminals who increasingly used cars to commit crime (Wilson, 1963).

Over time scholars noted an unintended consequence of deploying police officers in motor vehicles. Specifically, the patrol car created a barrier between police and the public, with police-citizen

encounters predominately occurring after a crime incident. This lack of informal interaction can negatively affect police-community relations by promoting an image of the police as an occupying force, entering neighborhoods for the sole purpose of enforcing the law (Kelling & Coles, 1996). As a remedy to this issue police have recently emphasized non-motor vehicle patrol strategies under the assumption that officers outside of cars are seen as more approachable and more involved in the community than officers in motor vehicles (Cordner, 2010). Increased informal contact (i.e., not in response to a reported crime incident) between police officers and citizens is the perceived mechanism by which non-motor vehicle patrol strategies can cultivate positive police-community relationships (Trojanowicz, 1982; Trojanowicz & Banas, 1985).

According to the U.S. Department of Justice, the use of bicycle patrol by local police departments increased from 28 to 34% between 1997 and 1999 (Hickman & Reaves, 2003). During this same period the use of foot patrol increased from 50 to 53%. These numbers have remained relatively stable over time. In 2007 55% of local police utilized foot patrol and 32% relied on bicycle (Reaves, 2010). While similar figures are not available for Canada, anecdotal evidence such as news reports and informal observation suggests non-motor vehicle patrol has achieved a high degree of popularity in Canada (see CTV News Ottawa, 2014; Toronto Police Service, 2016, p. iii; CBC News, 2016; Calgary Police Service, 2016).

Menton (2008) has shown that bicycle patrols can result in twice as many interactions between officers and citizens when compared to motor vehicle patrols. Given the potential for police-public contact that comes with stepping away from motor vehicle use, bicycle patrol can make for a valuable tool in the community policing tool belt. Yet despite the relatively wide use of bicycle patrol and its potential for community engagement there is a dearth of research which places a spotlight on bicycle patrol within the context of community-oriented policing (COP). In addition, the majority of studies on police-community relations has measured this relationship from the perspective of the public (e.g., Brunson & Gau, 2015; Sindall, McCarthy, & Brunton-Smith, 2017) with police officer perceptions having gone largely unexplored. We feel this is a key gap in the literature, as accounting for officer perceptions can generate important insights for use in COP programs.

The current study fills gaps in the literature through a survey of bicycle and motor vehicle patrol officers within the Toronto Police Service (TPS). The city of Toronto makes for an ideal study setting to fill these gaps because the TPS has implemented city-wide COP units known as Community Response Units (CRUs). CRUs consist of bicycle patrol, but there are also officers within CRUs that cannot rely on bicycles due to environmental restrictions within their divisions, such as freeways. All officers in CRUs, regardless of patrol method, differ from Primary Response Units (PRUs) regarding their day-to-day missions and functions. While PRUs primarily respond to citizen-generated calls for service, officers assigned to CRUs are expected to deliver COP services through community engagement and proactive patrol activities. The composition of the TPS allows for a research design that takes advantage of naturally occurring treatment and comparison groups.

Within the COP model we compare officer perceptions among those who rely on bicycle patrol to those who rely on motor vehicle patrol on number of contacts with the public, reasons for contact, and officer ranking of public contacts. Second, because the mandate of CRU officers differs from that of PRU, we also compare officer perceptions between these two aggregate units on the above measures, as well as crime control and procedural justice measures. Findings suggest that mode of patrol significantly affects number of contacts with the public and CRU officers engage with the public for a wider variety of reasons compared to PRU officers. Within CRUs officer patrol style impacts reasons for contact with the public, with motor vehicle patrol officers being more likely to respond to calls for service and less likely to engage in proactive policing – despite proactive policing being within their mandate. Unit and mode of patrol also impacts perceptions of some areas of job performance, with CRU officers being more likely to rank higher their perceptions of performing in a procedurally just manner and bicycle officers being more likely to rank higher their perceptions of various crime control measures. We conclude with a discussion of the policy implications of these findings.

Review of relevant literature

Community policing

COP emerged as a predominate policing strategy in the 1990s. While somewhat of an amorphous term, the philosophy of COP involves adherence to four interrelated organizational principles: police-community partnerships, decentralization of power within the police agency, an expansion of the police mandate, and problem solving (Bayley, 1992; Cordner, 2005; Gill, Weisburd, Telep, Vitter, & Bennett, 2014; Mastrofski, 2006; Oliver, 1998; Skogan, 2006; Skogan & Frydl, 2004). The adoption of COP in the United States was bolstered with the passage of the 1994 violent crime bill, which mandated that the 100,000 police officers hired through this legislation be engaged in COP (Cordner, 2005). The popularity of COP has since spread to the point that one would be hard pressed to find a police agency in North America that did not incorporate at least some COP strategies (Skogan, 2006). According to the U.S. Department of Justice, in 2013 90% of police agencies serving 25,000 or more residents included some type of COP component in their mandate (Reaves, 2015). Police officer conduct in Ontario is governed by the Police Services Act of Ontario which explicitly states in Part IV section 41. c), 'The duties of the chief of police include ... ensuring that the police force provides community-oriented police services' (np, 2015). The city of Toronto developed units to specialize in COP in 1996 known as CRUs. CRUs fit the common definition of COP as evidenced by the following passage taken from the CRU officer training manual:

You will be expected to pro-actively discover and determine the needs of your neighbourhood and then respond to those needs ... Community policing is about joint identification of problems and joint solving of problems. (Toronto Police Service, 2015, pp. 3–4)

The notion of COP and perceived importance of community engagement has been bolstered by recent scholarship on procedural justice and police legitimacy. Police officers can be said to possess legitimacy if the public views the police as an authority to be deferred to. With police legitimacy comes public confidence in that aspect of the criminal justice system – a necessary ingredient for crime reporting (Hough & Roberts, 2004; Putnam, 1995; Slocum, Taylor, Brick, & Esbensen, 2010; Sunshine & Tyler, 2003). Perceptions of legitimacy are largely based upon procedural justice (Sunshine & Tyler, 2003), which is defined as 'perceived fairness of the procedures involved in decision-making and implementation, and the treatment people receive from the authority' (Murphy, Hinds, & Fleming, 2008, p. 139). A systematic review by Mazerolle, Bennett, Davis, Sargeant, and Manning (2013) concludes that programming or innovation aiming to foster legitimacy is less important than the inclusion of procedural justice features. One way in which officers can cultivate procedurally fair interactions and thus strengthen legitimacy is through COP and the often positive and informal contact that go along with it (Trojanowicz, 1982; Trojanowicz & Banas, 1985). A systematic review by Gill et al. (2014) found no effects of COP on fear of crime and effects on crime levels were inconclusive, however they did find that COP can have a positive impact on legitimacy of police, perceptions of disorder, and public satisfaction with the police. These findings reinforce Skogan's (2006, pp. 29–31) assertion that the positive interactions between residents and police that are fostered through COP activities can improve public support of the police.

The perceived importance of positive police-citizen interactions raises an important procedural question: what if, from the perspective of those delivering COP activities, there is a barrier to positive interactions occurring in the first place? While the topic of police-community relations has received a great deal of empirical attention, the majority of research has measured this relationship from the perspective of the public (e.g., Brunson & Gau, 2015; Sindall et al., 2017). The literature on police perceptions is often crime-specific, such as the effect officer attitudes have on approaches to sexual assault cases (Brown, 1998; Page, 2007, 2008) and drug enforcement (Petrocelli, Oberweis, Smith, & Petrocelli, 2014). Police perception literature also tends to focus on how individual officer characteristics such as gender predict attitudes (Carlan, 2009; Poteveva & Sun, 2009). Sobol (2010) explored how crime rates influence police levels of cynicism toward residents, but police perceptions of community relations have

largely gone unexplored; with the notable exception being Weisburd, Greenspan, Hamilton, Bryant, and Williams's (2001) work on, among other things, how officers perceive COP to be influencing use of force. This gap in the literature leaves concerns about incongruences between stated COP mandates and fidelity to those mandates. Police officers themselves are in one of the best positions to opine on how community engagement goals of COP are actually met in practice.

Non-motor vehicle patrol

The community involvement aspect of COP can be difficult to achieve, particularly within disenfranchised communities (Sampson, Raudenbush, & Earls, 1997; Skogan, 1990, 2006). This is problematic because disenfranchised communities with low collective efficacy may benefit most from improved relationships with police (Bayley, 1992; Gill et al., 2014; Skogan, 2006). Further, the now-famous Kelling, Pate, Dieckman, and Brown (1974) study on preventive patrol in Kansas City, Missouri speaks to motor vehicle patrol alienating officers from the residents they aim to serve (p. 49). For instance the majority of officers interviewed in the study advocated for less visibility to the public, including use of unmarked and their own private motor vehicles and plainclothes (Kelling et al., 1974, p. 46). In contrast, given the potential for police-public contact, patrol styles that increase officer visibility such as foot and bicycle patrol can be a first step to mobilizing residents to become involved in the crime prevention process (Gill et al., 2014; Skogan, 2006). Indeed police departments engaged in COP typically report the use of a wide range of projects meant to increase community engagement, including the use of non-motor vehicle patrol (Skogan, 2006; Cordner, 2005).

There is no shortage of research on the impact of foot patrol on various outcomes, including improved public perceptions of safety (Kelling, 1981), increased crime reporting (Bowers & Hirsch, 1987), decreased violent crime within hotspots (Piza & O'Hara, 2014; Ratcliffe, Taniguchi, Groff, & Wood, 2011), increased public satisfaction with the police, and a reduction in calls for service (Andresen & Lau, 2014; Hornick, Burrows, Phillips, & Leighton, 1991; Novak, Fox, Carr, & Spade, 2016). In spite of the success of foot patrol there are some notable shortcomings that can be addressed through the use of bicycle patrol. Bicycles allow officers to cover larger geographies than foot, while simultaneously improving upon response times. When compared to motor-vehicle and foot, bicycle patrol may also provide a more effective and faster means of navigating difficult urban terrain, such as crowded food markets or busy public events – particularly when pursuing a suspect. If bicycle patrol can address shortcomings left by foot and facilitate the public engagement not afforded through motor-vehicle, this mode of patrol may be the most attractive option for a police service aiming to incorporate a COP mandate.

Despite the potential benefits, bicycle patrol has been largely ignored in the literature – particularly in the Canadian context. This paucity is unsurprising. Huey and Ricciardelli (2016, p. 119) argue Canada is desperately lacking in 'quality, actionable research in policing and community safety issues.' Though there are some noteworthy exceptions. Barclay, Buckley, Brantingham, Brantingham, and Whin-Yates (1997) analyzed bicycle patrols deployed in a car park in Vancouver, finding a sharp decrease in motor vehicle theft during the experimental period. Both temporal and spatial diffusion of benefits were also observed. While a slight increase was observed in a nearby problem area, suggesting displacement, it was smaller than the observed diffusion of benefits. While the evaluation of Barclay et al. (1997) lends support to bicycle patrol as a crime deterrent in car parks, it does not speak to the tactic's potential influence in a public setting. A qualitative study of 12 officers in Finland by Lundälv, Gårder, Risser, and Leden (2008) found that officers felt the use of bicycles provides an opportunity for police to interact and communicate with the public. These findings are echoed by Menton's (2008) work comparing motor vehicle to bicycle patrol on public contact in several U.S. cities, which found that bicycle patrols can result in twice as many interactions between officers and citizens and citizens are more willing to approach bicycle patrol officers. In a pre- and post-test study of a COP program in Mississippi that included bicycle patrol along with foot and targeted crackdowns to reduce arrest rates, the authors found a substantial decrease in arrest (Byxbe & Carlan, 2001). What is missing from

the limited literature on bicycles is research which isolates bicycle patrol within the context of COP to assess how it compares to both motor vehicle patrol and reactive policing on officer perceptions of public contact and job performance.

Scope of the current study

The purpose of this study is to compare a specialized COP unit to a reactive unit on officer perceptions of public contact, and officer perceptions of job performance, as well as compare bicycle patrol officers to motor vehicle patrol officers within and across units. This study answers two research questions:

- (1) How do bicycle patrol and CRU officer roles influence officer perceptions of contact with the public (number of contacts with the public, reason for contacts, and ranking of contacts)?
- (2) How do bicycle patrol and CRU officer roles influence officer perceptions of job performance as it relates to procedural justice and crime control?

To explore these research questions a questionnaire was administered to CRU and PRU officers within the TPS.

The study setting for this project is Toronto, Ontario, Canada's largest city. Systematic data on mode of patrol does not exist in Canada, but Toronto has a nearly 30 year history of relying on bicycle patrol in everyday policing. The TPS employs between 5000 and 5500 sworn officers at a given time, and serves a population of about 2.8 million residents. In the 1980s TPS found itself facing intense backlash following the 1981 raids on Toronto bathhouses, resulting in the arrest of nearly 300 men (CBC Radio, 1981). The raids led to thousands of citizens protesting the treatment of the gay community by the TPS and calls for an inquiry into the raids. In response to unfavourable public opinion, as well as due to changing trends in policing in Canada and the U.S., the TPS created a 'Bike Patrol Unit' in 1989 (CBC News, 2016; Hornick et al., 1991; see Green & Mastrofski, 1988). The goal of this unit was to have 6 bicycles on patrol during each shift. While the Calgary Police Service enacted 'Bicycle Detail' the year before, this was nonetheless a novel innovation at the time, with officers often being mistaken for couriers or messengers (Calgary Police Service, 2016; CBC News, 2016). Today, while this figure varies by season and staffing factors, the TPS often employs up to 400 bicycle patrol officers at a given time, with CRUs consisting largely of bicycle patrol when the environment allows.

Unit assignment brings a different set of duties and goals. For instance, PRU officers are expected to spend more time responding to calls rather than engaging in proactive enforcement because that is their role as reactive officers. CRU officers are expected to engage in proactive policing regardless of patrol mode because their role is that of the community officer. As such patrol mode within the CRU sample is explored. Specifically, data analyses are conducted comparing bicycle to motor vehicle patrol modes for the total sample, CRUs to PRUs for the total sample, and bicycle to motor vehicle patrol within the CRU sample only. In the case of the multi-level models, the total sample is used, but unit is controlled for.

Design and sampling

The TPS polices 17 divisions across the city. These divisions can be characterized as either Area Field Command operations, which generally refers to divisions located outside the city's core (i.e., more residential and suburban areas) or Central Field Command operations, which generally refers to divisions located within the city's core. See Figure 1 for a map of divisions. Each division is separated into PRUs primarily responsible for responding to calls for service, and CRUs, which engage in COP.¹ CRUs in Central Field Command include a substantial percentage of bicycle patrol. CRUs in Area Field Command use bicycle patrol at a much lower rate due to environmental restrictions which make cycling difficult. While divisions within the same Field Command are similar in population density, they differ dramatically across Field Commands. As such this research relies on a static group comparison design.

Figure 1. Divisional Boundaries.

Notes: This figure illustrates the location of Central Field Command (located in the south-centre of the map) and Area Field Command (located in the outer west, north, and east boundaries). Map was created using open source GIS files and imagery from the City of Toronto Open Data portal and ESRI's ArcMAP software.

A purposive sampling technique is used to select divisions exhibiting both the highest rates of bicycle use and lowest rates of bicycle use (and therefore low and high rates of motor-vehicle use within a COP mandate). We did this to reflect the possibility that officer perceptions may in part be shaped by the primary patrol strategy employed in their division. To control for the potential influence of sociodemographic factors, we loosely matched divisions on rate of dispatched calls for service per 1000 based on the 3-year average of 2010–2012 and various measures of disadvantage. While detailed census information is collected by Statistics Canada on numerous measures of disadvantage, that data is not available by TPS division. Division level information is compiled specially for the TPS on variables of interest to them. Of the variables available at the division level only percent household where English is not mother tongue (a measure of foreign-born and therefore ethnic heterogeneity) and percent one-parent families were appropriate measures of disadvantage (other measures include age distribution and type of dwelling, with single detached houses being rare in the city of Toronto as a whole). Percent one-parent families has been used a measure of disadvantage in the literature and ethnic heterogeneity as operationalized by various means is a common measure of socially disorganized neighbourhoods (see Krivo, Peterson, & Kuhl, 2009; Sampson et al., 1997). Personnel and bicycle counts were provided to researchers by a sponsor in the TPS, and are based on 2015 data. Calls for service data was taken from the 2012 annual Statistical Report, which is publicly available on the TPS website. No annual reports post-2012 had been posted at the time of this research. Data on disadvantage was taken from the 2013 Environmental Scan – the most recent demographic report publicly available from the TPS at the time of this research. Environmental Scan data is collected by the Statistics Canada Census Program.

Officers from two divisions within Area Field and two divisions within Central Field were approached to complete a short, anonymous questionnaire. By including both Area Field and Central Field PRUs and CRUs, units that share the same function but operate differently due to environmental differences are included. Two divisions from each Field Command account for variation across divisions within the same Field Command and across Field Commands with the same units, while at the same time limiting disruption and inconvenience to the TPS. Divisions 55 and 14 were chosen first because they are located within Central Field and have the highest ratio of bicycles to CRU officers – with 9.7% ($n = 20$) and 15.4% ($n = 40$) of total officers being CRU, respectively; and with 75 and 85% of CRU officers relying on bicycle patrol, respectively. Area Field divisions were then chosen in a manner that struck a balance between lowest CRU officer-to-bicycle ratio (in order to recruit the numbers necessary to effectively compare bicycle users to motor vehicle users within a COP mandate, but across Field Commands) while being similar in rate of dispatched calls for service per 1000. One Area Field division (31) has a smaller percentage of bicycles within the CRU than division 42, however it differs greatly from divisions 55 and 14 on measures of disadvantage, and thus was excluded. See Table 1 for descriptive statistics of personnel and bicycle counts, calls for service rates, and disadvantage data by division.

From within the four selected divisions individual officers representing both PRUs and CRUs were recruited for survey using a variety of strategies. Researchers visited all four divisions during various shift start times to disseminate questionnaires in person to available CRU officers. CRU officer recruitment was made a priority during site visits over PRU recruitment due to researcher resource restrictions combined with the smaller number of CRU officers found within the TPS as a whole. Recruiting a relatively large number of PRU officers posed less of a challenge because of their larger total numbers, thus the focus of site visits was to specifically recruit CRU officers to ensure statistical power when comparing groups. Additionally due to the larger number of PRU officers on a given shift, organizing a PRU-focused site visit would have been very difficult as shift start times are staggered. During in-person visits the purpose and method of the research was described by researchers. The questionnaire also included detailed instructions as part of the informed consent document. All other CRU (those not present at shift start time) as well as all PRU officers included in the study were made aware of the survey by training or staff sergeants during shift start times.

Table 1. Division descriptive statistics.

Division	Field	Dispatched calls per 1000 (2010-2012)	2013 Percent household english not mother tongue	2013 Percent one-parent families*	2015 Total number of officers	2015 Percent cru officers of total	2015 Percent CRU bike usage of CRU
55	<i>Central</i>	322.96	28.00	21.00	206	9.71	85.00
14	<i>Central</i>	445.79	41.00	19.00	259	15.44	75.00
54	Central	282.55	45.00	22.00	183	12.02	72.73
13	Central	222.55	46.00	21.00	170	10.59	72.22
53	Central	195.00	30.00	14.00	170	13.53	60.87
11	Central	254.60	40.00	19.00	204	9.80	60.00
52	Central	898.51	46.00	13.00	227	19.38	59.09
51	Central	517.85	42.00	21.00	254	16.93	53.49
12	Central	276.91	50.00	31.00	204	14.22	48.28
42	<i>Area</i>	139.44	64.00	21.00	206	10.19	57.14
23	<i>Area</i>	220.96	54.00	24.00	232	18.10	28.57
32	Area	164.07	55.00	18.00	208	11.06	69.57
22	Area	216.32	41.00	19.00	196	9.69	68.42
41	Area	256.80	46.00	24.00	235	8.09	68.42
33	Area	166.33	58.00	19.00	160	10.00	62.50
43	Area	208.14	43.00	23.00	242	14.46	57.14
31	Area	301.73	56.00	32.00	235	15.74	37.84

Note: Italicized divisions were selected as study sites.

*80–86% Female-headed households.

Subjects were invited, either in person by the researchers and/or through written instructions disseminated by training or staff sergeants, to fill out questionnaires at their leisure. Paper questionnaires were provided to officers and officers were asked to seal completed questionnaires in an envelope for anonymity. Completed questionnaires were sent to a sponsor in the TPS through inter-departmental mail and returned to researchers in person. Out of a possible 903 officers 178 questionnaires were returned. Pairwise deletion was used in cases where subjects did not complete a particular question. See Table 2 for descriptive statistics of respondents.

Measurement and analysis

Primary patrol mode during shift is a central variable of those analyses focused on how mode of patrol predicts a given outcome. To ascertain this, officers were asked which mode of patrol they currently rely on most often. Attributes include bicycle (coded as 1) and motor vehicle (coded as 0). Additional statistical analyses determine how officer assignment to either CRU or PRU (regardless of patrol mode) predict various outcomes in an attempt to determine how operating within a COP mandate (i.e., being assigned to CRU instead of PRU) influences officer perceptions. To this end ‘unit’ is operationalized as the unit in which the respondent was currently assigned at the time of data collection. Respondents chose between CRU (coded as 1) and PRU (coded as 0). Division and field refer to the division number in which the officer operated during the time of the study and the field in which that division is located (Central = 1 and Area = 0). Various officer-level predictors were collected to serve as control variables. While officer age was collected, due to multicollinearity with a variable measuring the approximate number of years respondents had been police officers at the time of data collection (Pearson’s $r = .8$), age is not included in analyses. Number of years as an officer was chosen over age because it captures job experience in years regardless of age. Gender and race/ethnicity are binary (male = 1, female = 0; 1 = white, 0 = non-white).

Table 2. Respondent descriptive statistics.

Variable	Unit			
	CRU (%)	PRU (%)	Total (%)	
<i>Division</i>				
14	36(49)	22(21)	58(33)	
23	12(16)	15(14)	27(15)	
42	9(12)	51(49)	60(34)	
55	16(22)	17(16)	33(19)	
Total	73(100)	105(100)	178(100)	
<i>Field</i>				
Central	52(71)	39(37)	91(51)	
Area	21(29)	66(63)	87(49)	
Total	73(100)	105(100)	178(100)	
<i>Patrol mode</i>				
Bicycle	41(58)	0(0)	41(23)	
Motor vehicle	28(39)	104(100)	132(75)	
Total	69(100)	104(100)	173(100)	
<i>Race/Ethnicity</i>				
White	52(74)	74(74)	126(74)	
Non-White ^a	18(26)	26(26)	44(26)	
Total	70(100)	100(100)	170(100)	
<i>Gender</i>				
Man	61(85)	76(76)	137(80)	
Woman	11(15)	24(24)	35(20)	
Total	72(100)	100(100)	172(100)	
	<i>N</i>	Mean(SD)	Min.	Max.
Age	168	37.5(7.7)	23	60
Years officer	173	10.5(7.5)	1	33
Number of contacts with public per shift	166	14.27(11.27)	0	50

^aNon-white includes black, Aboriginal, Asian/South Asian, Hispanic, and other.

In addition to number of contacts with the public during a typical shift, research question number 1 is addressed in part by exploring common reasons for contact with the public. This is measured using the following question and response categories:

What is the most common reason for you to have contacts with the public? Responding to calls for service; Citizen-initiated non-law enforcement (e.g., citizen asking for directions); Officer-initiated non-law enforcement (e.g., asking citizen if they require directions); Citizen-initiated law enforcement (e.g., citizen approaching you to report a crime); Proactive police enforcement (e.g., suspicion of crime in progress); Community events/presentations.

Space was provided for respondents to record another most common reason, but none were provided. Satisfaction with public contacts is also explored. Officers were asked to rank the contact they have with the public in their current job assignment based on a 4-point ordinal scale ranging from very negative to very positive.

The analytical framework of this study includes several techniques, which we feel serve to strengthen this work following a relatively weak research design reliant on purposive and convenience sampling. Where appropriate, unit is either controlled for, or separate analyses are conducted comparing bicycle to motor vehicle patrol modes for the total sample, CRUs to PRUs for the total sample, and bicycle to motor vehicle patrol within the CRU sample only. Patrol mode within the CRU sample serves the purpose of isolating patrol mode without the intervening effect of unit, which brings a different set of job assignment duties and goals – again, CRU officers do not necessarily use bicycles. Some CRU officers, particularly in the Area Field, must rely on motor vehicle due to environmental constraints.

A three-level mixed effects model is used to determine how mode of patrol predicts number of contacts with the public during a typical shift, while accounting for variation at unit and division levels, as well as the random effects of patrolling in the city centre compared to more suburban areas. Nesting unit within division, and division within field, eliminates the potential for overstatement of significance as a result of nested data violating the assumption that each respondent is an independent observation. It also isolates patrol mode without the intervening effect of unit. The Stata command 'xtmixed' is used with patrol mode acting as the fixed effect, the individual officer is level 1, unit is level 2, and division is level 3. Field is set as a random effect on number of contacts because while number of contacts with the public is thought to be impacted primarily by patrol mode, given various unknown differences in policing urban compared to suburban landscapes, field can have an impact beyond the fixed effect of patrol and division level. Following the multilevel analyses cross-tabulation with X^2 and Cramer's V are used to assess the strength and nature of the relationships between reasons for public contact and primary mode of patrol, reasons for public contact and unit, ranking of public contact and primary mode of patrol, and ranking of public contact and unit.

Ordinal logistic regression is used to determine how patrol style predicts officer ranking of public contact, controlling for officer-level predictors. While OLS and multinomial models have previously been used to analyze categorical data, ordinal logistic regression is the most appropriate statistical test for ranked categories representing an underlying continuum that cannot be directly measured or observed (Britt & Weisburd, 2010). Individuals who respond in the same ranked category (e.g., 'disagree,' 'strongly disagree,' etc.) may not have identical values on the dependent variables in reality. Said differently, two respondents answering 'strongly disagree' may differ in the magnitude to which they disagreed (Britt & Weisburd, 2010, p. 668). Ordinal logistic regression best measures such responses.

While there are a number of uses for structural equation modeling (SEM), as in the case of the 'multiple indicators, multiple causes' measurement models developed here, a set of observed variables can be used to specify a model containing both directional and non-directional relationships between observed variables and latent constructs (MacCallum & Austin, 2000). Because SEM attempts to specify patterns of covariation or correlation, directionality is fluid – with measured variables acting as both dependent and independent variables at different stages of interpretation (Suhr, n.d.). In the current study SEM is used to determine how well a number of observed indicators of a theoretical concept represent that latent concept, and how an exogenous variable then predicts the latent concept. Because the latent variable is based on observed data, the exogenous variable also acts as an independent variable for each of the indicators of the latent concept, allowing observed indicators to

serve as both independent (a latent construct depends on each observed measure²) and dependent variables (scores on observed indicators that make up a latent construct may depend on an outside, or exogenous variable) simultaneously. The 'gsem' command in Stata is used to produce generalized ordinal logistic regression SEMs. Crime control and procedural justice are the latent constructs in the model and ordinal logistic is used here because of the ordinal nature of the measured variables that make up crime control and procedural justice. Patrol mode and assigned unit act as exogenous variables in two separate models.

The questionnaire includes 11 variables measuring officer perceptions of job performance related to crime control and procedural justice. Prior to conducting the SEMs officer perception of job performance variables were reverse-coded where necessary to ensure consistent direction (higher ratings indicate more favourable attitudes). Principal components analysis was used to reduce possible measures of crime control and procedural justice, which resulted in retaining four measures of crime control (Cronbach's alpha = .77) based on the following survey questions:

Do you believe the unit in which you currently work does a good job, an average job, or a poor job of supplying information to the public on ways to reduce crime?

Do you believe the unit in which you currently work (either Community Response or Primary Response) does a good job, an average job, or a poor job of enforcing the laws?

Do you believe the unit in which you currently work does a good job, an average job, or a poor job of ensuring the safety of the citizens in your division?

Do you believe the unit in which you currently work does a good job, an average job, or a poor job of preventing crime in your division?

Three measures of procedural justice were retained (Cronbach's alpha = .75) based on the following survey questions:³

Do you believe the unit in which you currently work does a good job, an average job, or a poor job of being approachable by the public and easy to talk to?

Do you believe the unit in which you currently work does a good job, an average job, or a poor job of being polite to people in the neighbourhood?

Do you believe the unit in which you currently work does a good job, an average job, or a poor job of treating citizens fairly?

Results

Contact with public

A three-level random coefficient model determines how mode of patrol predicts number of contacts with the public during a typical shift, while accounting for variation at unit and division levels as well as the random effects of patrolling in the city centre compared to more suburban areas. Based on model fit statistics, accounting for both unit-level effects and division membership effects improves upon the patrol mode-only model, whereas accounting only for unit-level effects is actually inferior to the one-predictor model. Patrol mode remains significant across all models and the final model provides the greatest predictive value. Model 4 in Table 3 indicates that relying on bicycle patrol over motor vehicle is associated with over 7 more contacts with the public during a typical shift controlling for officer gender, race, and years on the job, accounting for variation at unit and division levels, and controlling for the random effects of patrolling in the city centre (Central Field) compared to the outskirts (Area Field). Standard deviation estimates provided in Table 3 for levels 2 and 3 are intercepts only, and thus no significance test was conducted. It should also be noted that the standard deviation for number of contacts across fields is 6.05 ($\bar{x} = 14.27$), suggesting wide variation in individual officer number of stops by Field Command.

Table 3. Multilevel mixed effects models number of contacts with the public.

Fixed effects	Model 1	Model 2	Model 3	Model 4
Level 1 – Officers (<i>N</i> = 162)	Coeff(SE)	Coeff(SE)	Coeff(SE)	Coeff(SE)
Intercept	12.29(.95)***	12.83(1.69)***	13.04(3.19)***	14.05(2.89)***
Patrol mode (Bicycle = 1)	7.39(1.91)***	5.84(2.32)*	6.87(2.49)**	7.31(2.74)**
Gender (Man = 1)			−1.41(2.05)	−1.37(2.05)
Race/Ethnicity (White = 1)			1.96(1.99)	1.78(1.98)
Years as officer			−.08(.12)	−.08(.12)
Field (Central = 1)				−2.15(5.00)
Random effects	SD Estimate(SE)	SD Estimate(SE)	SD Estimate(SE)	SD Estimate(SE)
Field (Central = 1)				6.05(4.89)
Level 2 – Unit (<i>N</i> = 8) (CRU = 1)				
Intercept		1.87(2.28)	1.51(2.43)	2.07(1.65)
Level 3 – Division (<i>N</i> = 4)				
Intercept			3.61(2.02)	.00(.02)
Model Fit				
Deviance(df)	1215.46(3)	1214.96(4)	1157.3(8)	1151.28(10)
AIC	1221.46	1222.96	1173.31	1171.28
BIC	1230.73	1235.31	1197.71	1201.78

p* < .01;*p* < .001.**Table 4.** Cross-tabulations reason for public contact.

Reason for public contact	Patrol mode total			Unit			Patrol mode within CRU		
	<i>N</i> (%)	Bicycle	Motor vehicle	<i>N</i> (%)	CRU	PRU	<i>N</i> (%)	Bicycle	Motor vehicle
Responding to calls for service	105(68)	5(14)	100(84)	106(67)	14(22)	92(98)	14(23)	5(14)	9(35)
Citizen-initiated non-law enforcement	8(5)	6(17)	2(2)	8(5)	8(13)	0(0)	8(13)	6(17)	2(8)
Officer-initiated non-law enforcement	12(8)	6(17)	6(5)	12(8)	12(19)	0(0)	12(20)	6(17)	6(23)
Citizen-initiated law enforcement	3(2)	2(6)	1(1)	3(2)	3(5)	0(0)	3(5)	2(6)	1(4)
Proactive police enforcement	22(14)	14(40)	8(7)	23(15)	21(33)	2(2)	20(33)	14(40)	6(23)
Community events/presentations	4(3)	2(6)	2(2)	6(4)	6(9)	0(0)	4(7)	2(6)	2(8)
Total	154(100)	35(100)	119(100)	158(100)	64(100)	94(100)	61(100)	35(100)	26(100)
<i>p</i>		.00***			.00***			.36 (Fisher's Exact)	
<i>V</i>		.64			.8			.3	

****p* < .001.

Subjects were asked to identify the most common reason for contact with the public. Cross-tabulation shows that bicycle patrol and CRU officers tend to engage with the public for a wide variety of reasons (see Table 4). Further 84% of motor vehicle patrol officers and 98% of PRU officers stated that responding to calls for service is the most common reason for contact with the public. This is not surprising for PRU officers given that responding to calls is a central aspect of job assignment. However these findings hint at the fact that some CRU officers in motor vehicles are mostly responding to calls for service, rather than engaging primarily in COP activities. This is further confirmed in the cross-tabulation which includes CRU-only officers. Of the 35 bicycle patrol officers within CRUs that responded to this question, 14 stated that proactive police enforcement is the most common reason for contact with the public. This is in contrast to the 6 CRU motor vehicle officers who stated the same.

Forty percent of bicycle patrol officers and 33% of CRU officers in the total sample stated that proactive police enforcement is the most common reason for public contact. Both citizen and officer-initiated non-law enforcement are also common reasons for public contact for bicycle patrol officers, however 22% of CRU officers stated that responding to calls for service is the primary reason for public contact, which runs counter to their mandate of COP activities. Relationships between reason for public contact and patrol mode, and reason for public contact and unit are both significant and very strong. When patrol mode within CRU is analyzed, the relationship with reason for contact is not significant, although the effect size is moderate.

Subjects were asked to rank their contact with the public based on their current job assignment using an ordinal scale. When a measure of association is conducted between ranking of public contacts and patrol mode the relationship is weak and non-significant ($V = .19, p = .12$). When this is done for CRU officers only, the results are similar ($V = .2, p = .52$), as with unit ($V = .2, p = .08$). Following testing of the proportional odds assumption – or the assumption that the relationship between each response category and all other response categories are equivalent – ordinal logistic regression is used to determine how patrol style predicts officer ranking of public contact, controlling for officer-level predictors (gender, race/ethnicity, years as officer). See Table 5. Unit is not included here due to nested data violating the assumption that units of analysis are independent observations. While the effect size is strong for patrol mode, the results are non-significant ($OR = 1.84, p = .10$). The only significant predictor is race/ethnicity, indicating that being white decreases the odds of selecting a very positive ranking of contacts over the combination of each of the three lower categories by 55% ($OR = .45, p = .04$). When this same model is run with only CRU officers, patrol mode retains a sizable odds, but is non-significant ($OR = 1.37, p = .55$).

Table 5. Cross-tabulations rank contact with public.

Rank contact with public	Patrol mode total			Unit			Patrol mode within CRU		
	N(%)	Bicycle	Motor vehicle	N(%)	CRU	PRU	N(%)	Bicycle	Motor vehicle
Very negative	2(1)	1(2)	1(1)	2(1)	1(1)	1(1)	1(1)	1(2)	0(0)
Somewhat negative	27(16)	2(5)	25(20)	27(16)	6(8)	21(21)	6(9)	2(5)	4(15)
Somewhat positive	101(60)	26(63)	75(59)	103(60)	42(59)	61(60)	41(60)	26(63)	15(56)
Very positive	39(23)	12(29)	27(21)	41(24)	22(31)	19(19)	20(29)	12(29)	8(30)
Total	169(100)	41(100)	128(100)	173(100)	71(100)	102(100)	68(100)	41(100)	27(100)
<i>p</i>		.12			.08			.52 (Fisher's Exact)	
<i>V</i>		.19			.2			.2	

Table 6. Ordered logistic regression rank contact with public.

	Model 1: Patrol mode total		Model 2: Patrol mode within CRU	
	Coeff(SE)	Exp(b)	Coeff(SE)	Exp(b)
<i>Predictors</i>				
Patrol mode (Bicycle = 1)	.61(.37)	1.84(.68)	.31(.52)	1.37(.71)
Gender (Man = 1)	-.15(.39)	.86(.34)	-1.2(.67)	.3(.2)
Race/Ethnicity (White = 1)	-.79(.38)*	.45(.17)	-.7(.59)	.5(.3)
Years as officer	-.01(.02)	.99(.02)	.02(.04)	1.02(.04)
<i>Model fit</i>				
Deviance(df)		304.22(7)		119.26(7)
AIC		318.22		133.26
BIC		339.79		148.48

* $p < .05$.

Officer perception of job performance

Two generalized SEMs using ordinal logistic regression are run using crime control and procedural justice as latent concepts; first with patrol mode being an exogenous predictor, then officer unit (see Table 6). In both models the first of the observed variables for each latent concept are constrained at 1 and these variables set the direction for the latent concepts; meaning because the question 'Do you believe the unit in which you currently work does a good job, an average job, or a poor job of supplying information to the public on ways to reduce crime?' was reverse coded so that 3 = good job, the crime control latent variable measures a positive perspective of police with regard to crime control.

The SEM models produce results for the crime control and procedural justice latent variables, as well as for each observed variable that make up their respective latent concept. For the first model, which contains mode of patrol as an exogenous predictor, officers whose primary mode of patrol is bicycle have more positive perspectives of both crime control and procedural justice – although these findings are non-significant. The variable measuring *perceived officer performance of officers in their unit on ensuring the safety of the citizens in their division* is the largest statistically significant contributor to the crime control latent concept. On this measure the average difference in crime control perceptions for motor vehicle and bicycle patrol is 1.53 (.96*1.59), with bicycle patrol officers being 1.53 standard deviations to the right of motor vehicle patrol on average. In other words, bicycle patrol officers are more likely to rate higher on this—and each of the other observed measures of crime control—compared to motor vehicle patrol officers. Of the observed measures of the procedural justice latent variable only the belief that officers in their unit treat citizens fairly is significant. On this measure the average difference in the procedural justice latent variable for motor vehicle and bicycle patrol is 1.39 (1.13*1.23), thus bicycle patrol officers are more likely to rate higher than motor vehicle patrol on their belief that citizens are treated fairly by officers in their unit.

In the unit model, CRU officers have more positive perspectives of both crime control and procedural justice, generally. In this case the effect of unit on crime control is small and non-significant, but the effect of unit on procedural justice is significant and large. Among observed measures of crime control, ensuring the safety of citizens again has the largest statistically significant effect size. Among procedural justice measures, officer perceptions that fellow officers in their unit are polite to people in the neighbourhood has the largest statistically significant effect size. CRU officers on average are more likely to believe that officers in their unit are polite to people in the neighbourhood. A similar model that includes patrol mode for CRU officers only cannot be run due to a lack of observations. As

Table 7. Generalized structural equation models officer perceptions job performance.

	Model 1: Patrol Mode Total		Model 2: Unit	
	Coeff(SE)	Exp(b)	Coeff(SE)	Exp(b)
<i>Crime control</i>				
Supplying information	1	2.73	1	2.72
Enforcing laws	.94(.31)**	2.56(.79)	.9(.3)**	2.47(.74)
Ensuring safety	1.59(.65)*	4.9(3.16)	1.46(.57)*	4.3(2.45)
Preventing crime	.88(.27)**	2.42(.64)	.84(.26)**	2.32(.6)
Patrol mode (Bicycle = 1)	.96(.58)	2.61(1.52)		
Unit (CRU = 1)			.59(.5)	1.81(.9)
<i>Procedural justice</i>				
Approachable	1	2.72	1	2.72
Polite	1.42(.79)	4.16(3.27)	1.34(.67)*	3.82(2.58)
Treat fairly	1.23(.59)*	3.43(2.01)	1.32(.63)*	3.77(2.37)
Patrol mode (Bicycle = 1)	1.13(.78)	3.09(2.42)		
Unit (CRU=1)			1.38(.65)*	3.99(2.61)
<i>Model fit</i>				
Deviance(df)		1172.42(23)		1195(23)
AIC		1218.42		1240.99
BIC		1290.95		1314.17

* $p < .05$; ** $p < .01$.

an alternative, the principal components analysis standardized scores are saved to create procedural justice and crime control scale variables. Ordinary least squares is run for each scale using patrol mode for CRU officers-only as the central predictor, controlling for officer-level variables. No coefficients in the model are significant and effect sizes are negligible (Table 7).

Discussion

Findings of this study provide support for bicycle patrol combined with a specialized COP unit as a means of achieving each mandate of COP. Officers deployed on bicycles reported engaging with the public over seven more times per shift than officers deployed within motor vehicles. Prior research has found foot patrol to provide similar benefits. However, a noted shortcoming of foot patrol is the limited geography officers can cover on a walking beat, and the slow response time to incidents of concern. While such limitations do not seem to impede upon crime reduction effects of foot patrol in certain instances (Andresen & Lau, 2014; Novak et al., 2016; Piza & O'Hara, 2014; Ratcliffe et al., 2011), deploying officers on bicycles expands officer coverage and decreases response time while maintaining the community engagement benefits. Cross-tabulations provided further insight into the nature of these public contacts. Overall, the findings show that CRU officers engage with the public for a wide variety of reasons and officers on bicycles more often generate interactions with community members, both as non-law enforcement contacts and as proactive police enforcement. The wide variety of reasons for contact with the public points to the fact that the COP unit found within the TPS has been successful at decentralization and allowing officer discretion in duties. These findings also suggest that bicycle patrol may provide mechanisms for crime control in addition to community engagement given recent research finding that focused, proactive enforcement can lead to crime prevention (Weisburd & Eck, 2004). This is further supported by the findings on officer perception of job performance related to crime control, which points to bicycle patrol officers rating higher on each of the observed crime control measures compared to motor vehicle. Additionally, officers with a CRU mandate relegated to motor vehicle patrol due to environmental restrictions were less likely to engage in proactive policing. While non-significant, this finding further points to the value of bicycle patrol as a community engagement and problem solving tool.

While frequency of citizen contacts differed across patrol mode, officer assessment of the quality of contacts across patrol mode or unit assignment was non-significant. Interestingly, race was the only variable to achieve statistical significance in the 'quality of contact' model, with white officers being less likely to report citizen contacts as positive. While not the main purpose of our analysis, this finding contributes to research on the officer race hypothesis, which postulates that minority residents will have more favorable views of police when police forces employ higher numbers of minority officers. A recent study by Brunson and Gau (2015) did not find support for this hypothesis, with macro-level socioeconomic disadvantage being significantly related to citizen perceptions of officers and citizen race having null effects. This suggests that socioeconomic conditions of neighborhoods may have more effect on citizen perceptions of police than an individual's race. Findings of the current study conversely raise the possibility that race may be an important consideration when viewing police/community relations from the officer's perspective. This observation is somewhat speculative, as testing the officer race hypothesis was beyond the scope of this study. We encourage criminologists to directly explore this issue in future research.

Regarding perceptions of procedural justice, mode of patrol did not exhibit significant effects. However, significant findings were observed for unit, with CRU officers being significantly more likely to report positive perceptions of the level of procedural justice in their unit. Taken together with the prior findings, this observation may have important implications for community policing. Deploying officers on bicycles increased contact with citizens, but may not have influenced perceptions of procedural justice based on several measures. However, assignment to a unit with a COP mandate (i.e., CRU) produced more positive perceptions of procedural justice. This suggests the importance of upper management communicating the benefits of community driven policing to rank-and-file police

officers delivering these services. Indeed, the TPS's (2016a) interim report by the TPS Transformational Task Force (a team within the TPS charged with identifying evolving areas of need as related to law enforcement within Toronto's contemporary landscape) emphasizes the importance of COP philosophies to the agency.

Despite these implications, this study, like most research, suffers from specific limitations that should be mentioned. For one, we incorporated a purposive sampling method in selecting divisions under study and a convenience sample to select individual officers. The use of a non-probability sample means that our findings are not generalizable to officers across the entirety of the TPS. To review, we selected this sampling technique so that the questionnaire distribution and collection was most manageable for the TPS, as our sponsor volunteered his time in assisting the research team. While concerning, the sampling method coupled with the use of questionnaire research, is not unusual. In fact in this journal's annual review of trends in police research, Mazeika et al. (2010) found that of the 522 publications selected for their 2007 systematic review, 32% were correlation or survey studies and only 12% were outcome studies. These results actually mark an 8% decrease in the use of correlation or survey studies since the annual review began in 2000 (Beckman, Lum, Wyckoff, & Larsen-Vander Wall, 2003). There are myriad reasons for this lack of rigorous research in policing. In this case the use of a more rigorous probability sample was not possible given the resource constraints of the research team and our desire to inconvenience our TPS sponsor, and TPS as an organization, as little as possible in order to preserve rapport for future research partnerships. The implication of using complex samples on results varies by statistical test and how divergent the sample is from a simple random sample, and we cannot know when a non-probability sample will be problematic. According to Bollen, Tueller, and Oberski (2013, p. 4), when it comes to SEM, for example 'The impact can range from nearly correct estimates ... to severely biased parameter estimates. One unanswered question is when the results assuming simple random sampling will be robust to complex sampling.' As such we urge researchers to build upon our approach by incorporating probability sampling techniques so as to allow research findings to be generalizable to the host police agency. Additionally, as a result of our sampling technique, ensuring a high response rate posed a challenge. There may be selection bias occurring, with a larger sample size resulting in a very different picture of community engagement. Another limitation of note is that fact that unit could not always be accounted for in models containing patrol mode as the central predictor variable. Similarly, separate analyses for the CRU-only sample was at times problematic due to sample size issues. For example in determining officer ranking of public contact by patrol mode unit was not included due to the nested nature of the data, and CRU-only analyses for procedural justice and crime control were not possible due to sample size. While efforts were made to tease out these relationships, such as excluding PRU officers from models or utilizing alternative methods such as principal components analysis, ultimately the moderating effect of unit on various outcomes when patrol mode is the central predictor remains somewhat unclear.

Conclusion

Despite limitations, we consider this work to be a welcome contribution to the COP literature. The work has shown that bicycle patrol officers report engaging with the public more often than do officers deployed within motor vehicles. Officers on bicycles also generate interactions with community members as both non-law enforcement and as proactive police enforcement. This research measures important aspects of COP, such as community engagement and procedural justice, from the police officers' perspective, and it adds an additional case study to the still-developing literature on bicycle patrol. Given the paucity of such research we project continued study into the value of this non-motor vehicle patrol style to achieve both tenets of COP, as well as for crime control purposes. Additionally, we advocate for future research that more readily measure the key tenets of community policing from the officers' perspective.

Notes

1. Specialized operations such as mounted and marine units were not included in this study due to the fact that they are not generally deployed based on division, but rather on an *ad hoc* basis as needed. As such including them would have dramatically complicated the current sampling strategy.
2. When building a 'multiple indicators, multiple causes' measurement model, the assumption is ultimately that the observed variables are caused by the latent construct, and the latent construct is caused by the exogenous variable(s). Despite this assumption in model building, in the interpretation the direction is reversed. That is, latent constructs depend on the observations that combine to create them.
3. Several measures used in this study relate to the organization rather than individuals. This approach was taken in the hopes of eliciting more truthful responses on questions that may be perceived as sensitive in nature. When speaking about organizational culture rather than personal behaviours the risk of social desirability of responses is lessened. This is similar to the way in which Weisburd et al. (2001) worded many of their questions on police abuse of power.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

- Andresen, M. A., & Lau, K. C. Y. (2014). An evaluation of police foot patrol in Lower Lonsdale. *British Columbia. Police Practice and Research*, 15, 476–489.
- Barclay, P., Buckley, J., Brantingham, P. J., Brantingham, P. L., & Whin-Yates, T. (1997). Preventing auto theft in commuter lots: A bike patrol in Vancouver. In R. Clarke (Ed.), *Situational crime prevention. Successful case studies* (p. 143–156). Monsey, NY: Criminal Justice Press.
- Bayley, D. (1992). *The best defence*. Washington, DC: Police Executive Research Forum.
- Beckman, K., Lum, C., Wyckoff, L., & Larsen-Vander Wall, K. (2003). Trends in police research: A Cross-sectional analysis of the 2000 literature. *Police Practice and Research: An International Journal*, 4, 79–96.
- Bollen, K. A., Tueller, S. J., & Oberski, D. (2013). Issues in the structural equation modeling of complex survey data. Retrieved from <http://www.statistics.gov.hk/wsc/STS010-P1-S.pdf>
- Bowers, W. J., & Hirsch, J. H. (1987). Impact of foot patrol staffing on crime and disorder in Boston: An unmet promise. *American Journal of Police*, 6, 17–44.
- Britt, C., & Weisburd, D. (2010). Logistic regression models for categorical outcome variables. In A. Piquero, & D. Weisburd (Eds.), *Handbook of Quantitative Criminology* (pp. 649–682). New York, NY: Springer.
- Brown, J. (1998). Gender differences in police officers attitudes toward rape: Results of an exploratory study. *Crime and Law*, 4, 265–279.
- Brunson, R. K., & Gau, J. M. (2015). Officer race versus macro-level context: A test of competing hypotheses about black citizens' experiences with and perceptions of black police officers. *Crime & Delinquency*, 61, 123–242.
- Byxhe, F. R., & Carlan, P. E. (2001). The neighborhood enhancement team: Contemporary initiatives in community-oriented policing. *Journal of Police and Criminal Psychology*, 16, 11–19.
- Calgary Police Service. (2016). *Calgary Police Service history*. Retrieved from <http://www.calgary.ca/cps/Pages/Calgary-Police-Service-history.aspx>
- Carlan, P. (2009). A contemporary snapshot of policewoman attitudes. *Women and Criminal Justice*, 9, 60–79.
- CBC News. (2016, February 24). Honouring Toronto's first bike patrol, after 27 years. *Canadian Broadcasting Corporation*. Retrieved from <http://www.cbc.ca/news/canada/toronto/programs/metromorning/toronto-police-bike-patrol-1.3460510>

- CBC Radio. (1981, February 15). Aftermath of the Toronto bathhouse raids. *Canadian Broadcasting Corporation*. Retrieved from <http://www.cbc.ca/archives/entry/the-toronto-bathhouse-raids>
- Cordner, G. (2005). Community policing. Elements and effects. In R. G. Dunham, & G. P. Alpert (Eds.), *Critical issues in policing. Contemporary readings*. (5th ed., pp. 401–418). Long Grove, IL: Waveland Press.
- Cordner, G. (2010). *Reducing fear of crime: Strategies for police*. Washington, DC: US Department of Justice, Office of Community Oriented Policing Services.
- CTV News Ottawa. (2014, July 3). Ottawa Police bike patrol shows off its pedal power. CTV. Retrieved from <http://ottawa.ctvnews.ca/ottawa-police-bike-patrol-shows-off-its-pedal-power-1.1898075>
- Page, A. D. (2008). Gateway to reform? Policy implications of police officers' attitudes toward rape. *American Journal of Criminal Justice*, 33, 44–58.
- Gill, C., Weisburd, D., Telep, C. W., Vitter, Z., & Bennett, T. (2014). Community-oriented policing to reduce crime, disorder and fear and increase satisfaction and legitimacy among citizens: A systematic review. *Journal of Experimental Criminology*, 10, 399–428.
- Green, J. R., & Mastrofski, S. D. (Eds.). (1988). *Community policing: Rhetoric or reality*. New York, NY: Praeger.
- Hickman, M. J., & Reaves, B. A. (2003). *Community policing in local police departments, 1997 and 1999*. (Bureau of Justice Statistics Publication No. NCJ 184794). Washington, DC: U.S. Department of Justice.
- Hornick, J. P., Burrows, B. A., Phillips, D. M., & Leighton, B. (1991). An impact evaluation of the Edmonton neighbourhood foot patrol program. *The Canadian Journal of Program Evaluation*, 6, 47–70.
- Hough, M., & Roberts, J. V. (2004). *Confidence in justice: An international review*. London: King's College.
- Huey, L., & Ricciardelli, R. (2016). From seeds to orchards: Using evidence-based policing to address Canada's policing research needs. *Canadian Journal of Criminology and Criminal Justice*, (January), 119–131.
- Kelling, G. L. (1981). *The Newark foot patrol experiment*. Washington, DC: Police Foundation.
- Kelling, G. L., & Coles, C. M. (1996). *Fixing broken windows: Restoring order and reducing crime in our communities*. New York, NY: Touchstone.
- Kelling, G. L., Pate, A. M., Dieckman, D., & Brown, C. E. (1974). *The Kansas City preventive patrol experiment: Summary report*. Washington, DC: Police Foundation.
- Krivo, L. J., Peterson, R. D., & Kuhl, D. C. (2009). Segregation, racial structure, and neighbourhood violent crime. *American Journal of Sociology*, 114, 1765–1802.
- Lundälv, J., Gärder, P., Risser, R., & Leden, L. (2008). Police cycle-patrols in Finland: A qualitative study applying the diamond model. *The Police Journal*, 81, 323–335.
- MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology*, 51, 201–226.
- Mastrofski, S. (2006). Community policing: A skeptical view. In D. Weisburd & A. A. Braga (Eds.), *Police innovation: Contrasting perspectives* (pp. 44–73). New York, NY: Cambridge University Press.
- Mazeika, D., Bartholomew, B., Distler, M., Thomas, K., Greenman, S., & Pratt, S. (2010). Trends in police research: A cross-sectional analysis of the 2000–2007 literature. *Police Practice and Research*, 11, 520–547.
- Mazerolle, L., Bennett, S., Davis, J., Sargeant, E., & Manning, M. (2013). *Legitimacy in policing: A systematic review. Campbell systematic reviews*. Oslo: The Campbell Collaboration. doi:10.4073/csr.2013.1
- Menton, C. (2008). Bicycle patrols: An underutilized resource. *Policing: An International Journal of Police Strategies & Management*, 31, 93–108.
- Murphy, K., Hinds, L., & Fleming, J. (2008). Encouraging public cooperation and support for police. *Policing and Society*, 18, 136–155.
- Novak, K. J., Fox, A. M., Carr, C. M., & Spade, D. A. (2016). The efficacy of foot patrol in violent places. *Journal of Experimental Criminology*, 12, 465–475.
- Oliver, W. (1998). *Community-oriented policing: A systemic approach to policing*. Upper Saddle River, NJ: Prentice Hall.
- Page, A. D. (2007). Behind the blue line: Investigating police officers' attitudes toward rape. *Journal of Police and Criminal Psychology*, 22, 22–32.
- Petrocelli, M., Oberweis, T., Smith, M. R., & Petrocelli, J. (2014). Assessing police attitudes toward drugs and drug enforcement. *American Journal of Criminal Justice*, 39, 22–40.
- Piza, E., & O'Hara, B. (2014). Saturation foot-patrol in a high-violence area: A quasi-experimental evaluation. *Justice Quarterly*, 31, 693–718.
- Police Services Act of Ontario, Revised Statutes of Ontario, 2015, c. P.15. Retrieved from <https://www.ontario.ca/laws/statute/90p15>
- Poteveva, M., & Sun, I. Y. (2009). Gender differences in police officers' attitudes: Assessing current empirical evidence. *Journal of Criminal Justice*, 37, 512–522.
- Putnam, R. D. (1995, June). Bowling alone: America's declining social capital. *Current*, 373, 3–7.
- Ratcliffe, J. H., Taniguchi, T., Groff, E. R., & Wood, J. D. (2011). The Philadelphia foot patrol experiment: A randomized controlled trial of police patrol effectiveness in violent crime hotspots. *Criminology*, 49, 795–831.
- Reaves, B. A. (2010). *Local police departments, 2007* (Bureau of Justice Statistics Publication No. NCJ 231174). Washington, DC: U.S. Department of Justice.

- Reaves, B. A. (2015). *Local police departments, 2013: Personnel, policies, and practices* (Bureau of Justice Statistics Publication No. NCJ 248677). Washington, DC: U.S. Department of Justice.
- Sampson, R. J., Raudenbush, S., & Earls, F. (1997). Neighborhoods and violence crime: A multilevel study of collective efficacy. *Science*, 277, 918–924.
- Slocum, L. A., Taylor, T. J., Brick, B. T., & Esbensen, F. (2010). Neighbourhood structural characteristics, individual-level attitudes, and youths' crime reporting intentions. *Criminology*, 48, 1063–1100.
- Sindall, K., McCarthy, D. J., & Brunton-Smith, I. (2017). Young people and the formation of attitudes towards the police. *European Journal of Criminology*, 14, 344–364. doi:10.1177/1477370816661739
- Skogan, W. G. (1990). *Disorder and decline: Crime and the spiral decay in American cities*. New York, NY: The Free Press.
- Skogan, W. G. (2006). The promise of community policing. In D. Weisburd & A. A. Braga (Eds.), *Police innovation: Contrasting perspectives* (pp. 27–43). New York, NY: Cambridge University Press.
- Skogan, W. G., & Frydl, K. (Eds.). (2004). *Fairness and effectiveness in policing: The evidence. Committee to review research on police policy and practices. Committee on law and justice, division of behavioral and social sciences and education*. Washington, DC: The National Academies Press.
- Sobol, J. J. (2010). The social ecology of police attitudes. *Policing: An International Journal of Police Strategies & Management*, 33, 253–269.
- Suhr, D. (n.d.). *Step your way through path analysis*. Cary, NC: SAS Institute.
- Shunshine, J., & Tyler, T. (2003). The role of procedural justice and legitimacy in shaping public support for policing. *Law & Society Review*, 37, 513–548.
- Toronto Police Service (2015). *The neighbourhood officer: 14 Division Community Response Unit* [unpublished training manual]. Toronto, ON: Toronto Police Service.
- Toronto Police Service. (2016). The way forward: Modernizing community safety in Toronto: Interim report. Retrieved from http://www.torontopolice.on.ca/TheWayForward/docs/report_full.pdf
- Trojanowicz, R. (1982). *Evaluation of the neighborhood foot patrol program in Flint, Michigan*. East Lansing, MI: School of Criminal Justice, Michigan State University.
- Trojanowicz, R. C., & Banas, D. W. (1985). *Impact of foot patrol on black and white perceptions of policing*. East Lansing, MI: Michigan State University, The National Center for Community Policing.
- Weisburd, D., & Eck, J. (2004). What can police do to reduce crime, disorder, and fear? *Annals of the American Academy of Political and Social Science*, 593, 42–65.
- Weisburd, D., Greenspan, R., Hamilton, E. E., Bryant, K. A., & Williams, H. (2001). *The abuse of police authority: A national study of police officers' attitudes*. Washington, DC: Police Foundation.
- Wilson, O. W. (1963). *Police administration*. New York, NY: McGraw-Hill.